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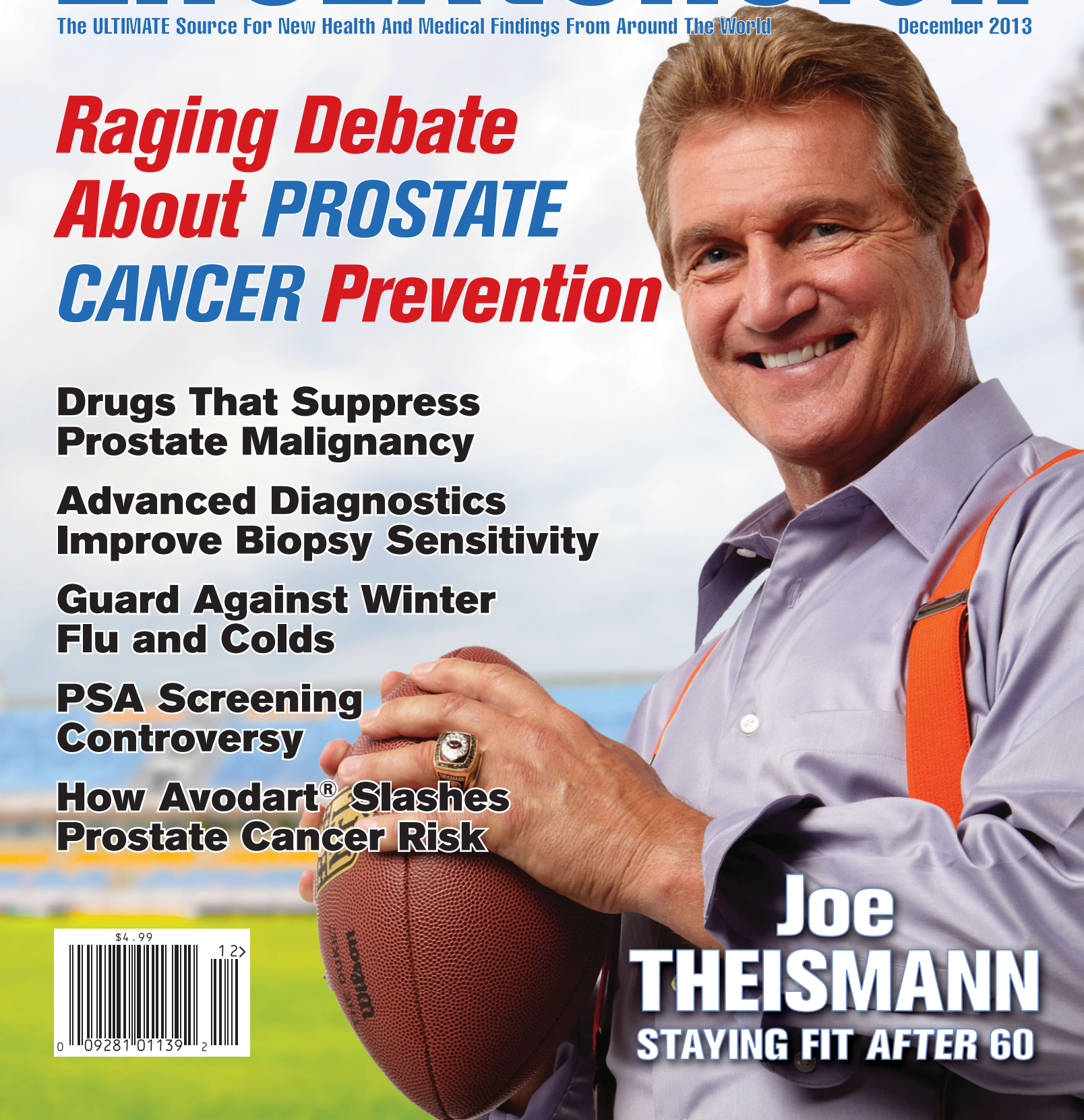
December 2013

Raging Debate About PROSTATE CANCER Prevention



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References

1. *J Ethnopharmacol*. 2007 Jan 19;109(2):177-206.
2. *Eur J Nutr*. 2003 Jan;42(1):18-28.
3. *J Infl amm (Lond)*. 2009;6:1.
4. *Altern Med Rev*. 2008 Jun;13(2):128-44.
5. *Chem Pharm Bull (Tokyo)*. 2008 Nov;56(11):1628-31.
6. *Fitoterapia*. 2006 Dec;77(7-8):534-7.

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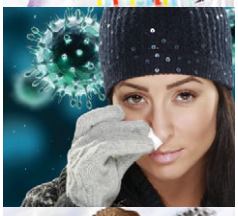

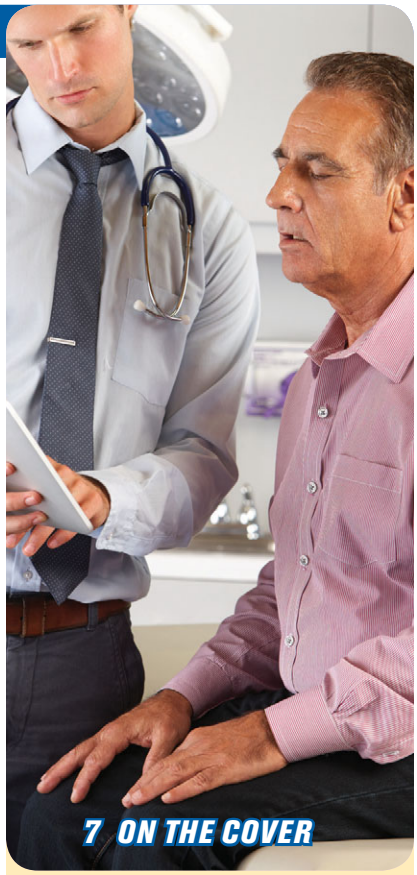

CONTROVERSY SURROUNDS PROSTATE CANCER PREVENTION

Prostate cancer is curable when detected at ***early*** stages. **Proven** methods exist to slash one's risk of developing this common malignancy. Yet conventional medicine is advising men to avoid **PSA screening** and avoid **drugs** that not only reduce prostate cancer incidence, but also relieve urinary miseries. Read ***Life Extension***'s scathing rebuttal to these flawed positions suggesting that men do nothing to guard against this epidemic killer.

DEPARTMENTS

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John Boik, PhD, is the author of two books on cancer therapy, *Cancer and Natural Medicine* (1996) and *Natural Compounds in Cancer Therapy* (2001). He obtained his doctorate at the University of Texas Graduate School of Biomedical Sciences with research at the MD Anderson Cancer Center, focusing on screening models to identify promising new anticancer drugs. He conducted his postdoctoral training at Stanford University Department of Statistics. He is currently president of New Earth BioMed, a nonprofit cancer research corporation that studies mixtures of natural products.

Frank Eichorn, MD, is a urologist specializing in prostate cancer for 10 years. He has a private practice in Bad Reichenhall, Germany, and is prostate cancer consultant at the Urologische Klinik Castringius, Planegg, Munich. In his integrative approach to prostate cancer he is working together with an international network of experts to improve treatment outcomes for prostate cancer patients with a special focus on natural and translational medicine.

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Stanley W. Jacob, MD, is Gerlinger Distinguished Professor, Department of Surgery, Oregon Health and Science University. He has authored 175 scientific articles and 15 books and holds 3 patents, including the initial patent on the therapeutic implications of dimethyl sulfoxide (DMSO).

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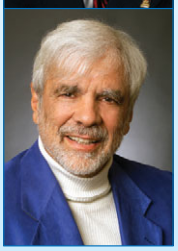
Peter H. Langsjoen, MD, FACC, is a cardiologist specializing in congestive heart failure, primary and statin-induced diastolic dysfunction, and other heart diseases. A leading authority on coenzyme Q10, Dr. Langsjoen has been involved with its clinical application since 1983. He is a founding member of the executive committee of the International Coenzyme Q10 Association, a fellow of the American College of Cardiology, and a member of numerous other medical associations.

Ralph W. Moss, PhD, is the author of books such as *Antioxidants Against Cancer*, *Cancer Therapy*, *Questioning Chemotherapy*, and *The Cancer Industry*, as well as the award-winning PBS documentary "The Cancer War." Dr. Moss has independently evaluated the claims of various cancer treatments and currently directs The Moss Reports, an updated library of detailed reports on more than 200 varieties of cancer diagnoses.

Michael D. Ozner, MD, FACC, FAHA, is a board-certified cardiologist who specializes in cardiovascular disease prevention. He serves as medical director for the Cardiovascular Prevention Institute of South Florida and is a noted national speaker on heart disease prevention. Dr. Ozner is also author of *The Great American Heart Hoax* and *The Miami Mediterranean Diet* (2008, Benbella Books). For more information visit www.drozner.com.



Jonathan V. Wright, MD, is medical director of the Tahoma Clinic in Renton, WA. He received his MD from the University of Michigan and has taught natural biochemical medical treatments since 1983. Dr. Wright pioneered the use of bioidentical estrogens and DHEA in daily medical practice. He has authored 11 books and publishes *Nutrition and Healing*, a monthly newsletter with a worldwide circulation of more than 100,000.

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Vitamin B1	75 mg	1.5 mg
Vitamin B2	50 mg	1.7 mg
Vitamin B6	75 mg	3 mg
Vitamin B12 (as methylcobalamin)	300 mcg	25 mcg
Niacin (as niacinamide)	50 mg	20 mg
Pantothenic acid	100 mg	10 mg
Vitamin E	100 IU (natural)	50 IU (synthetic)
Natural Folate	400 mcg	400 mcg (synthetic)
Zinc	30 mg	11 mg
Selenium	200 mcg	55 mcg
Lutein	5,000 mcg	250 mcg
Lycopene	2,000 mcg	300 mcg
Biotin	300 mcg	30 mcg
Boron	3,000 mcg	150 mcg
Chromium	200 mcg	45 mcg
Molybdenum	100 mcg	45 mcg
Magnesium	100 mg	50 mg
Manganese	2 mg	2.3 mg
Iodine	150 mcg	150 mcg
Potassium	25 mg	80 mg
Vitamin A (as beta-carotene)	4,500 IU	1,000 IU
Vitamin A (preformed)	500 IU	1,500 IU
Choline (as bitartrate)	20 mg	(none)
Inositol	50 mg	(none)
Calcium	12 mg	220 mg
Alpha Lipoic Acid	25 mg	(none)
Natural Mixed Tocopherols	20 mg	(none)

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The chart to the left reveals how much more potent **Two-Per-Day** is compared to the leading commercial multi-vitamin.

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Contains soybeans. Due to the source of the kelp, this product may contain fish and shellfish.

Prostate Cancer Prevention Controversy

BY WILLIAM FALOON

My editorial in the **May 2013** issue of this publication generated quite a bit of feedback and critique.

Some ***Life Extension***® members said it should be a mandatory part of physician education. Others raised concerns about the use of the **PSA** blood test as a **screening** tool, why I suggest **Avodart**® for certain men, and why **drugs** were mentioned since there are **nutrients** that function via similar mechanisms.

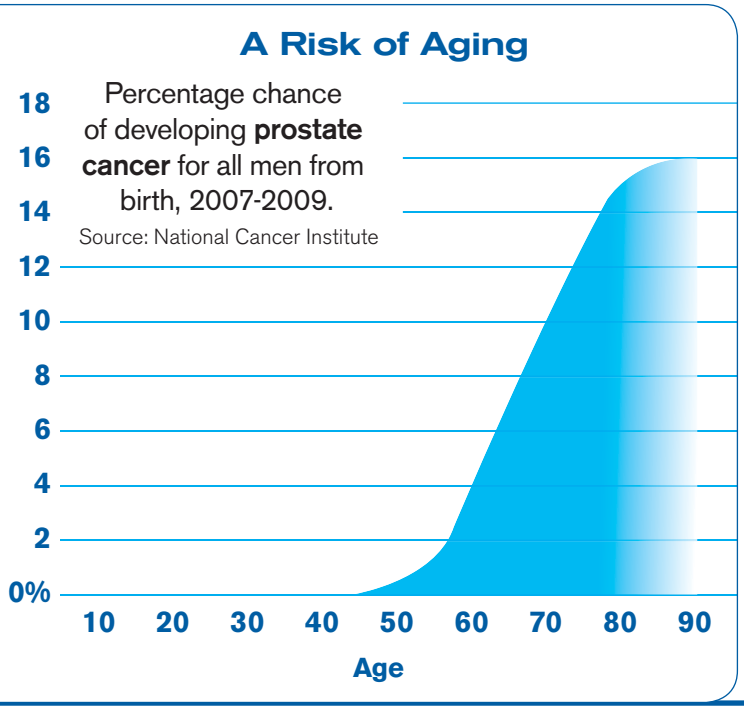
The most impressive critique came from **Patrick C. Walsh, MD**, who may be the most renowned prostate cancer expert in the world. Dr. Walsh was involved in identifying the genetic characteristic of hereditary prostate cancer and pioneered "nerve-sparing" surgery. I have urged hundreds of prostate cancer patients to travel to Johns Hopkins to have **Patrick Walsh** perform their surgery, as I consider him the finest in the world.

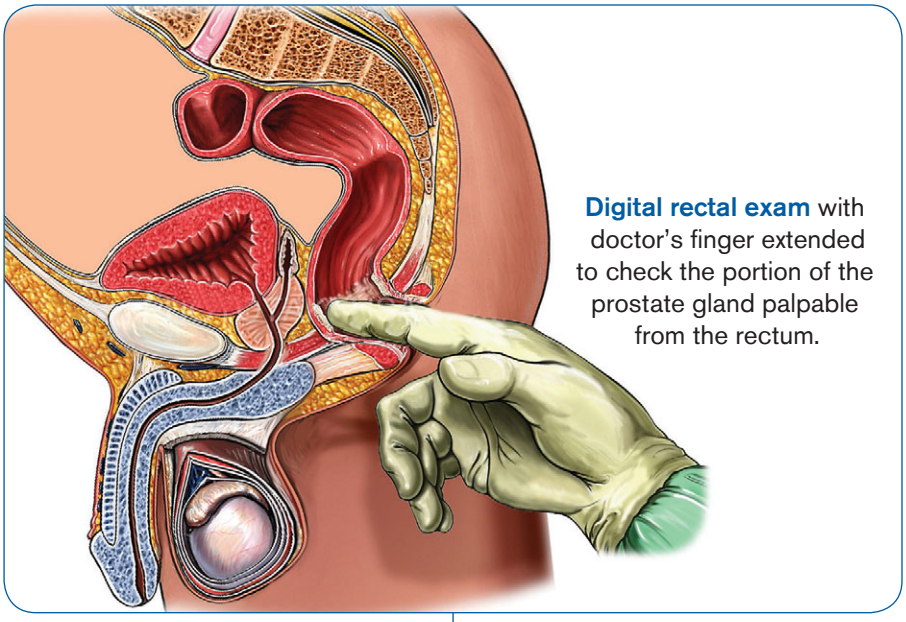
So when Dr. Walsh writes us, I pay attention, and Life Extension members should be informed that there are credentialed individuals that are against using drugs in the class of **Avodart**® for cancer prevention purposes.

Shortly after my editorial was published, the **American Urological Association** issued revised guidelines for **PSA screening**. They now say PSA screening should be mostly considered only for men aged **55-69**.[1] We vehemently disagree with this new recommendation and chastise this group for not emphasizing the need to devise safer and more efficient ways of performing prostate diagnostics.

To emphasize the seriousness of all this, the chart on this page shows the spiraling incidence of prostate cancer that occurs as men age. Autopsy results reveal that **85%** of men have **atypical cells** in their **prostate glands** and **1 in 4** has **cancer**.[2] While many men with atypical lesions or even malignant cells in their prostate do not ever progress to clinical disease, aging men cannot ignore this problem.

The public still accepts absurdly short life spans. We at ***Life Extension*** do not and that is just one reason why our position on prostate cancer ***differs*** from the mainstream. >





Digital rectal exam with doctor's finger extended to check the portion of the prostate gland palpable from the rectum.

There is something to be said about attending live lectures as opposed to staying glued to our computer/TV screens. A good speaker can make an impact that you may forever remember.

I'll never forget a lecture I attended in **1977** at a South Florida condominium social hall. The place was packed with retirees. The lecturer was over age 80 and passionately urged all men to visit a urologist once a year for a ***digital rectal exam***. He began by reading a long list of the names of the many members of his retirement community who had suffered agonizing deaths from **metastatic prostate cancer**.

The lecturer understood that a digital rectal exam would not detect all prostate cancers, but he knew it could save lives. If the **PSA** blood test had been available at that time, I can only imagine how feverish this benevolent speaker would have been in advocating PSA tests to his fellow men.

Move forward **35 years** and the federal government and some mainstream medical groups are recommending against **PSA screening**, which is more reliable than ***digital rectal exams***, though both ideally should be done annually.[1,3]

What Makes Prostate Cancer Different?

Prostate cancer is unusual in that it has a **blood marker** called **prostate-specific antigen (PSA)** that can facilitate ***early*** detection, thereby enabling therapies to be employed before cancer spreads to regional lymph nodes or distant metastases occur.[4]

With the advent and widespread use of **PSA** screening, an argument can be made based on a large human study that huge numbers of men could be spared agonizing deaths from metastatic prostate cancer.[5,6] The earlier diagnosis of prostate cancer, however, must be put into context of the individual patient to ascertain which men need to be treated and which men are reasonable candidates for active surveillance or "watchful waiting."

The journal *European Urology* published a study in **2013** conducted on nearly 35,000 men aged 55-69.[5] This data came from the **European Randomized Study of Screening for Prostate Cancer**, a major, robust study examining the impact of **PSA screening** over a median period of **13 years** on prostate cancer mortality. The eye-opening conclusion was that men who underwent repeated PSA screening were **51%** less likely to die from prostate cancer than men who did not undergo screening.[5] If the statistics from this study are applied to the entire population of men aged 55-69 in the United States, PSA screening could potentially save over **80,000** lives in a 13-year period.[6]

The **United States Preventive Services Task Force** (USPSTF) published a report in **2012** recommending that men stop undergoing **PSA screening**.[3]

Life Extension disagreed with the **USPSTF** recommendation, particularly as it relates to our members to whom we are steadfastly committed. We know that in the absence of PSA screening, prostate cancer will once again be diagnosed at an advanced stage, when there is painful bulky disease and only a small chance of curative therapy.

The widespread use of PSA testing beginning in **1987** enabled doctors to identify prostate cancer at a greatly reduced stage of disease.[7] If the dictum of the **USPSTF** is followed, a major advance in medicine will be erased.

The Staggering Statistics

Here is what the **American Cancer Society** says about **prostate cancer** in the United States:[8]

- About **238,590** new cases of prostate cancer will be diagnosed in **2013**.
- About **29,720** men will die of prostate cancer in **2013**.
- About **1** man in **6** will be diagnosed with prostate cancer during his lifetime.
- The average age at diagnosis is **67**.
- Prostate cancer is the **second leading** cause of cancer **death** among American men.
- About **1** man in **36** will die from prostate cancer.

If **prostate cancer** were an infectious illness, there would be widespread panic. To put this in perspective, **HIV** infected less than **50,000** Americans in 2011.[9]

In **2013**, the **United States Preventive Services Task Force** urged all Americans to undergo routine **HIV screening**.[10]

There are valid reasons for HIV screening, but almost **five times** more Americans are diagnosed with prostate cancer each year compared to HIV.[8,9] The same government-funded **Task Force** that suggests universal **HIV screening** does not want aging men to benefit from ***early detection*** of prostate cancer. They maintain that the treatment is worse than the disease. They confuse the message conveyed by the PSA with the judgment and actions of physicians who too often are programmed toward invasive and expensive therapies.

Do we toss out the baby with the bath water, so to speak, because physicians are not taking the time, or possibly do not have the expertise to advise patients soundly? The actions of the **USPSTF** and the **American Urological Association** should be to fix the deficiency of the physician with strict guidelines, just as was done in the 1980s to alter the routine use of the ***radical mastectomy*** performed in almost every woman diagnosed with breast cancer.[11]

The **United States Preventive Services Task Force** (USPSTF) prefers aging men wallow in ignorance concerning their prostate health, which within the next decade will send death rates spiraling upwards. The **USPSTF** clearly wants aging men to bury their heads in the sand and not concern themselves about prostate cancer.

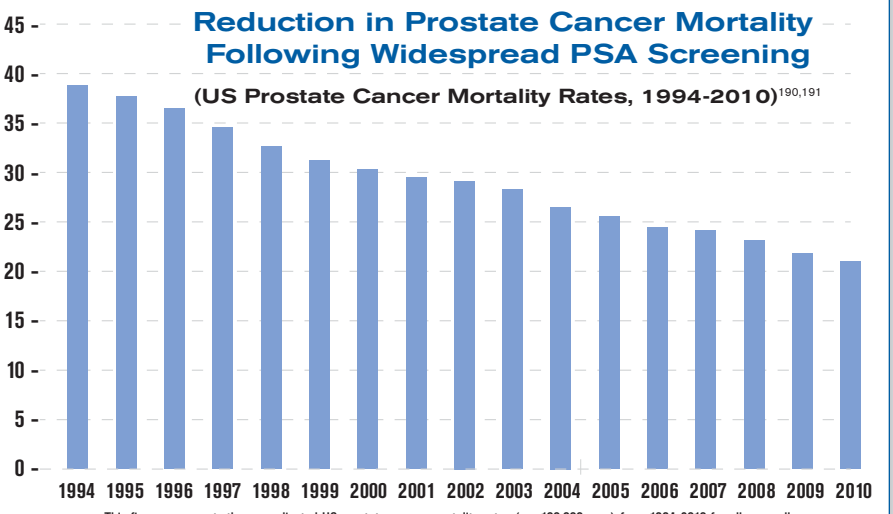
The hard statistics showing more than **238,000** newly diagnosed prostate cancer cases annually proves otherwise.[8] While the USPTF recommendations will save government health programs billions of dollars in the short term, there will be catastrophic long term costs to pay when record numbers of men who could have been cured instead develop metastatic disease.

Why Life Extension Members Are Different

There are factors that influence mainstream recommendations that do not pertain to ***Life Extension*** members. The typical American male over age 60 is remarkably unhealthy, often suffering multiple underlying maladies relating to ***metabolic syndrome*** and other pathologies called "co-morbidities."[12] This is indicative of a state of disease in

Decline in Prostate Cancer Mortality Following Approval of PSA Screening

We at Life Extension are confounded by the US Preventive Services Task Force conclusions that question the value of PSA screening. In 1994, the FDA approved PSA testing as a screening tool for prostate cancer. The graph below, developed from National Cancer Institute data, illustrates the meaningful decline in the US prostate cancer death rate following FDA approval of PSA screening.[190,191]



This figure represents the age-adjusted US prostate cancer mortality rates (per 100,000 men) from 1994-2010 for all ages, all races.
In 1994, the FDA approved the use of the PSA test in conjunction with a digital rectal exam (DER) to test asymptomatic men for prostate cancer.

the biologic environment of the patient.

A frank diagnosis (or indication) of prostate cancer should act as an early warning that something is amiss in the patient's overall health and that further attention is warranted to various systems. Thus a diagnosis of prostate cancer need not be equated with invasive procedures such as radical prostatectomy, radiation therapy, cryosurgery, high intensity focus ultrasound, or androgen deprivation therapy, but with a call to the patient and physician to be alert to pathologic states that if corrected can stabilize or repair some or all of the systems that are amiss.

One reason the **USPSTF** believes that **PSA screening** should be halted is that so many men are already in such poor health they are likely to die of some other cause before prostate cancer becomes clinically relevant.[3]

This is the **opposite** of ***Life Extension*** members, who go to extraordinary efforts to slow aging and protect against degenerative disease. It would be irrational for healthy Life Extension members to stop **PSA screening** merely because their age group on average is in such poor overall health.

Few doctors today have comprehensive programs designed to *reverse* multiple underlying factors that lead to clinically-diagnosed prostate cancer. The typical aging person does not know about lifestyle changes, drugs, and nutrients that may keep an indolent cancer confined to the prostate gland.

Life Extension members have long been armed with this information and have access to health advisors to help guide them to more effective ways of working with their physician to improve their odds of keeping low-grade prostate cancer, or indications of low-grade prostate cancer (such as rising PSA), under control. This issue of ***Life Extension*** magazine is dedicated to reminding members and alerting the public about these novel approaches to disease prevention.

Most urologists believe when PSA reaches a certain level that their only choice is to perform **needle biopsies**. They often overlook existing tests, such as testing and properly analyzing blood results of **free PSA** percentage, **PSA density**, and **PSA velocity**, along with other diagnostics such as **PCA3 urinary test** and advanced non-invasive techniques that can provide additional insight that may reduce the need for invasive procedures.[13-17] Urology patients are not always made aware of these non-invasive choices, and especially of the importance of measuring the PSA rise over time (PSA velocity) to help ascertain if prostate biopsy is warranted.

What clearly separates ***Life Extension*** members from the general public, however, are the aggressive steps we take to achieve meaningful extensions of our healthy life spans. Those advising against PSA screening are largely "writing-off" men over **age 70**.

Huge Decline in Prostate Cancer Deaths Since Advent of PSA Screening

Year	Prostate Cancer Mortality Rate per 100,000
1994	39
1995	37
1996	36
1997	34
1998	33
1999	32
2000	31
2001	30
2002	29
2003	27
2004	26
2005	25
2006	24
2007	24
2008	23
2009	22
2010	21

Life Extension male members need to ensure their **prostate health** is assessed and maintained at an optimal level for the many decades of extended life they expect.

American Urological Association Capitulates

When the United States Preventive Services Task Force suggested that aging men stop PSA screening altogether, the **American Urological Association** disagreed. About a year later, the **American Urological Association** issued revised guidelines that will sharply reduce the number of PSA screenings performed.[1,20,21] And other professional groups have issued similar opinions.[22]

The latest recommendation from the **American Urological Association** (AUA) is for men over age **70** to avoid **PSA screening**.[1] The AUA is essentially saying that once you move past **age 70**, your life span is too short to bother with.

The **American Urological Association** is also writing off men aged **40-54** for prostate screening because of the relative low incidence of cancer in this group compared to men over **54**.[1] This is a tragedy as it condemns younger men who do develop prostate cancer to probable death. Earlier diagnosis provides a huge advantage when attempting curative therapy. Just ask Prostate Cancer Foundation Chairman **Michael Milken**, who insisted on a PSA test at age 46 and discovered he had prostate cancer in time to benefit from curative therapy.[23]

On the flip side are famous people like Frank Zappa, Telly Savalas, Bill Bixby, and other younger men who likely could have identified their prostate cancer earlier had they undergone PSA screening.[24] These men probably had rising PSA levels long before metastatic disease manifested.

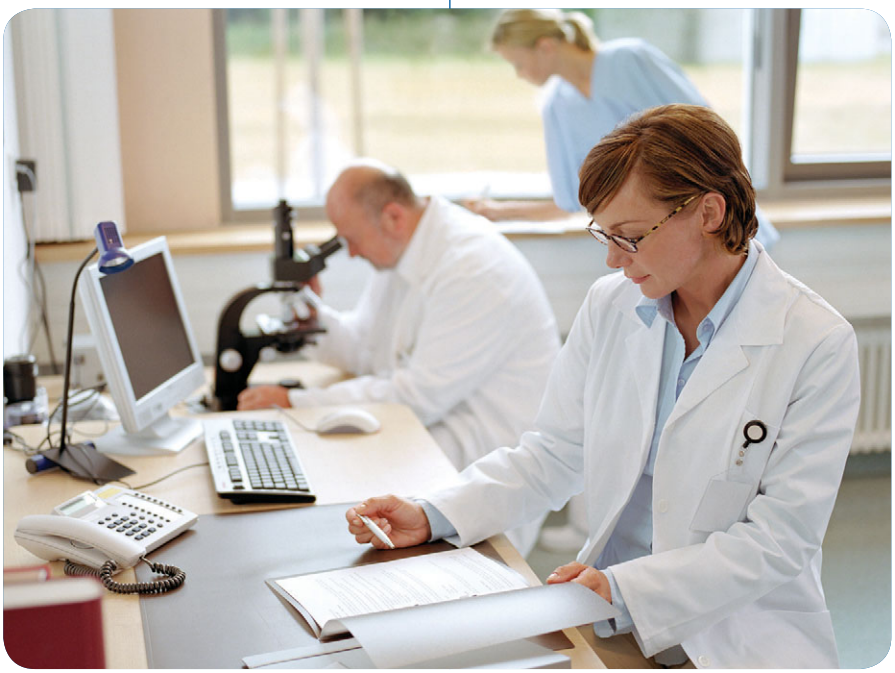
Overlooking More Efficient Procedures

In recommending more limited PSA-screening, the **American Urological Association** is tacitly admitting that conventional diagnostic and early treatment of prostate cancer is so inadequate, or performed so incompetently, that it's better to wait for full-blown ***metastatic disease*** to manifest. Once advanced stage prostate cancer develops, however, treatments are seldom curative.

Instead of looking at physicians who are diagnosing and treating early stage prostate cancer using less invasive procedures and then emulating these skilled artists, the **American Urological Association** has apparently caved in to accepting and promoting mediocrity within their profession.

A big problem is that most urologists are not properly assessing PSA results, nor are they efficiently implementing further diagnostic and treatment protocols. And on the other end of the spectrum are the many men who are promptly sent for ultrasound-guided biopsies after one PSA elevation. And again, to add insult to injury, the biopsies are often not ones targeted to abnormalities within the prostate but merely targeting the prostate as a gland.

It is one issue to biopsy an ultrasound lesion that may represent the needle in the haystack, but it's another issue, and a sad one at that, when it is the haystack that is the target. You know that this is the case when a man has had 2, 3, or 4 prostate biopsies showing no cancer cells, and then he is referred, finally, to a competent physician who uses excellent ultrasound equipment to directly target suspicious lesions within the prostate gland.



In these cases, it seems the diagnosis is magically made; but it's not magic, it is just an issue of a far higher degree of **competence**. All men are not equal in talent and all equipment is not of the same quality. The unfortunate outcome is that too many aging men are being subjected to needless and incompetently administered invasive procedures that sometimes result in unnecessary suffering and premature death.

Instead of recommending that medical professionals upgrade their evaluation and treatment protocols to deliver state-of-the-art technology, the United States Preventive Services Task Force suggests that aging men not undergo PSA screening at all, while the **American Urological Association** limits its recommendation for PSA screening mostly to men **aged 55-69**.[1]

The **media** treats these authoritarian groups as being virtually **infallible**.

Prostate Cancer Not an Isolated Disease

A common mistake made by doctors and patients is thinking that prostate cancer manifests in isolation from other pathological events occurring as a person ages. This is not the case.

Research shows that other serious pathological conditions are frequently seen in prostate cancer patients.[25] These factors involved in prostate malignancy can adversely impact other parts of the body.[26]

For example, ***Life Extension*** has shown one way prostate cancer and coronary atherosclerosis are related is that they are both influenced by the breakdown of **bone**.[27] As an aging man develops osteoporosis, excess calcium released into the blood contributes to arterial ***calcification***.[27] What's lost in the bone ends up in the coronary arteries and other major vessels of the body.[27,28]

These atherosclerotic lesions are not vascular "calcifications" but bone growth or osteogenesis.[28-30] Bone breakdown also releases ***growth factors*** into the blood that promote the proliferation of what may have been indolent prostate cancer cells.[31] Therefore, it should come as no surprise that nutrients that prevent **bone loss** such as **vitamin K2** also inhibit **vascular calcification**.[32,33]

PSA screening thus provides an important clue of a man's overall health, with the advantage of identifying problems ***early*** enough to take effective corrective actions. That's a LOT of benefit for assessing one's prostate gland once a year utilizing **PSA blood testing**.

Where's the Accountability?

The level of ***medical competency*** directly affects the quality and quantity of the lives of others, yet there is not enough monitoring of patient outcomes.

When it comes to treating prostate disease, there needs to be a reporting of serious side effects such as incontinence, impotence, and major blood loss or urethral strictures after a urologist performs a radical prostatectomy.

This kind of **accountability** is relatively non-existent in today's bureaucratic medical environment, though the Internet may eventually enable patients to assess the degree of ***medical competency*** of a physician they entrust their life to.

What Makes Cancer Cells Propagate?

When designing prevention and treatment strategies, ***Life Extension*** focuses on underlying ***mechanisms of disease*** that are fueled by specific ***biological factors*** in the body. This is not perfect science however because you can block one factor involved in tumor development, and cancer cells will use other growth-promoting vehicles to progress.

What we seek to do is stay two steps ahead of the cancer by cutting off its many growth promoters and pathways used to escape eradication. For instance, we know that ***dihydrotestosterone*** (DHT) promotes prostate cell growth (proliferation).[34] This growth affects both benign prostate cells as well as cancerous ones. In the context of a man with prostate cancer, a serial rise in PSA is circumstantial evidence that the tumor cell population is increasing. Such

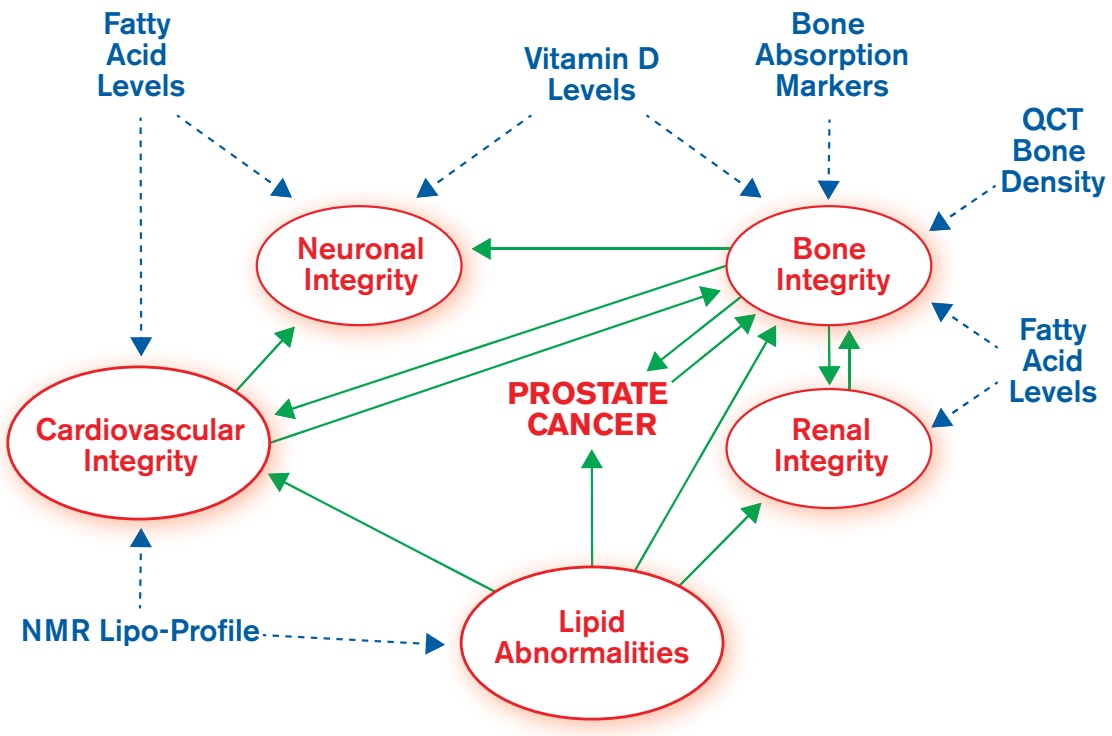
an increase in PSA is not only of importance insofar as prompting investigations to rule out prostate cancer. We have evidence that PSA breaks down natural barriers that keep isolated tumor cells confined to regions within the prostate gland. Remember that PSA is a *serine protease*, an enzyme that breaks down proteins.[35] One such containment protein degraded by PSA is the **extra-cellular matrix**, i.e., the natural barrier that may confine cancer cells within the prostate gland.

But suppressing **DHT** alone is not a total solution. There are other prostate tumor growth promoters such as **insulin**, **estrogen**, **prolactin**, **transforming growth factor beta (TGF-1** and **TGF-2),** and **vascular endothelial growth factor (VEGF)** that also should be brought under control.[36-42] Fortunately, many of the **nutrients** Foundation members already take can help suppress ***growth factors*** used by prostate cancer cells (and other cancers) to proliferate.[43-52]

There are other mechanisms involved in the evolution of a prostate tumor such as ***5-lipoxygenase*** (5-LOX)[53-55] and ***cyclooxygenase-2*** (COX-2)[56] that can be markedly improved by **dietary changes**, along with **curcumin**,[57,58] **fish oil**,[59-61] **boswellia,**[62] **aspirin,**[63] **Zyflamend®,**[64-68] and prescription COX-2 inhibitors like **Celebrex®**.[69,70]

Genetic factors involved in prostate cancer initiation and promotion may be favorably modulated by taking relatively high doses of **vitamin D**.[71,72] Hormonal influences like prolactin and insulin can benefit from using prolactin-suppressing drugs like cabergoline (**Dostinex®**)[73] or Lisuride[74] and the insulin-suppressing drug **metformin**.[75-77]

The overriding goal in reversing any cancer is to induce favorable changes in the ***genes*** that regulate cell proliferation and apoptosis (cell destruction). We know that nutrients like **curcumin**,[78-80] **genistein**,[81-84] **fish oil**,[85,86] and **vitamin D**[87,88] favorably affect genes involved in carcinogenesis, as do drugs like **aspirin,**[89,90] **metformin**,[91-93] **finasteride (Proscar®)**,[94] and **dutasteride (Avodart®)**.[95]



THE WHOLISTIC NATURE OF HEALTH IN RELATION TO PROSTATE CANCER.
As we learn more about specific health issues we see evidence of the interconnectivity of all key processes involved in mind and body functions. This should come as no surprise since this phenomenon characterizes all living entities, from the atom to the universe.

Importance of Food Choices

What one eats (and doesn't eat) makes a huge impact on whether prostate cancer ever develops.[102,103]

Healthier eating patterns also improve the odds of treatment success.[104,105]

A rising PSA level or prostate cancer diagnosis can be the signal that it's time to switch what you eat more towards a **Mediterranean diet** that focuses on fish instead of red meat, whole vegetables instead of glucose-spiking starches/sugars, foods cooked at lower temperatures, and reduced intake of omega-6 fats.[106-108]

Those who pioneered aggressive *dietary changes* to help treat cancer were decades ahead of their time. While it's unlikely that aggressive dietary alterations will cure clinically diagnosed prostate cancer, there are strong mechanistic values to consuming foods/beverages that suppress prostate cancer proliferation (like cruciferous vegetables[109-111] and green tea[112,113]) as opposed to continuing to eat foods that have been related to higher prostate cancer risk such as red meat,[114-116] starches and sugars,[117,118] excess dairy,[115,119-121] and excess omega-6 fats that contribute to a high omega-6:omega-3 ratio.[122,123]

Vitamin D Decreases Gleason Tumor Score

If a ***needle biopsy*** of the prostate detects a malignancy, it will be ***graded*** with a **Gleason score** number as follows:

Under 7 (**low-grade**): Slow growing and not likely to be aggressive.[96] Low-grade prostate cancers are seldom the cause of death in men over age 70, especially those that are in poor health.[97] Low-grade are the majority of prostate tumors found and the ones where "watchful waiting" is often employed in lieu of radical procedures.[97,98]

Over 7 (high-grade): Fast growing, aggressive tumors that require intervention such as radical prostatectomy, radiation, androgen ablation, etc.[96] High-grade prostate tumors make up less than **15%*** of newly diagnosed prostate cancers.[99]

*Caveat: Errors in the pathology lab can result in lethal mistakes, such as issuing a low Gleason score to a high-grade tumor. These errors are discovered when a radical prostatectomy is performed and it is found to have a Gleason score of **8-10** as opposed to a **6** Gleason score found in the biopsied specimen.[100]

A study published in **2012** evaluated a group of men with early-stage prostate cancer who received a **4,000 IU** vitamin D3 supplement each day for a year.[101]

Mean ***25-hydroxyvitamin D*** blood levels at baseline were **32.8 ng/mL** and increased to **66.2 ng/mL** after **vitamin D** supplementation.[101]

After one year, **55%** of the men showed a decrease in tumor sensitive biopsies or a decrease in the **Gleason** tumor score. An additional **11%** showed no change (meaning the cancer had not progressed).

The study also showed that over time, supplementation with vitamin D3 led to a decrease in the number of positive cores taken during prostate biopsies. This is in stark contrast to the untreated control group who experienced an increase in the number of positive cores on repeat biopsies.[101]

Only **34%** of men taking vitamin D progressed compared to **63%** of the control group. This represents a **46%** reduction in the number of men who moved to advancing disease, indicating powerful effects of taking **4,000 IU/day** of vitamin D for one year.

The men in this study had not received any other treatment than **vitamin D** and all were in an ***active surveillance*** program that carefully measured disease progression or regression.

This study showed that just one intervention (**4,000 IU/day/vitamin D**) was able to reverse the clinical course of disease in a significant percentage of these prostate cancer patients.

This study helps validate the importance of **PSA screening**. Had these men not known they had early-stage prostate cancer, they would not have known to take **vitamin D**, and their disease would have likely progressed until symptoms such as **bone pain** manifested.

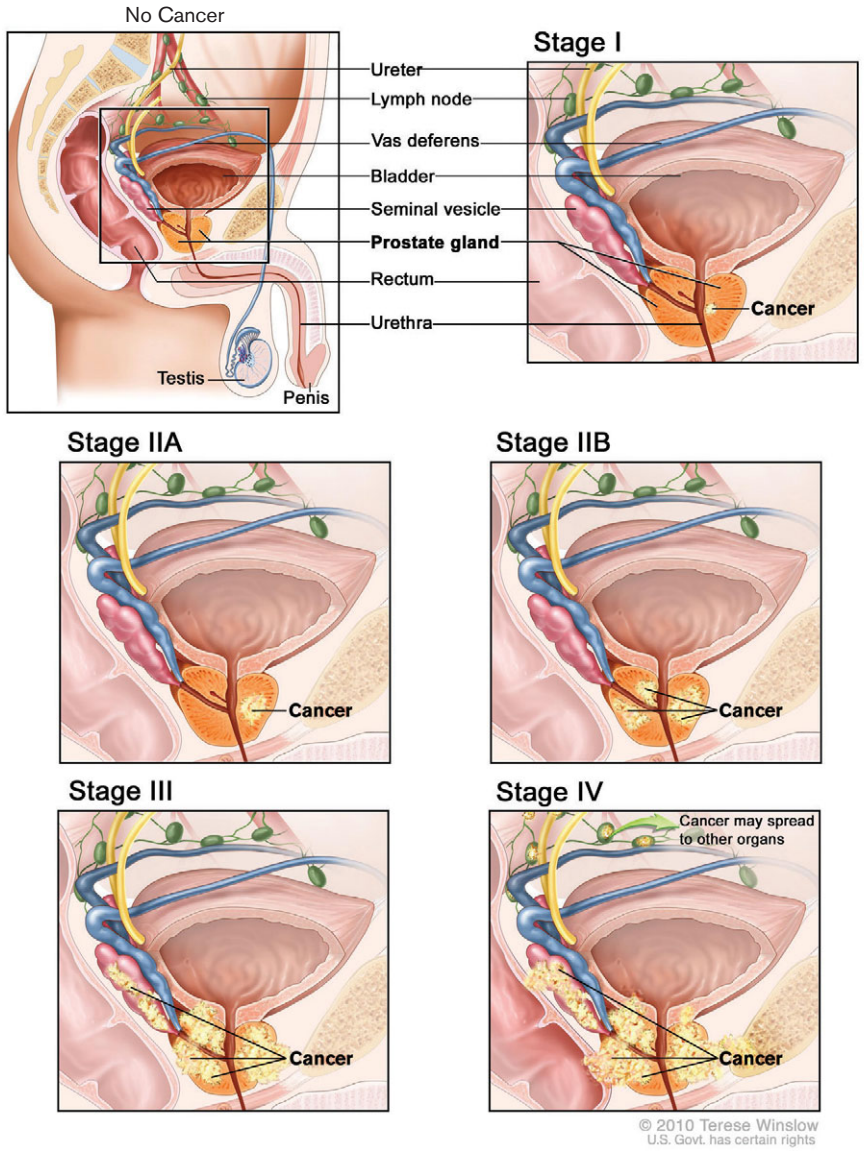
The first article in this month's issue titled, *"**Impact of Diet on Prostate Cancer Risk and Mortality**"* describes foods that promote prostate cancer and which ones protect against it. We explain how consuming the wrong foods can fuel prostate cancer growth, while following healthy dietary choices can reduce the risk that you will develop clinically diagnosed prostate cancer.

Some men instinctively start eating healthier as they mature, but it took a higher **PSA** reading (**1.4 ng/mL**) ten years ago for me to alter my diet in a healthier direction. My diet is not perfect, but it's a huge improvement over what I consumed in my younger years. My last PSA test came in at **0.4 ng/mL**...a **71%** decrease in a ten-year period (PSA levels normally rise with age).

If I had not had my PSA checked annually, I may have continued making poor dietary choices and may have developed prostate cancer by now. My father was diagnosed with it around age 75. He consumed a typical diet for his era, with a daily intake of red meat and high glycemic starches like potatoes, while never touching a vegetable or fruit. He set himself up perfectly to encourage prostate cancer growth and mutation.

Even for those who aren't sure if they are making the proper food choices, laboratory tests like the **Omega Score®** test (a fatty acid profile) enable one to evaluate their diet and supplement program and make changes to optimize health. You are what you eat and what you assimilate does have a bearing on your health.

Five Stages of Prostate Cancer Progression



As prostate cancer progresses from Stage I to Stage IV, the cancer cells grow within the prostate, through the outer layer of the prostate into nearby tissue, and then to lymph nodes or other parts of the body.

A More Rational Approach

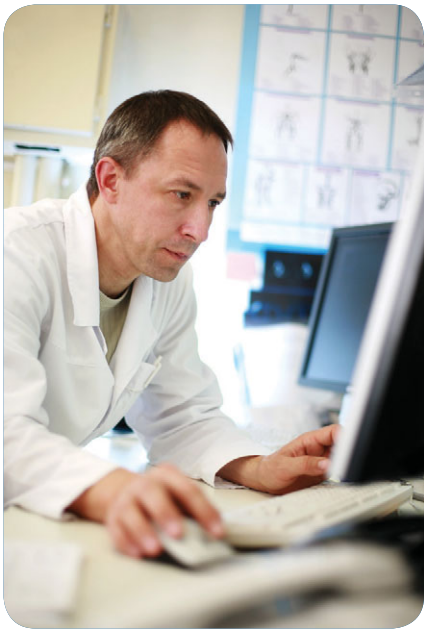
Most prostate tumors are very sensitive to their internal environment or what we prefer to call their "biological milieu." We know this because when ***androgen-deprivation therapy*** is properly administered, PSA levels can drop to near zero and prostate cancer cells die through the process of programmed cell death, a.k.a. **apoptosis**.[124,125]

However, it is not uncommon for prostate cancers to eventually find other ***growth factors*** to fuel their continued proliferation and the anti-proliferative and pro-apoptotic effects of androgen-deprivation therapy wear off, as evidenced by a continuously rising PSA that was once brought down

to below **0.05 ng/mL** by adequately suppressing testosterone.[36-42,125]

When a diagnosis of prostate cancer occurs in the setting of a rising PSA in the lower range (below **4 ng/dL** ideally), ***Life Extension*** views this as an opportunity for early intervention that might result in one's body regaining control over tumor expansion.

We know that the drug **Avodart®** (dutasteride) lowers PSA levels by inhibiting the formation of ***dihydrotestosterone*** (DHT).[126] Avodart® and its less potent cousin Proscar® (finasteride) are 5ARIs (*5-alpha reductase* inhibitors).[127] *5-alpha reductase* is the enzyme that converts testosterone to DHT.[127] The effect of DHT on prostate cancer cell growth is five times greater than that of testosterone.[128] By blocking DHT, drugs like Avodart® and Proscar® provide a unique opportunity to suppress tumor growth. At the same time, comprehensive adjunct protocols can be initiated that are designed to deprive tumor cells of growth factors or fuels, further inhibiting cancer growth and/or invasion.



For example, a recent study found that men taking ***finasteride*** for prostate cancer prevention were far more likely to benefit if they had lower ***estrogen*** levels prior to initiation of treatment with finasteride.[129] This study clearly showed high concentrations of estrogen to be associated with increased cancer risk. So much so that the elevated estrogen neutralized the prostate cancer prevention impact of finasteride. Life Extension has repeatedly warned aging men about the critical need of achieving **estrogen balance**. One reason was our continued observation of high estrogen levels in newly diagnosed prostate cancer patients. Men can easily suppress elevated estrogen levels with *aromatase-inhibiting* therapies.[130]

So in response to a rising PSA and/or other indicators of prostate disease, men have a range of diagnostic options to assess whether there is underlying malignancy and if there is, what may be helping to fuel it (such as elevated DHT or estrogen).

If non-invasive diagnostics indicate malignancy, a **color Doppler ultrasound-guided biopsy** can indicate whether it may be **high-grade** (Gleason score over 7 that requires treatment) or **low-grade** (Gleason score under 7 that may be controlled with comprehensive surveillance/intervention).

Some ***Life Extension*** members choose to attack a rising PSA as if there is already **low-grade** prostate cancer present, especially if they suffer urinary symptoms relating to benign prostate hyperplasia (enlargement). In consultation with their doctor, they may choose to take **0.5 mg** of **Avodart®** daily (though it may not need to be taken every day) and simultaneously introduce an ***arsenal*** of ***mechanistic approaches*** to restrain benign and/or tumor cell propagation and induce benign and/or tumor cell apoptosis.

The use of Avodart® or finasteride can shrink prostate gland volume by **25%** thus relieving benign symptoms, improve the accuracy of a needle biopsy if this diagnostic procedure is needed, and deprive tumor cells of one growth promoter, i.e. DHT.[131,132]

A comprehensive ***arsenal*** of ***mechanistic approaches*** might involve healthy eating, high doses of specific **nutrients** (at least temporarily), **hormone adjustment** aimed at reducing **DHT**, **insulin**, **prolactin** and **estrogen** (but maintaining **free testosterone**[133] in youthful ranges), and drugs like **metformin** and **aspirin**. If

prolactin levels are elevated, the drug **Dostinex**® (carbergoline) can be used to suppress this cancer stimulating pituitary hormone.

I know this paradox has troubled aging men for decades, but according to a number of observations and some published studies, low levels of testosterone seem to predispose men to prostate cancer, including more **high-grade** Gleason score tumors. One explanation is that only low levels of testosterone are needed to convert into excess ***dihydrotestosterone*** (DHT).[125] When prostate cells are deprived of their **free testosterone**, they may mutate to overrespond to other growth vehicles such as estrogen, insulin-like-growth factor, and DHT.[129]

Genetic Tests for Men Undergoing Prostate Biopsy

About half of US men diagnosed with prostate cancer are classified as low-risk by use of conventional measures such as Gleason score (a form of tumor grading), the prostate-specific antigen test (PSA), and a physical exam.[135] Nonetheless, nearly **90%** of these low-risk patients will choose to undergo immediate aggressive treatment such as radical prostatectomy or radiation even though there is less than a **3%** chance of deadly progression.[135]

A new test called **Oncotype DX** is now available to physicians and their patients. It measures the level of expression of **17 genes** across four biological pathways to predict prostate cancer aggressiveness.[135]

Test results are reported as a **Genomic Prostate Score (GPS)** ranging from **0 to 100**; this score is assessed along with other clinical factors to clarify a man's risk prior to treatment intervention.[135] This multigene test can be used in conjunction with the needle biopsy sample taken *before* the prostate is removed, thereby providing the opportunity for low risk patients to avoid invasive treatments. According to the principal investigator of the validation study, "Individual biological information from the Oncotype DX prostate cancer test almost **tripled** the number of patients who can more confidently consider active surveillance and avoid unnecessary treatment and its potential side effects."[135]

The advantage of this test for those who choose the ***comprehensive surveillance program*** utilized by Life Extension members (which involves the use of several drugs, targeted nutrients, and adherence to healthy dietary patterns) is to provide greater assurance the right course of action is being followed.

For information about the **Oncotype DX** test, log on to www.oncotypedex.com.

Prolaris® is another genomic test developed to aid physicians in predicting prostate cancer aggressiveness in conjunction with clinical parameters such as Gleason score and PSA.[136]

Prolaris® measures prostate cancer tumor biology at the molecular level. By measuring and analyzing the level of expression of genes directly involved with cancer replication, Prolaris may be able to more accurately predict disease progression.[136]

Prolaris® is a tool designed to measure the aggressiveness of a patient's cancers to better predict and stratify an individual's relative risk of disease progression within ten years.[136] It may enable physicians to better define a treatment/monitoring strategy for their patients.

Prolaris® claims to be significantly more prognostic than currently used variables and provides unique additional information that can be combined with other clinical factors in an attempt to make a more accurate prediction of a patient's cancer aggressiveness and therefore disease progression.[136]

Prolaris® has been shown to predict clinical progression in four different clinical cohorts, in both pre and post-treatment scenarios.[136]

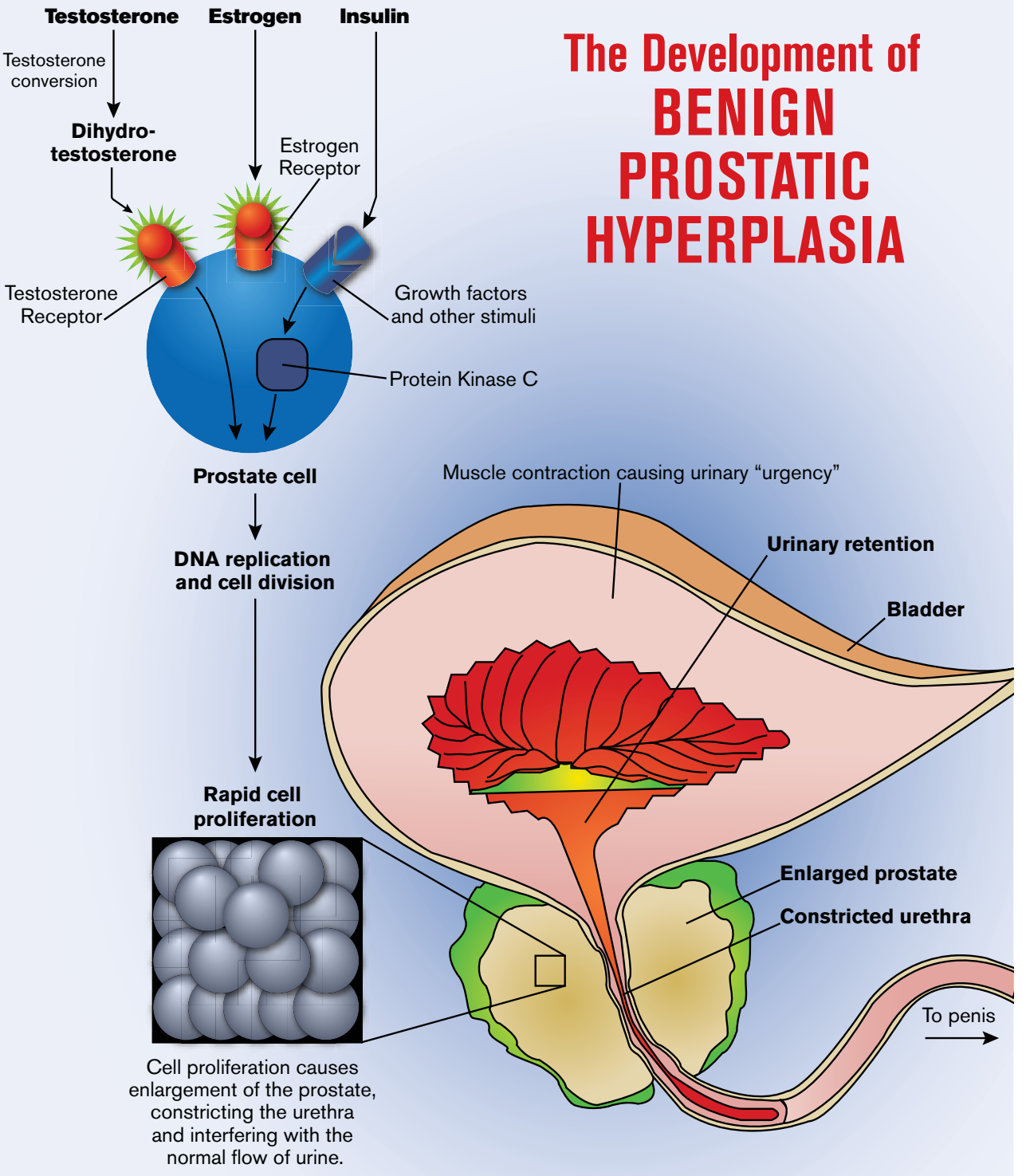
In the treatment of prostate cancer, Prolaris® is prognostic at the point of diagnosis and in the post-surgery setting.[136]

At diagnosis, Prolaris® can help to identify patients with less aggressive cancer who may be candidates for active surveillance. In addition, Prolaris® can define patients who appear clinically low-risk but have a more aggressive disease that requires more aggressive treatment.

Prolaris® testing is also well suited for use in post-prostatectomy patients that have higher risk features after surgery to better estimate their risk of disease recurrence and therefore adjust the level of monitoring or add additional therapy.

For more information about Prolaris®,
log on to the company website: www.myriad.com

The Development of BENIGN PROSTATIC HYPERPLASIA



How Life Extension Differs From the Mainstream

A common approach to dealing with biopsied-confirmed **low-grade** prostate cancer is called "***watchful waiting***." Under this scenario, PSA tests are performed at reasonable intervals and treatment decisions based on indicators of disease progression (or regression).

In the presence of persistently rising PSA and other markers, the patient and their doctor discuss wide ranges of treatment options ranging from surgical removal of prostate gland, different forms of radiation, cryoablation, and/or androgen ablation to temporarily reduce PSA and buy more time. All of these treatment modalities have side effects to consider.

Instead of merely "watching" a PSA rise until risky therapies are required, we at ***Life Extension*** view a **low-grade** prostate cancer (or even a biopsy that reveals no cancer) as an opportunity to intervene aggressively with a multitude of non-toxic approaches that benefit one's overall health. Success or failure is measured by monthly PSA testing, along with other tests to ensure that other growth factors like insulin, estrogen, DHT, and prolactin are being adequately suppressed.

To clarify the point about a no cancer diagnosis, the accuracy of typical initial needle biopsies today is only around **75%**.[134] So if your urologist tells you he has good news, i.e., the biopsy showed no tumor cells in your prostate gland, there may be a **25%** chance you do have tumor cells, thus making the kinds of comprehensive intervention that benefits your entire body a rational choice.

So rather than "***watchfully wait***," as your underlying disease may progress, we suggest **comprehensive intervention**. The objective is to take away every route that enable tumor cells to propagate and escape confinement within the prostate gland.

For those who require a prostate biopsy, there are new (and expensive) **genetic tests** (described on page 17) that may more accurately predict which tumors are aggressive and likely to metastasize and those that are so indolent that only minimal changes may be needed to keep control over them. If these genetic tests prove themselves in the clinical setting (outside the bias of company sponsored clinical trials), intelligently using the results of these tests can spare many men from needless treatments and provide information about genetic mutations to target in prostate cells may enable better long-term control.

Enhanced Diagnostic Procedures

What patients should understand is the diagnosis of prostate cancer per ***ultrasound-guided biopsies*** is also related to the skill of the physician performing the procedure, as well as the nature of the ultrasound (gray-scale *versus* color Doppler). CDU (color Doppler ultrasound) also indicates the degree of vascularity (angiogenesis) of the cancer, which if present is a factor associated with tumor aggressiveness. The more vascular the cancer the more aggressive it is. Dietary approaches, supplements, and medications to reduce angiogenesis should be considered in the arsenal of how we prevent the emergence or evolution of clinically significant prostate cancer.

An additional emerging area that may allow a better understanding of clinically significant prostate cancer and clarify the issue of risk of high-grade prostate cancer with 5-alpha reductase inhibitor drugs like Avodart® and Proscar® involves replacing the transrectal ultrasound of the prostate (TRUSP) with MRI utilizing parameters such as DWI (diffusion weighted imaging) and the associated grading of DWI using the Apparent Diffusion Coefficient (ADC). Studies indicate a much higher specificity for the diagnosis of prostate cancer than TRUSP when DWI and ADC are used together.[154,155]

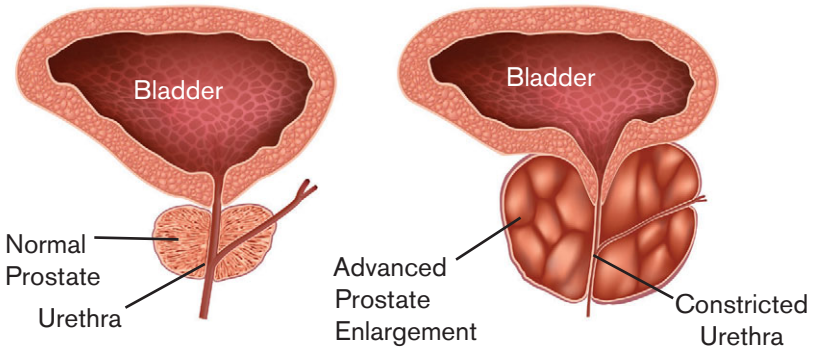
Our Enlarging Prostate Glands

Aging results in a proliferation of prostate cells that is technically referred to as **benign prostatic hyperplasia** (BPH).[137] The graphic on page 18 depicts an advanced case of BPH with a constricted urethra that would impede or block urine flow.

Illustrations on page 20 show a normal prostate gland compared to an extreme case of BPH.

Symptoms associated with BPH include frequent urination and urinary hesitancy that can be especially troublesome at night.[137] In severe cases obstruction of urine flow requires insertion of a catheter into the bladder via the penile urethra.

A major culprit involved in the benign over-proliferation of prostate cells is ***dihydrotestosterone*** (DHT).[138] Drugs such as Avodart®



The graphic above depicts an extreme advanced case of BPH with a constricted urethra that would impede or block urine flow. Symptoms associated with BPH include frequent urination and urinary hesitancy that is especially troublesome at night.

(dutasteride) or Proscar® (finasteride) reduce DHT levels and shrink the size of an enlarged prostate gland, which reduces BPH symptoms.[139] These drugs also lower **PSA** levels by almost **50%**, which may reflect the mechanism(s) that explain why men taking these drugs have reduced overall prostate cancer risk.[140-142] In two large studies, men taking Avodart® or Proscar® had about a **24%** reduced risk of prostate cancer.[143,144]

Men should know that ***testosterone*** is not the culprit behind prostate problems. Numerous studies suggest that youthful levels of testosterone do not increase prostate cancer risk.[145-150] What happens in the aging man's body, however, is that testosterone converts to estrogen and DHT, and these two testosterone metabolites have been shown to be involved in benign and malignant prostate disease. Fortunately, there are low-cost methods available to suppress **DHT** and **estrogen** in aging men, while maintaining youthful ranges of **free testosterone**.

Recall that PSA is not just a marker of prostate cancer, but functions as a ***tumor promoter*** by degrading barrier structures in the prostate gland that may contain isolated tumor cells.

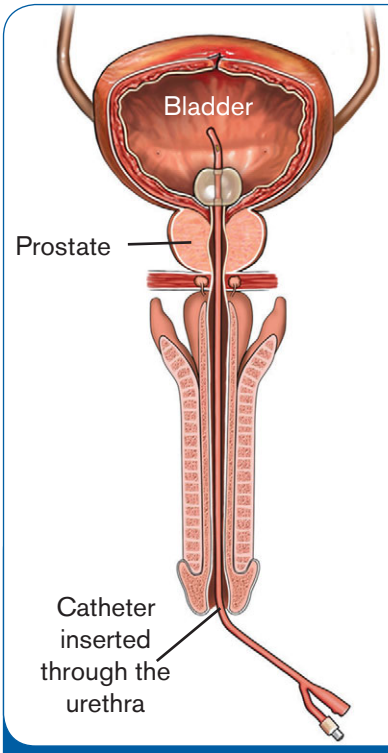
What troubles **Dr. Walsh** and some other experts is that some of the men taking Avodart® or finasteride who do contract prostate cancer have been shown in two studies to develop more aggressive forms of the disease. They are so concerned that they warn men not to use these drugs for the purpose of prostate cancer prevention, as does the FDA.

On the flip side are proponents of these drugs who point out that Avodart® as well as Proscar® (finasteride) reduce prostate gland volume by such a degree that the ability to identify high-grade tumors via prostate biopsy is improved. So it does not appear that Avodart® or Proscar® causes more **high-grade** tumors. Instead, these drugs facilitate earlier detection of such cancers, which is another reason to consider taking them.

A frustration with needle biopsies is that they miss as many as **20-30%** of prostate cancers.[134,151,152] The larger one's prostate gland, the easier it is to have the biopsy miss those sites that are malignant. The illustration on page 21 depicts a 12-core biopsy to show why a larger prostate gland makes it more difficult to detect malignant cells. So an advantage of shrinking one's prostate gland using drugs like Avodart® or Proscar® is that if a needle biopsy is required, it may more accurately detect underlying malignancy.[153]

As you'll read in the article in this issue titled **The Avodart®-Proscar® Debate**, there is compelling evidence that these drugs may reduce **high-grade** prostate cancer risk.

Another virtue to using *5-alpha reductase inhibitors* (like Avodart® or Proscar®) is that in the presence of prostate cancer, PSA levels don't decrease as much after these drugs are initiated.[140-142]



Obstruction of urine flow in severe cases requires insertion of a catheter into the bladder via the penile urethra.

Physicians using *5-alpha reductase inhibitors* should take into account the PSA-lowering effect of these agents by doubling the PSA lab value.[156] Given that PSA decreases less in the presence of prostate cancer, the doubling of PSA will result in a higher value of PSA and will trigger the need for diagnostic investigations sooner.

What doctors have observed is that drugs like Avodart® or finasteride suppress PSA levels more effectively in men with benign prostate enlargement or low-grade prostate cancer. When PSA levels drop then start raising again, this indicates that the 5-alpha reductase inhibitor is reducing low-grade cells of questionable clinical significance but is not affecting higher grade malignancies.[131] This finding is another plus for using a 5-alpha reductase inhibitor as it can increase the sensitivity of the PSA test to reveal which men need aggressive diagnostics such as needle biopsies.

Why We Suggest Certain Drugs

When it comes to combatting cancer, ***Life Extension*** long ago learned that the initial treatment regimen should be aggressive enough to deprive tumor cells of an opportunity to mutate into forms that are resistant to future therapies. If we know of a relatively side effect-free **drug** that works via a single or multiple mechanisms to impede tumor survival, we're going to include it in our **comprehensive surveillance program**.

Let's talk first about **metformin**. It was used in England in **1958** but did not make it into the United States until **1995—37 years later!**[157] I am familiar with metformin because the **FDA** tried to have me incarcerated for recommending it as an **anti-aging drug** long before it was "approved" to treat **type II diabetes**.

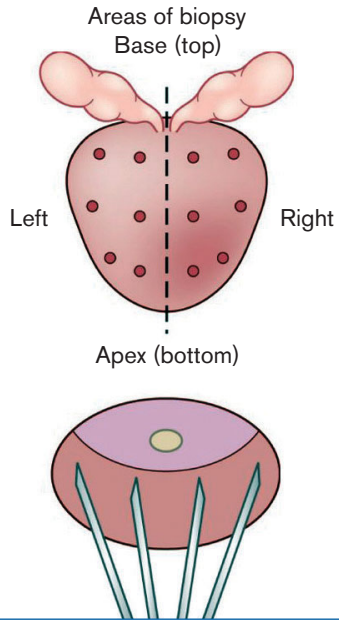
What's been happening over the last ten years is an explosion of published studies that consistently show that **metformin** reduces the risks of certain tumors and may be an effective cancer treatment.[158-165]

People ask me all the time, how can an anti-diabetic drug work so well against cancer? The encouraging news is that **metformin** functions via multiple mechanisms to create a less favorable environment for tumor progression.[166-175] We know that insulin (and glucose) increase the risk of many tumors.[176] This is of particular concern to obese men with prostate tumors. Metformin lowers blood glucose and insulin levels. The sidebar on the next page reveals the multiple anti-cancer mechanism of metformin.

There are nutrients that can have similar effects such as **standardized green coffee extract**.[177] We nonetheless suggest that a man with an elevated or rising PSA should ask his doctor to consider prescribing **metformin**. The starting dose can be **500 mg** of extended release (Metformin ER) taken with breakfast each day. Under the supervision of the patient's local medical doctor, the dose can be increased to **500 mg** ER taken at breakfast and at dinner. (Dose ranges for non-extended release metformin are **250- 850 mg** taken before no more than three meals a day.) Metformin is an inexpensive generic drug and can be taken along with nutrients (like **green coffee extract**) that similarly function to reduce glucose/insulin.

Metformin does more than slash tumor-promoting glucose/insulin levels. It also acts directly on cancer cells to induce apoptosis and/or inhibit proliferation.[91] Metformin does this conserving the process by which food is converted to energy.[169-172] Healthy cells react to metformin by adjusting their functions to use less energy.

12-core Prostate Needle Biopsy



This diagram depicts a 12-core needle biopsy of a prostate gland. Note how many areas of the prostate are missed during biopsy. In the PCPT (Prostate Cancer Prevention Trial) where only 6 core biopsies from 6 regions of the gland were obtained, the effect of Proscar® in reducing gland volume was to increase the ability to detect high-grade prostate cancer.[131,192]

A cancer cell, on the other hand, that is forced to minimize energy consumption is less able to exhibit aggressive metastatic or proliferative behavior.[178] In other scenarios, the energy stress caused by metformin is sufficient to cause cancer cell death.

The **National Cancer Institute** is sponsoring a clinical study where metformin will be tested to see if it can slow the progression of prostate cancer in men undergoing active surveillance (watchful waiting) with low-grade tumors.[179] We hope the study design includes the measurement of 2-hour postprandial (2 hours after meals) blood glucose levels as well as glycosylated hemoglobin (HbA1c) to ascertain that optimal dosing of study subjects has been achieved.

At a cancer conference earlier this year, the results of a study were reported of 22 men (median age 64, median PSA **6 ng/mL**) with confirmed prostate cancer that were given **500 mg** of metformin three times a day 41 days prior to surgery (prostatectomy). In response to metformin the men showed the expected reductions in ***glucose*** and ***insulin growth factor-1 (IGF-1)*** blood levels, along with **abdominal fat loss**.[180] What got the researchers excited was that compared to biopsied specimens, the surgically removed prostate glands showed a **32%** reduction in a marker of cell proliferation (Ki-67) and a favorable alteration in a pathway tumor cells use to proliferate out of control (via mTOR).[181]

Anti-Cancer Actions of Metformin

Numerous studies show the anti-diabetic drug **metformin** can slow growth of existing cancers and decrease risk of developing new cancers. Some studies show metformin may protect against prostate cancer and aid in treatment. Here are some of its **anti-cancer** mechanisms:

- **Metformin** reduces levels of **glucose**, **insulin**, and **insulin-like growth factors** that fuel tumor growth.[166-169]
- **Metformin** activates a powerful molecule called **AMPK** (adenosine monophosphate-activated protein kinase) that subjects cancer cells to unique metabolic stresses not experienced by healthy tissues. (Activated **AMPK** promotes death [apoptosis] of malignant cells and prevents their development.)[169,170]
- **Metformin** independently inhibits **mTOR** (mammalian target of rapamycin) that regulates cell growth, energy metabolism, cell motility, cell survival, and protein synthesis.[171,172]
- **Metformin** mimics the benefits of a hormone called adiponectin in activating AMPK-dependent growth inhibition in prostate cancer cells.[173]
- **Metformin** blocks cancer cell reproductive cycles by decreasing levels of a growth-promoting protein called **cyclin D1**.[174]
- **Metformin** increases production of a protein (**p27**) that inhibits the cell division cycle.[174]
- **Metformin** suppresses **vascular endothelial growth factor** (VEGF) thereby cutting off the blood supply to tumors.[175]

Knowledgeable members point out that **curcumin** interferes with these tumor growth pathways via similar mechanisms, which we at ***Life Extension*** have long been familiar with.[182] My argument for recommending **metformin** is that it should produce potent additive effects to curcumin. Moreover, we still don't know what the upper dose limits are for **metformin** and/or **curcumin** for cancer treatment, so taking both may have some obvious advantages.

Furthermore, because metformin is a drug, it tends to get more attention from researchers, perhaps because it is easier to obtain funding for drug studies. A European study published this year showed that metformin was effective against ***advanced castration-resistant prostate cancer***. The doctors who conducted this study concluded:

> ***To our knowledge, our results are the first clinical data to indicate that metformin use may improve PSA-recurrence free survival, distant metastasis-free survival, prostate cancer specific mortality, overall survival and reduce the development of castration resistant prostate cancer in prostate cancer patients. Further validation of metformin's potential benefits is warranted.***[183]

Interestingly, men who are on androgen deprivation therapy to treat prostate cancer often show rising insulin levels that can stimulate tumor growth.[167,184] By taking metformin, some of the side effects of androgen deprivation therapy can be mitigated, as was shown in this newly published European study.

So while nutrients like **curcumin** and **green coffee extract**

Daily Use of Aspirin May Decrease Prostate Risks

Researchers studied 2,447 men over 12 years, examining them every other year. After adjusting for age, diabetes, hypertension, and other factors, they found that men who took a daily aspirin or another NSAID (like ibuprofen) reduced their risk of moderate or severe urinary symptoms by 27% and lowered their risk of an enlarged prostate by **47%**. Even more intriguing was the finding that men who consumed aspirin or another NSAID were **48%** less likely to have an elevated level of prostate-specific antigen (PSA).[187]

Aspirin inhibits the cyclooxygenase (COX-1 and COX-2) enzymes, which are also involved in the arachidonic acid inflammatory pathway.[188,189] COX-2 in particular is known to promote the proliferation of prostate cancer cells.[56]

and others may share functions that are similar to metformin, we cannot ignore the strong data showing specific benefits to low-cost **metformin**.

Another hormone that prostate tumors use to escape eradication is **prolactin**,[39] and this can easily be suppressed by taking **0.25 mg** to **0.5 mg** of cabergoline (**Dosintex**®) two to three times weekly.[185]

Aspirin functions in multiple ways to interfere with prostate cancer propagation and metastasis and it may induce genetic changes that facilitate **apoptosis**.[186] There is too much data about the potential role of aspirin as an adjuvant cancer treatment for men with rising PSAs not to use it.

Treat Yourself As If You Already Have Prostate Cancer

This article is supposed to be about prostate cancer prevention, and here I am talking about therapies overlooked by most doctors that may facilitate enhanced treatment outcomes.

The reason we can't ignore **treatments** is that aging men should accept the reality that in all likelihood there are malignant cells in their prostate glands now. This makes it easier to consistently follow prevention programs that can reduce the risk that clinically diagnosed disease will ever manifest. It also keeps one on the lookout for non-toxic treatments that may also have preventative benefits.

As I have related in the past, when my PSA reading came back at **1.4 ng/mL** in year **2003**, I treated it as if I had early stage prostate cancer by adopting healthier dietary choices and taking every nutrient and drug that had shown efficacy in prostate cancer prevention. Ten years later my PSA is **0.4 ng/mL**.

I will remain on an aggressive prostate cancer treatment regimen and in the process reduce my risk for virtually every other age-related disease.

The articles in this month's issue provide comprehensive approaches for the prevention of prostate cancer, including a comprehensive overview demonstrating the **prostate cancer prevention** benefits in response to **Avodart**® and **finasteride**. Men with any type of prostate malignancy may also benefit, as the programs we advocate for **prevention** may also facilitate better overall **treatment**.

For longer life,

William Faloon

What if PSA Screen Detects a Potential Problem?

If an annual **PSA screen** reveals a potential problem, a man has an early opportunity to:

1. Review state-of-the-art studies to establish his status regarding the presence of prostate cancer.
2. Confirm the diagnosis and get a Gleason score reading by an expert in prostate cancer pathology.
3. Utilize published nomograms and neural nets to present the patient probabilities of organ-confined prostate cancer, capsular penetration, or disease progression to seminal vesicles and/or lymph nodes.
4. Obtain refined laboratory studies and imaging studies to confirm or refute the above.
5. Sit down with a physician that is least biased on a particular procedure and discuss the pros and cons of all therapies, including active surveillance.
6. Investigate and discuss all co-related illnesses that might have gone unrecognized but that play a role in stimulating prostate cancer growth.

Don't Accept Archaic Diagnostics

The highly variable skills of the urologist performing TRUSP (transrectal ultrasound guided needle biopsy of the prostate) is of great concern when a biopsy is needed.

Too often the urologist uses the TRUSP to target the prostate gland per se, rather than abnormal areas within the prostate. Rarely do we see a dedicated TRUSP report that mentions all of the important findings that can and should be related by the urologist e.g., gland volume, PSA density, status of the capsule and seminal vesicles, as well as location of hypoechoic and hyperechoic lesions within the prostate. Using the TRUSP to target the prostate gland, and not the various lesions within the gland is akin to diluting a vintage wine with ice cubes. (For illustration and a description of a model TRUSP report, see Appendix F of the book ***A Primer on Prostate Cancer*** by Strum and Pogliano available from Life Extension Media by calling **1-800-544-4440** or logging on to www.lef.org)

The varying quality of the ultrasound device and whether it is a standard ***gray-scale ultrasound*** or a ***color Doppler ultrasound*** is also significant. **Color Doppler ultrasound**, for instance, discloses pathologic states of increased blood vessel growth (angiogenesis) that is associated with more clinically aggressive prostate cancer, which is often of a higher Gleason score.[18]

MRI (magnetic resonance imaging) using **DWI** (diffusion weighted imaging) will also add to understanding the risk a particular patient with prostate cancer faces. That's because when ***color Doppler ultrasound*** is combined with **MRI-DWI**, a predictive value regarding the level of aggressiveness of the prostate cancer may be established.[19]

In this manner, selecting only those men whose prostate cancers are most likely to be "bad actors" and who need invasive therapy can be accomplished, while sparing those men with cancers of low grade, which are often amenable to changes in lifestyle, diet, and use of supplements.

References

1. Available at: http://www.auanet.org/advnews/press_releases/article.cfm?articleNo=290. Accessed August 22, 2013.
2. Billis A. Latent carcinoma and atypical lesions of prostate. An autopsy study. *Urology*. 1986 Oct;28(4):324-9.
3. Moyer VA, U.S. Preventive Services Task Force. Screening for prostate cancer: U.S. Preventive Services Task Force recommendation statement. *Ann Intern Med*. 2012 Jul 17;157(2):120-34.
4. Catalona WJ, Richie JP, Ahmann FR, et al. Comparison of digital rectal examination and serum prostate specific antigen in the early detection of prostate cancer: results of a multicenter clinical trial of 6,630 men. *J Urol.* 1994 May;151(5):1283-90.
5. Bokhorst LP, Bangma CH, van Leenders GJ, et al. Prostate-specific antigen-based prostate cancer screening: Reduction of prostate cancer mortality after correction for nonattendance and contamination in the Rotterdam Section of the European Randomized Study of Screening for Prostate Cancer. *Eur Urol.* Aug 11 2013.
6. Available at http://www.census.gov/population/age/data/2011comp.html. Accessed September 23,2013.
7. Available at: http://www.cancer.gov/cancertopics/factsheet/detection/PSA. Accessed September 24, 2013.
8. Available at: http://www.cancer.org/cancer/prostatecancer/detailedguide/prostate-cancer-key-statistics. Accessed Aug 26, 2013.
9. Available at: http://www.cdc.gov/hiv/statistics/basics/ataglance.html. Accessed August 27, 2013.
10. Available at: http://www.uspreventiveservicestaskforce.org/uspstf13/hiv/hivfinalrs.htm. Accessed September 2013.
11. Ghossain A, Ghossain MA. History of mastectomy before and after Halsted. *J Med Liban*. 2009 Apr-Jun;57(2):65-71.
12. Ervin RB. Prevalence of metabolic syndrome among adults 20 years of age and over, by sex, age, race and ethnicity, and body mass index: United States, 2003-2006. *Natl Health Stat Report.* 2009 May 5;(13):1-7.
13. Vessella RL, Lange PH, Partin AW, et al. Probability of prostate cancer detection based on results of a multicenter study using the AxSYM free PSA and total PSA assays. *Urology*. 2000 Jun;55(6):909-14.
14. Lieberman S. Can percent free prostate-specific antigen reduce the need for prostate biopsy? *Eff Clin Pract*. 1999 Nov-Dec;2(6):266-71.
15. Stephan C, Stroebel G, Heinau M, et al. The ratio of prostate-specific antigen (PSA) to prostate volume (PSA density) as a parameter to improve the detection of prostate carcinoma in PSA values in the range of < 4 ng/mL. *Cancer*. 2005 Sep 1;104(5):993-1003.
16. Loeb S, Carter HB. Point: Impact of prostate-specific antigen velocity on management decisions and recommendations. *J Natl Compr Canc Netw*. 2013 Mar 1;11(3):281-5.
17. Hessels D, Schalken JA. The use of PCA3 in the diagnosis of prostate cancer. *Nat Rev Urol*. 2009 May;6(5):255-61.
18. Strohmeyer D, Frauscher F, Klauser A, et al. Contrast-enhanced transrectal color doppler ultrasonography (TRCDUS) for assessment of angiogenesis in prostate cancer. *Anticancer Res*. 2001 Jul-Aug;21(4B):2907-13.
19. Ibrahiem EI, Mohsen T, Nabeeh AM, Osman Y, Hekal IA, Abou El-Ghar M. DWI-MRI: single, informative, and noninvasive technique for prostate cancer diagnosis. *ScientificWorldJournal.* 2012;2012:973450.
20. Pollack CE, Platz EA, Bhavsar NA, et al. Primary care providers' perspectives on discontinuing prostate cancer screening. *Cancer*. 2012 Nov 15;118(22):5518-24.
21. Allard CB, Dason S, Lusis J, Kapoor A. Prostate cancer screening: Attitudes and practices of family physicians in Ontario. *Can Urol Assoc J.* 2012 6(3):188-93.
22. Qaseem A, Barry MJ, Denberg TD, et al. Screening for prostate cancer: a guidance statement from the Clinical Guidelines Committee of the American College of Physicians. *Ann Intern Med.* 2013 May 21;158(10):761-9.
23. Available at: http://www.mikemilken.com/pcfbook_chapter1.pdf. Accessed September 25, 2013.
24. Available at: http://www.pccnc.org/awareness/. Accessed September 25, 2013.
25. Post PN, Kil PJ, Hendrikx AJ, Janssen-Heijnen ML, Crommelin MA, Coebergh JW. Comorbidity in patients with prostate cancer and its relevance to treatment choice. *BJU Int.* 1999 Oct;84(6):652-6.

26. Howcroft TK, Campisi J, Louis GB, et al. The role of inflammation in age-related disease. Aging (Albany NY). 2013 Jan;5(1):84-93.
27. Available at: http://www.lef.org/magazine/mag2009/jan2009_Vitamin-K-Protection-Against-Arterial-Calcification-Bone-Loss-Cancer-Aging_01.htm?source=search&key=calcification. Accessed September 25, 2013.
28. Available at: http://content.onlinejacc.org/article.aspx?articleid=1136110. Accessed September 25, 2013.
29. Available at: http://circres.ahajournals.org/content/84/2/250.full. Accessed September 25, 2013.
30. Abedin M, Tintut Y, Demer LL. Vascular calcification: mechanisms and clinical ramifications. *Arterioscler Thromb Vasc Biol*. 2004 Jul;24(7):1161-70.
31. Available at: http://media.curetoday.com/downloads/documents/BoneHealth_PG_rev_b.pdf. Accessed Aug 30, 2013.
32. Beulens JW, Bots ML, Atsma F, et al. High dietary menaquinone intake is associated with reduced coronary calcification. *Atherosclerosis*. 2009 Apr;203(2):489-93.
33. Fodor D, Albu A, Poant L, Porojan M. Vitamin K and vascular calcifications. *Acta Physiol Hung.* 2010 Sep;97(3):256-66.
34. Wen J, Zhao Y, Li J, et al. Suppression of DHT-induced paracrine stimulation of endothelial cell growth by estrogens via prostate cancer cells. *Prostate*. 2013 Jul;73(10):1069-81.
35. Pezzato E, Sartor L, Dell'Aica I, et al. Prostate carcinoma and green tea: PSA-triggered basement membrane degradation and MMP-2 activation are inhibited by (-) epigallocatechin-3-gallate. *Int J Cancer.* 2004 Dec 10;112(5):787-92.
36. Cox ME, Gleave ME, Zakikhani M, et al. Insulin receptor expression by human prostate cancers. *Prostate*. 2009 Jan 1;69(1):33-40.
37. Singh PB, Matanhelia SS, Martin FL. A potential paradox in prostate adenocarcinoma progression: oestrogen as the initiating driver. *Eur J Cancer*. 2008 May;44(7):928-36.
38. Giton F, de la Taille A, Allory Y, et al. Estrone sulfate (E1S), a prognosis marker for tumor aggressiveness in prostate cancer (PCa). *J Steroid Biochem Mol Biol*. 2008 Mar;109(1-2):158-67.
39. Dagvadorj A, Collins S, Jomain JB, et al. Autocrine prolactin promotes prostate cancer cell growth via Janus kinase-2-signal transducer and activator of transcription-5a/b signaling pathway. *Endocrinology*. 2007 Jul;148(7):3089-101.
40. Tu WH, Thomas TZ, Masumori N, et al. The loss of TGF-beta signaling promotes prostate cancer metastasis. *Neoplasia*. 2003 May-Jun;5(3):267-77.
41. Ling MT, Lau TC, Zhou C, et al. Over-expression of Id-1 in prostate cancer cells promotes angiogenesis through the activation of vascular endothelial growth factor (VEGF). *Carcinogenesis*. 2005 Oct;26(10):1668-76.
42. Häggström S, Bergh A, Damber JE. Vascular endothelial growth factor content in metastasizing and nonmetastasizing Dunning prostatic adenocarcinoma. *Prostate*. 2000 Sep 15;45(1):42-50.
43. Meyer F, Galan P, Douville P, et al. Antioxidant vitamin and mineral supplementation and prostate cancer prevention in the SU.VI.MAX trial. *Int J Cancer*. 2005 Aug 20;116(2):182-6.
44. Ripple MO, Henry WF, Schwarze SR, Wilding G, Weindruch R. Effect of antioxidants on androgen-induced AP-1 and NF-kappaB DNA-binding activity in prostate carcinoma cells. *J Natl Cancer Inst*. 1999 Jul 21;91(14):1227-32.
45. Yan L, Spitznagel EL. Soy consumption and prostate cancer risk in men: a revisit of a meta-analysis. *Am J Clin Nutr*. 2009 Apr;89(4):1155-63.
46. Hussain M, Banerjee M, Sarkar FH, et al. Soy isoflavones in the treatment of prostate cancer. *Nutr Cancer*. 2003 47(2):111-7.
47. Giovannucci E, Ascherio A, Rimm EB, Stampfer MJ, Colditz GA, Willett WC. Intake of carotenoids and retinol in relation to risk of prostate cancer. *J Natl Cancer Inst*. 1995 Dec 6;87(23):1767-76.
48. McLarty J, Bigelow RL, Smith M, Elmajian D, Ankem M, Cardelli JA. Tea polyphenols decrease serum levels of prostate-specific antigen, hepatocyte growth factor, and vascular endothelial growth factor in prostate cancer patients and inhibit production of hepatocyte growth factor and vascular endothelial growth factor in vitro. *Cancer Prev Res (Phila)*. 2009 Jul;2(7):673-82.
49. Liang JY, Liu YY, Zou J, Franklin RB, Costello LC, Feng P. Inhibitory effect of zinc on human prostatic carcinoma cell growth. *Prostate*. 1999 Aug 1;40(3):200-7.
50. Singh RP, Raina K, Sharma G, Agarwal, R. Silibinin inhibits established prostate tumor growth, progression, invasion, and metastasis and suppresses tumor angiogenesis and epithelial-mesenchymal transition in transgenic adenocarcinoma of the mouse prostate model mice. *Clin Cancer Res*. 2008 Dec 1;14(23):7773-80.
51. Smith S, Sepkovic D, Bradlow HL, Auborn KJ. 3,3'-Diindolylmethane and genistein decrease the adverse effects of estrogen in LNCaP and PC-3 prostate cancer cells. *J Nutr.* 2008 Dec;138(12):2379-85.
52. Xing N, Chen Y, Mitchell SH, Young CY. Quercetin inhibits the expression and function of the androgen receptor in LNCaP prostate cancer cells. *Carcinogenesis*. 2001 Mar;22(3):409-14.
53. Gupta S, Srivastava M, Ahmad N, et al. Lipoxygenase-5 is overexpressed in prostate adenocarcinoma. *Cancer*. 2001 Feb 15;91(4):737-43.
54. Matsuyama M, Yoshimura R, Mitsuhashi M, et al. Expression of lipoxygenase in human prostate cancer and growth reduction by its inhibitors. *Int J Oncol*. 2004 Apr;24(4):821-7.
55. Ghosh J, Myers CE. Arachidonic acid stimulates prostate cancer cell growth: critical role of 5-lipoxygenase. *Biochem Biophys Res Commun*. 1997 Jun 18;235(2):418-23.
56. Xu S, Gao JP, Zhou WQ. Cyclooxygenase-2 and cyclooxygenase-2 inhibitors in prostate cancer. *Zhonghua Nan Ke Xue*. 2008 Nov;14(11):1031-4.
57. Bengmark S. Curcumin, an atoxic antioxidant and natural NFkappaB, cyclooxygenase-2, lipooxygenase, and inducible nitric oxide synthase inhibitor: a shield against acute and chronic diseases. *JPEN J Parenter Enteral Nutr*. 2006 Jan;30(1):45-51.
58. Lantz RC, Chen GJ, Solyom AM, Jolad SD, Timmermann BN. The effect of turmeric extracts on inflammatory mediator production. *Phytomedicine*. 2005 Jun;12(6-7):445-52.
59. Taccone-Gallucci M, Manca-di-Villahermosa S, Battistini L, et al. N-3 PUFAs reduce oxidative stress in ESRD patients on maintenance HD by inhibiting 5-lipoxygenase activity. *Kidney Int*. 2006 Apr;69(8):1450-4.
60. Calder PC. N-3 polyunsaturated fatty acids and inflammation: from molecular biology to the clinic. *Lipids*. 2003 Apr;38(4):343-52.
61. Norrish AE, Skeaff CM, Arribas GL, Sharpe SJ, Jackson RT. Prostate cancer risk and consumption of fish oils: a dietary biomarker-based case-control study. *Br J Cancer*. 1999 Dec;81(7):1238-42.
62. Safayhi H, Sailer ER, Ammon HP. Mechanism of 5-lipoxygenase inhibition by acetyl-11-keto-beta-boswellic acid. *Mol Pharmacol*. 1995 Jun;47(6):1212-6.
63. Salinas CA, Kwon EM, FitzGerald LM, et al. Use of aspirin and other nonsteroidal antiinflammatory medications in relation to prostate cancer risk. *Am J Epidemiol*. 2010 Sep 1;172(5):578-90.
64. Bemis DL, Capodice JL, Anastasiadis AG, Katz AE, Buttyan R. Zyflamend, a unique herbal preparation with nonselective COX inhibitory activity, induces apoptosis of prostate cancer cells that lack COX-2 expression. *Nutr Cancer*. 2005 52(2):202-12.
65. Yang P, Cartwright C, Chan D, Vijjeswarapu M, Ding J, Newman RA. Zyflamend-mediated inhibition of human prostate cancer PC3 cell proliferation: effects on 12-LOX and Rb protein phosphorylation. *Cancer Biol Ther*. 2007 6(2):228-36.
66. Capodice JL, Gorroochurn P, Cammack AS, et al. Zyflamend in men with high-grade prostatic intraepithelial neoplasia: results of a phase I clinical trial. *J Soc Integr Oncol.* 2009 7(2):43-51.
67. Huang EC, McEntee MF, Whelan J. Zyflamend, a combination of herbal extracts, attenuates tumor growth in murine xenograft models of prostate cancer. *Nutr Cancer*. 2012 64(5):749-60.
68. Sandur SK, Ahn KS, Ichikawa H, et al. Zyflamend, a polyherbal preparation, inhibits invasion, suppresses osteoclastogenesis, and potentiates apoptosis through down-regulation of NF-kappa B activation and NF-kappa B-regulated gene products. *Nutr Cancer*. 2007 57(1):78-87.

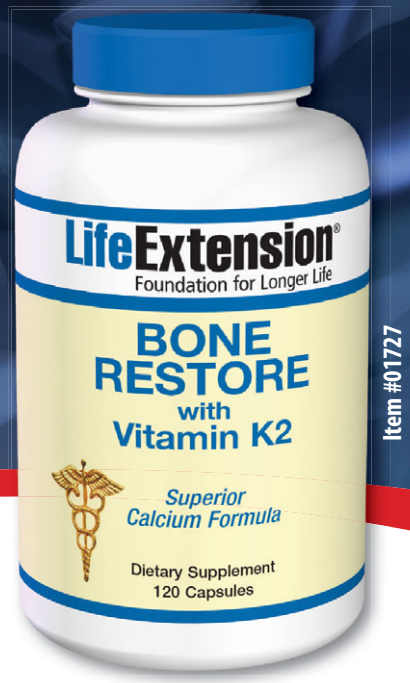
69. Harris RE. Cyclooxygenase-2 (cox-2) blockade in the chemoprevention of cancers of the colon, breast, prostate, and lung. *Inflammopharmacology*. 2009 Apr;17(2):55-67.
70. Pruthi RS, Derksen JE, Moore D, et al. Phase II trial of celecoxib in prostate-specific antigen recurrent prostate cancer after definitive radiation therapy or radical prostatectomy. *Clin Cancer Res*. 2006 Apr 1;12(7 Pt 1):2172-7.
71. Chen L, Davey Smith G, Evans DM, et al. Genetic variants in the vitamin d receptor are associated with advanced prostate cancer at diagnosis: findings from the prostate testing for cancer and treatment study and a systematic review. *Cancer Epidemiol Biomarkers Prev*. 2009 Nov;18(11):2874-81.
72. Flanagan JN, Young MV, Persons KS, et al. Vitamin D metabolism in human prostate cells: implications for prostate cancer chemoprevention by vitamin D. *Anticancer Res*. 2006,Jul-Aug;26(4A):2567-72.
73. Webster J, Piscitelli G, Polli A, et al. Dose-dependent suppression of serum prolactin by cabergoline in hyperprolactinaemia: a placebo controlled, double blind, multicentre study. *Clin Endocrinol (Oxf)*. 1992 Dec;37(6):534-41.
74. Bohnet HG, Hanker JP, Horowski R, Wickings EJ, Schneider HP. Suppression of prolactin secretion by lisuride throughout the menstrual cycle and in hyperprolactinaemic menstrual disorders. *Acta Endocrinol (Copenh)*. 1979 Sep;92(1):8-19.
75. Clements A, Gao B, Yeap SH, Wong MK, Ali SS, Gurney H. Metformin in prostate cancer: two for the price of one. *Ann Oncol*. 2011 Dec;22(12):2556-60.
76. Hitron A, Adams V, Talbert J, Steinke D. The influence of antidiabetic medications on the development and progression of prostate cancer. *Cancer Epidemiol*. 2012 Aug;36(4):e243-50.
77. Wright JL, Stanford JL. Metformin use and prostate cancer in Caucasian men: results from a population-based case-control study. *Cancer Causes Control*. 2009 Nov;20(9):1617-22.
78. Teiten MH, Gaascht F, Eifes S, Dicato M, Diederich M. Chemopreventive potential of curcumin in prostate cancer. *Genes Nutr*. 2010 Mar;5(1):61-74.
79. Shishodia S, Singh T, Chaturvedi MM. Modulation of transcription factors by curcumin. *Adv Exp Med Biol*. 2007 595:127-48.
80. Reuter S, Gupta SC, Park B, Goel A, Aggarwal BB. Epigenetic changes induced by curcumin and other natural compounds. *Genes Nutr*. 2011 May;6(2):93-108.
81. Chen Y, Zaman MS, Deng G, et al. MicroRNAs 221/222 and genistein-mediated regulation of ARHI tumor suppressor gene in prostate cancer. *Cancer Prev Res (Phila)*. 2011 Jan;4(1):76-86.
82. Lakshman M, Xu L, Ananthanarayanan V, et al. Dietary genistein inhibits metastasis of human prostate cancer in mice. *Cancer Res*. 2008 Mar 15;68(6):2024-32.
83. Davis JN, Singh B, Bhuiyan M, Sarkar FH. Genistein-induced upregulation of p21WAF1, downregulation of cyclin B, and induction of apoptosis in prostate cancer cells. *Nutr Cancer*. 1998 32(3):123-31.
84. Davis JN, Kucuk O, Sarkar FH. Genistein inhibits NF-kappa B activation in prostate cancer cells. *Nutr Cancer*. 1999 35(2):167-74.
85. Berquin IM, Min Y, Wu R, et al. Modulation of prostate cancer genetic risk by omega-3 and omega-6 fatty acids. *J Clin Invest*. 2007 Jul;117(7):1866-75.
86. Deckelbaum RJ, Worgall TS, Seo T. n-3 fatty acids and gene expression. *Am J Clin Nutr*. 2006 Jun;83(6 Suppl):1520S-1525S.
87. Krishnan AV, Peehl DM, Feldman D. Inhibition of prostate cancer growth by vitamin D: Regulation of target gene expression. *J Cell Biochem*. 2003 Feb 1;88(2):363-71.
88. Mantell DJ, Owens PE, Bundred NJ, Mawer EB, Canfield AE. 1 alpha,25-dihydroxyvitamin D(3) inhibits angiogenesis in vitro and in vivo. *Circ Res*. 2000 Aug 4;87(3):214-20.
89. Yoo J, Lee YJ. Aspirin enhances tumor necrosis factor-related apoptosis-inducing ligand-mediated apoptosis in hormone-refractory prostate cancer cells through survivin down-regulation. *Mol Pharmacol*. 2007 Dec;72(6):1586-92.
90. Kim KM, Song JJ, An JY, Kwon YT, Lee YJ. Pretreatment of acetylsalicylic acid promotes tumor necrosis factor-related apoptosis-inducing ligand-induced apoptosis by down-regulating BCL-2 gene expression. *J Biol Chem*. 2005 Dec 9;280(49):41047-56.
91. Jalving M, Gietema JA, Lefrandt JD, et al. Metformin: taking away the candy for cancer? *Eur J Cancer*. 2010 Sep;46(13):2369-80.
92. Avci CB, Harman E, Dodurga Y, Susluer SY, Gunduz C. Therapeutic potential of an anti-diabetic drug, metformin: alteration of miRNA expression in prostate cancer cells. *Asian Pac J Cancer Prev*. 2013;14(2):765-8.
93. Isakovic A, Harhaji L, Stevanovic D, et al. Dual antiglioma action of metformin: cell cycle arrest and mitochondria-dependent apoptosis. *Cell Mol Life Sci*. 2007 May;64(10):1290-302.
94. Luo J, Dunn TA, Ewing CM, Walsh PC, Isaacs WB. Decreased gene expression of steroid 5 alpha-reductase 2 in human prostate cancer: implications for finasteride therapy of prostate carcinoma. *Prostate*. 2003 Oct 1;57(2):134-9.
95. Schmidt LJ, Regan KM, Anderson SK, Sun Z, Ballman KV, Tindall DJ. Effects of the 5 alpha-reductase inhibitor dutasteride on gene expression in prostate cancer xenografts. *Prostate*. 2009 Dec 1;69(16):1730-43.
96. Available at: http://www.stjohnprovidence.org/InnerPage.aspx?PageID=1446. Accessed September 26, 2013.
97. Stangelberger A, Waldert M, Djavan B. Prostate cancer in elderly men. *Rev Urol*. 2008 Spring;10(2):111-9.
98. Gofrit ON, Zorn KC, Taxy JB, etal. Predicting the risk of patients with biopsy Gleason score 6 to harbor a higher grade cancer. *J Urol*. 2007 Nov;178(5):1925-8.
99. Bastian PJ, Boorjian SA, Bossi A, et al. High-risk prostate cancer: from definition to contemporary management. *Eur Urol*. 2012 Jun;61(6):1096-106.
100. Carter HB, Partin AW, Walsh PC, et al. Gleason score 6 adenocarcinoma: should it be labeled as cancer? *J Clin Oncol*. 2012 Dec 10;30(35):4294-6.
101. Marshall DT, Savage SJ, Garrett-Mayer E, et al. Vitamin D3 supplementation at 4000 international units per day for one year results in a decrease of positive cores at repeat biopsy in subjects with low-risk prostate cancer under active surveillance. *J Clin Endocrinol Metab*. 2012 Jul;97(7):2315-24.
102. Miano L. Mediterranean diet, micronutrients and prostate carcinoma: a rationale approach to primary prevention of prostate cancer. *Arch Ital Urol Androl*. 2003 Sep;75(3):166-78.
103. Itsiopoulos C, Hodge A, Kaimakamis M. Can the Mediterranean diet prevent prostate cancer? *Mol Nutr Food Res*. 2009 Feb;53(2):227-39.
104. Ornish D, Magbanua MJ, Weidner G, et al. Changes in prostate gene expression in men undergoing an intensive nutrition and lifestyle intervention. *Proc Natl Acad Sci U S A*. 2008 Jun 17;105(24):8369-74.
105. Kenfield SA, Chang ST, Chan JM. Diet and lifestyle interventions in active surveillance patients with favorable-risk prostate cancer. *Curr Treat Options Oncol*. 2007 Jun;8(3):173-96.
106. Ferris-Tortajada J, Berbel-Tornero O, Garcia-Castell J, Ortega-Garcia JA, Lopez-Andreu JA. Dietetic factors associated with prostate cancer: protective effects of Mediterranean diet. *Actas urologicas espanolas*. 2012 Apr;36(4):239-245.
107. Kenfield SA, Dupre N, Richman EL, et al. Mediterranean diet and prostate cancer risk and mortality in the Health Professionals Follow-up Study. *Eur Urol*. 2013 Aug 13.
108. Sofi F, Cesari F, Abbate R, Gensini GF, Casini A. Adherence to Mediterranean diet and health status: meta-analysis. *BMJ*. 2008 Sep 11;337:a1344.
109. Xiao D, Srivastava SK, Lew KL, et al. Allyl isothiocyanate, a constituent of cruciferous vegetables, inhibits proliferation of human prostate cancer cells by causing G2/M arrest and inducing apoptosis. *Carcinogenesis*. 2003 May;24(5):891-7.
110. Garikapaty VP, Ashok BT, Chen YG, et al. Anti-carcinogenic and anti-metastatic properties of indole-3-carbinol in prostate cancer. *Oncol Rep*. 2005 Jan;13(1):89-93.
111. Srivastava SK, Xiao D, Lew KL, et al. Allyl isothiocyanate, a constituent of cruciferous vegetables, inhibits growth of PC-3 human prostate cancer xenografts in vivo. *Carcinogenesis*. 2003 Oct;24(10):1665-70.

112. Chuu CP, Chen RY, Kokontis JM, Hiipakka RA, Liao S. Suppression of androgen receptor signaling and prostate specific antigen expression by (-)-epigallocatechin-3-gallate in different progression stages of LNCaP prostate cancer cells. *Cancer Lett*. 2009 Mar 8;275(1):86-92.
113. Thakur VS, Gupta K, Gupta S. Green tea polyphenols causes cell cycle arrest and apoptosis in prostate cancer cells by suppressing class I histone deacetylases. *Carcinogenesis*. 2012 Feb;33(2):377-84.
114. Punnen S, Hardin J, Cheng I, Klein EA, Witte JS. Impact of meat consumption, preparation, and mutagens on aggressive prostate cancer. *PLoS One*. 2011 6(11):e27711.
115. Michaud DS, Augustsson K, Rimm EB, Stampfer MJ, Willet WC, Giovannucci E. A prospective study on intake of animal products and risk of prostate cancer. *Cancer Causes Control*. 2001 Aug;12(6):557-67.
116. Richman EL, Kenfield SA, Stampfer MJ, Giovannucci EL, Chan JM. Egg, red meat, and poultry intake and risk of lethal prostate cancer in the prostate-specific antigen-era: incidence and survival. *Cancer Prev Res (Phila)*. 2011 Dec;4(12):2110-21. 19.
117. Bidoli E, Talamini R, Bosetti C, et al. Macronutrients, fatty acids, cholesterol and prostate cancer risk. *Ann Oncol*. 2005 Jan;16(1):152-7.
118. Freedland SJ, Aronson WJ. Dietary intervention strategies to modulate prostate cancer risk and prognosis. *Curr Opin Urol*. 2009 May;19(3):263-7.
119. Song Y, Chavarro JE, Cao Y, et al. Whole milk intake is associated with prostate cancer-specific mortality among U.S. male physicians. *J Nutr*. 2013 Feb;143(2):189-96.
120. Chan JM, Stampfer MJ, Ma J, Gann PH, Gaziano JM, Giovannucci E. Dairy products, calcium, and prostate cancer risk in the Physicians' Health Study. *Am J Clin Nutr*. 2001 74(4):549-554.
121. Gao X, LaValley MP, Tucker KL. Prospective studies of dairy product and calcium intakes and prostate cancer risk: a meta-analysis. *J Natl Cancer Inst*. 2005 Dec 7;97(23):1768-77.
122. Williams CD, Whitley BM, Hoyo C, et al. A high ratio of dietary n-6/n-3 polyunsaturated fatty acids is associated with increased risk of prostate cancer. *Nutr Res*. 2011 Jan 31(1):1-8.
123. Masko EM, Allott EH, Freedland SJ. The relationship between nutrition and prostate cancer: is more always better? *Eur Urol*. 2013 May;63(5):810-20.
124. Grossmann ME, Huang H, Tindall DJ. Androgen receptor signaling in androgen-refractory prostate cancer. *J Natl Cancer Inst*. 2001 Nov 21;93(22):1687-97.
125. Available at: http://cdn.intechopen.com/pdfs/24233/InTech-Paradigm_shift_in_the_concept_of_hormonal_milieu_of_prostate_cancer.pdf. Accessed September 30, 2013.
126. Arena F. Specific antigen prostatic changes during treatment with finasteride or dutasteride for benign prostatic hyperplasia. *Minerva Urol Nefrol*. 2013 Sep;65(3):211-216.
127. Available at: http://www.medscape.com/viewarticle/745454_4. Accessed September 30, 2013.
128. Available at: http://www.urologyhealth.org/urology/index.cfm?article=149. Accessed September 30, 2013.
129. Kristal AR, Till C, Tangen CM, et al. Associations of serum sex steroid hormone and 5 -androstane-3 ,17 -diol glucuronide concentrations with prostate cancer risk among men treated with finasteride. *Cancer Epidemiol Biomarkers Prev*. 2012 Oct;21(10):1823-32.
130. Ta N, Walle T. Aromatase inhibition by bioavailable methylated flavones. *J Steroid Biochem Mol Biol*. 2007 Oct;107(1-2):127-9.
131. Cohen YC, Liu KS, Heyden NL, et al. Detection bias due to the effect of finasteride on prostate volume: a modeling approach for analysis of the Prostate Cancer Prevention Trial. *J Natl Cancer Inst*. 2007 Sep 19;99(18):1366-74.
132. Nickel JC. Comparison of clinical trials with finasteride and dutasteride. *Rev Urol*. 2004;6 Suppl 9:S31-9.
133. Yavuz BB, Ozkayar N, Halil M, et al. Free testosterone levels and implications on clinical outcomes in elderly men. *Aging Clin Exp Res*. 2008 Jun;20(3):201-6
134. Taira AV, Merrick GS, Galbreath RW, et al. Performance of transperineal template-guided mapping biopsy in detecting prostate cancer in the initial and repeat biopsy setting. *Prostate Cancer Prostatic Dis*. 2010 Mar;13(1):71-7.
135. Available at: http://files.shareholder.com/downloads/GHDX/2097290524x0x661617/85f38a0e-ccd5-47de-a348-8d0c2b5c03bd/GHDX_News_2013_5_8_General.pdf. Accessed September 29, 2013.
136. Available at: http://www.myriad.com/products/prolaris/. Accessed September 29, 2013.
137. Gharaee-Kermani M, Macoska JA. Promising molecular targets and biomarkers for male BPH and LUTS. *Curr Urol Rep*. 2013 Aug 3.
138. Clark RV, Hermann DJ, Cunningham GR, Wilson TH, Morrill BB, Hobbs S. Marked suppression of dihydrotestosterone in men with benign prostatic hyperplasia by dutasteride, a dual 5alpha-reductase inhibitor. *J Clin Endocrinol Metab*. 2004 May;89(5):2179-84.
139. Schmidt LJ, Tindall DJ. Steroid 5 -reductase inhibitors targeting BPH and prostate cancer. *J Steroid Biochem Mol Biol*. 2011 May;125(1-2):32-8.
140. Kaplan SA, Ghafar MA, Volpe MA, Lam JS, Fromer D, Te AE. PSA response to finasteride challenge in men with a serum PSA greater than 4 ng/ml and previous negative prostate biopsy: preliminary study. *Urology*. 2002 Sep;60(3):464-8.
141. Handel LN, Agarwal S, Schiff SF, Kelty PJ, Cohen SI. Can effect of finasteride on prostate-specific antigen be used to decrease repeat prostate biopsy? *Urology*. 2006 Dec;68(6):1220-3.
142. Available at: http://www.medscape.com/viewarticle/734687. Accessed September 29, 2013.
143. Thompson IM, Goodman PJ, Tangen CM, et al. The influence of finasteride on the development of prostate cancer. *N Engl J Med*. 2003 Jul 17;349(3):215-24.
144. Andriole GL, Bostwick DG, Brawley OW, et al; REDUCE Study Group. Effect of dutasteride on the risk of prostate cancer. *N Engl J Med*. 2010 Apr 1;362(13):1192-202.
145. Tan RS, Salazar JA. Risks of testosterone replacement therapy in ageing men. *Expert Opin Drug Saf*. 2004 Nov;3(6):599-606.
146. Agarwal PK, Oefelein MG. Testosterone replacement therapy after primary treatment for prostate cancer. *J Urol*. 2005 Feb;173(2):533-6.
147. Gooren L. Androgen deficiency in the aging male: benefits and risks of androgen supplementation. *J Steroid Biochem Mol Biol*. 2003 Jun;85(2-5):349-55.
148. Morgentaler A. Testosterone replacement therapy and prostate cancer. *Urol Clin North Am*. 2007 Nov;34(4):555-63.
149. Rhoden EL, Averbeck MA, Teloken PE. Androgen replacement in men under-going treatment for prostate cancer. *J Sex Med*. 2008 Sep;5(9):2202-8.
150. Raynaud JP. Prostate cancer risk in testosterone-treated men. *J Steroid Biochem Mol Biol*. 2006 Dec;102(1-5):261-6.
151. Rabbani F, Stroumbakis N, Kava BR, Cookson MS, Fair WR. Incidence and clinical significance of false-negative sextant prostate biopsies. *J Urol*. 1998 Apr;159(4):1247-50.
152. Numao N, Kawakami S, Sakura M, et al. Characteristics and clinical significance of prostate cancers missed by initial transrectal 12-core biopsy. *BJU Int*. 2012 Mar;109(5):665-71.
153. Kulkarni GS, Al-Azab R, Lockwood G, et al. Evidence for a biopsy derived grade artifact among larger prostate glands. *J Urol*. 2006 Feb;175(2):505-9.
154. Shimamoto T, Ashida S, Yamasaki I, et al. The clinical value of 3 tesla diffusion-weighted magnetic resonance imaging in the diagnosis of prostate cancer. *Hinyokika Kiyo*. 2012 Mar;58(3):143-8.
155. Ibrahiem EI, Mohsen T, Nabeeh AM, Osman Y, Hekal IA, Abou El-Ghar M. DWI-MRI: single, informative, and noninvasive technique for prostate cancer diagnosis. *Scientific World Journal*. 2012 973450.
156. Andriole GL, Marberger M, Roehrborn CG. Clinical usefulness of serum prostate specific antigen for the detection of prostate cancer is preserved in men receiving the dual 5alpha-reductase inhibitor dutasteride. *J Urol*. 2006 May;175(5):1657-62.
157. Dowling RJ, Goodwin PJ, Stambolic V. Understanding the benefit of metformin use in cancer treatment. *BMC Med*. 2011 Apr 6;9:33.

158. Hirsch HA, Iliopoulos D, Tsichlis PN, Struhl K. Metformin selectively targets cancer stem cells, and acts together with chemotherapy to block tumor growth and prolong remission. *Cancer Res*. 2009 Oct 1;69(19):7507-11.
159. Anisimov VN, Berstein LM, Egormin PA, et al. Effect of metformin on life span and on the development of spontaneous mammary tumors in HER-2/neu transgenic mice. *Exp Gerontol*. 2005 Aug-Sep;40(8-9):685-93.
160. Vazquez-Martin A, Oliveras-Ferraros C, Del Barco S, Martin-Castillo B, Menendez JA. The anti-diabetic drug metformin suppresses self-renewal and proliferation of trastuzumab-resistant tumor-initiating breast cancer stem cells. *Breast Cancer Res Treat*. 2011 Apr;126(2):355-64.
161. Tomimoto A, Endo H, Sugiyama M, et al. Metformin suppresses intestinal polyp growth in ApcMin/+ mice. *Cancer Sci*. 2008 Nov;99(11):2136-41.
162. Gotlieb WH, Saumet J, Beauchamp MC, Gu J, Lau S, Pollak MN, Bruchim I. In vitro metformin anti-neoplastic activity in epithelial ovarian cancer. *Gynecol Oncol*. 2008 Aug;110(2):246-50.
163. Cantrell LA, Zhou C, Mendivil A, Malloy KM, Gehrig PA, Bae-Jump VL. Metformin is a potent inhibitor of endometrial cancer cell proliferation--implications for a novel treatment strategy. *Gynecol Oncol*. 2010 Jan;116(1):92-8.
164. Libby G, Donnelly LA, Donnan PT, Alessi DR, Morris AD, Evans JM. New users of metformin are at low risk of incident cancer: a cohort study among people with type 2 diabetes. *Diabetes Care*. 2009 Sep;32(9):1620-5.
165. Memmott RM, Mercado JR, Maier CR, Kawabata S, Fox SD, Dennis PA. Metformin prevents tobacco carcinogen—induced lung tumorigenesis. *Cancer Prev Res (Phila)*. 2010 Sep;3(9):1066-76.
166. Evans JM, Donnelly LA, Emslie-Smith AM, Alessi DR, Morris AD. Metformin and reduced risk of cancer in diabetic patients. *BMJ*. 2005 Jun 4;330(7503):1304-5
167. Currie CJ, Poole CD, Gale EA. The influence of glucose-lowering therapies on cancer risk in type 2 diabetes. *Diabetologia*. 2009 Sep;52(9):1766-77.
168. Nagi DK, Yudkin JS. Effects of metformin on insulin resistance, risk factors for cardiovascular disease, and plasminogen activator inhibitor in NIDDM subjects. A study of two ethnic groups. *Diabetes Care*. 1993 16(4):621-29.
169. Choi YK, Park KG. Metabolic roles of AMPK and metformin in cancer cells. *Mol Cells*. 2013 Jun 19.
170. Luo Z, Zang M, Guo W. AMPK as a metabolic tumor suppressor: control of metabolism and cell growth. *Future Oncol*. 2010 Mar;6(3):457-70.
171. Ben Sahra I, Regazzetti C, Robert G, et al. Metformin, independent of AMPK, induces mTOR inhibition and cell-cycle arrest through REDD1. *Cancer Res*. 2011 Jul 1;71(13):4366-72.
172. Loubière C, Dirat B, Tanti JF, Bost F. New perspectives for metformin in cancer therapy. *Ann Endocrinol (Paris)*. 2013 May;74(2):130-6.
173. Zakikhani M, Dowling RJ, Sonenberg N, Pollak MN. The effects of adiponectin and metformin on prostate and colon neoplasia involve activation of AMP-activated protein kinase. *Cancer Prev Res (Phila Pa)*. 2008 Oct;1(5):369-75.
174. Ben Sahra I, Laurent K, Loubat A, et al. The antidiabetic drug metformin exerts an antitumoral effect in vitro and in vivo through a decrease of cyclin D1 level. *Oncogene*. 2008 Jun 5;27(25):3576-86.
175. Ersoy C, Kiyici S, Budak F, et al. The effect of metformin treatment on VEGF and PAI-1 levels in obese type 2 diabetic patients. *Diabetes Res Clin Pract*. 2008 Jul;81(1):56-60.
176. Parekh N, Lin Y, Vadiveloo M, Hayes RB, Lu-Yao GL. Metabolic dysregulation of the insulin-glucose axis and risk of obesity-related cancers in the Framingham Heart Study-Offspring Cohort (1971-2008). *Cancer Epidemiol Biomarkers Prev*. 2013 Sep 24.
177. Ong KW, Hsu A, Tan BK. Anti-diabetic and anti-lipidemic effects of chlorogenic acid are mediated by ampk activation. *Biochem Pharmacol*. 2013 May 1;85(9):1341-51.
178. Dunlap SM, Chiao LJ, Nogueira L, et al. Dietary energy balance modulates epithelial-to-mesenchymal transition and tumor progression in murine claudin-low and basal-like mammary tumor models. *Cancer Prev Res (Phila)*. 2012 Jul;5(7):930-42.
179. Available at: http://www.clinicaltrials.gov/ct2/show/NCT01864096. Accessed October 1, 2013.
180. Available at: http://www.abstractsonline.com/Plan/ViewAbstract.aspx?sKey=d14acbff-7602-45e9-a577-11db6325068e&cKey=a5dfd7e0-c8eb-4d99-814c-8423fdd9519c&mKey=%7b2D8C569E-B72C-4E7D-AB3B-070BEC7EB280%7d. Accessed October 1, 2013.
181. Available at: http://journals.lww.com/oncology-times/blog/onlinefirst/pages/post.aspx?Postid=451. Accessed October 10, 2013.
182. Ravindran J, Prasad S, Aggarwal BB. Curcumin and cancer cells: how many ways can curry kill tumor cells selectively? *AAPS J*. 2009 Sep;11(3):495-510.
183. Spratt DE, Zhang C, Zumsteg ZS, Pei X, Zhang Z, Zelefsky MJ. Metformin and prostate cancer: reduced development of castration-resistant disease and prostate cancer mortality. *Eur Urol*. 2013 Apr;63(4):709-16.
184. Hvid T, Winding K, Rinnov A, et al. Endurance training improves insulin sensitivity and body composition in prostate cancer patients treated with androgen deprivation therapy. *Endocr Relat Cancer*. 2013 Aug 19;20(5):621-32.
185. Available at: http://www.drugs.com/cdi/cabergoline.html. Accessed October 1, 2013.
186. Langley RE, Burdett S, Tierney JF, Cafferty F, Parmar MK, Venning G. Aspirin and cancer: has aspirin been overlooked as an adjuvant therapy? *Br J Cancer*. 2011 Oct 11;105(8):1107-13.
187. St Sauver JL, Jacobson DJ, McGree ME, Lieber MM, Jacobsen SJ. Protective association between nonsteroidal antiinflammatory drug use and measures of benign prostatic hyperplasia. *Am J Epidemiol*. 2006 Oct 15;164(8):760-8.
188. Egan K, FitzGerald GA. Eicosanoids and the vascular endothelium. *Handb Exp Pharmacol*. 2006 176 (Pt 1):189-211.
189. Wu KK. Aspirin and other cyclooxygenase inhibitors: new therapeutic insights. *Semin Vasc Med*. 2003 May;3(2):107-12.
190. Available at: http://seer.cancer.gov/faststats/selections.php?run=runit&output=2&data=2&statistic=1&year=201302&race=1&sex=2&age=1&series=cancer&cancer=66#Output. Accessed October 4, 2013.
191. Available at: http://www.cancer.gov/cancertopics/factsheet/detection/PSA. Accessed October 4, 2013.
192. Available at: http://cancerpreventionresearch.aacrjournals.org/content/1/3/174.full. Accessed October 3, 2013.

BONE RESTORE

WITH VITAMIN K2



Bone Restore combines critical **bone boosting** nutrients into one **superior formula**.

Bone Restore includes highly ***absorbable*** forms of **calcium** and **boron,** along with **vitamin D3**, **magnesium**, **zinc**, **manganese**, and **silicon**. **Bone Restore** is available with or without **vitamin K2** (MK-7).

Bone Restore now contains **300 mg** of **magnesium**.

The retail price for 120 capsules of **Bone Restore** is $24. If a member buys four bottles, the price is reduced to **$16.50** per bottle. **(Item# 01727)**

The same **Bone Restore** formula without vitamin K2 (MK-7) is available as well. The retail price for 120 capsules is $22. If a member buys four bottles, the price is reduced to **$14.25** per bottle. **(Item# 01726)**

Just four capsules of Bone Restore provide:

Highly Absorbable Calcium (as DimaCal® dicalcium malate, TRAACS® calcium bisglycinate chelate, calcium fructoborate)	**700 mg**
Vitamin D3	**1,000 IU**
Vitamin K2 (as menaquinone-7)	**200 mcg**
Magnesium (as magnesium oxide)	**300 mg**
Boron (calcium fructoborate as patented FruiteX B® OsteoBoron®)	**3 mg**
Zinc (as zinc amino acid chelate)	**2 mg**
Manganese (as amino acid chelate)	**1 mg**
Silicon (from horsetail extract)	**5 mg**

Note: Those who take **Super Booster** or **Super K** usually do not need additional vitamin K2. They should order **Bone Restore** without **vitamin K2**. Those taking the anti-coagulant drug **Coumadin**® (warfarin) should use **BONE RESTORE** without **vitamin K2**.

Fruitex B® and OsteoBoron® are registered trademarks of VDF Futureceuticals, Inc. U.S. patent #5,962,049.

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To order Bone Restore, call 1-800-544-4440 or visit www.LifeExtension.com

ULTIMATE PROSTATE PROTECTION

At Life Extension®, we continually update our formulas to reflect the latest research findings.

Ultra Natural Prostate formula has been upgraded to include the most scientifically substantiated nutrients to help protect the prostate gland and maintain its healthy function.

The new **Ultra Natural Prostate** formula contains **thymoquinone**—a potent compound found in black cumin seed. Here are the eleven ingredients in the new **Ultra Natural Prostate**:

- **Thymoquinone** *targets* prostate cells to promote healthy **apoptosis** (orderly removal of senescent cells).[1-9] The **10 milligrams** of thymoquinone in this formula is the same amount contained in around **2.5 grams** of black cumin seed oil![10]
- **Standardized lignans** from flax seed and Norway spruce knotwood convert to *enterolactone* in the intestine, which is then absorbed into the bloodstream to provide support for prostate cells against excess estrogen levels.[11-13] Testosterone often converts to estrogen at higher rates as men age—and prostate cells are sensitive to estrogen's growth stimulatory effects.[14,15]
- **AprèsFlex®**, an extract of *Boswellia*, supports normal inhibition of *5-lipoxygenase* or *5-LOX*, an enzyme that is associated with undesirable cell division changes.[16,17] AprèsFlex® absorbs into the blood nearly **52% better** than standard Boswellia, for superior effectiveness.[18]
- **Nettle root extract** helps support prostate cells against excess estrogen levels by mitigating the activity of the aromatase enzyme needed to create estrogens.[19,20]
- **DeepExtract™ USPlus® saw palmetto extract** helps inhibit dihydrotestosterone (DHT) activity in the prostate, helps inhibit alpha-adrenergic receptor activity (to support normal urinary flow), and helps regulate inflammatory reactions in the prostate.[21-24] DeepExtract™ is a patented, state-of-the-art, ultra-high pressure CO2 extraction technology that ensures the most complete bioactive extract profile available. This results in a superior formula containing key ingredients in higher concentrations than many other extracts.[25]

To order Ultra Natural Prostate, call 1-800-544-4440 or visit www.LifeExtension.com

Now With Thymoquinone

Item #01895

- **Pygeum** (*Pygeum africanum*) extract helps suppress prostaglandin production in the prostate and supports healthy urination patterns.[26,27]
- **Pumpkin seed supercritical CO2 oil**, from select pumpkins, enhances the composition of free fatty acids and augments saw palmetto's benefits.[28-30]
- **Beta-sitosterol** is a biologically active constituent of pygeum and saw palmetto[31] that enhances pygeum's protective effects and helps improve quality of life.[32,33]
- **Graminex® Flower Pollen Extract™**, a European pollen extract has been shown to help relax the smooth muscles of the urethra and help regulate inflammatory reactions.[34-36]
- **Boron** has been shown to slow elevation of prostate-specific antigen (PSA), seemingly a result of this mineral's positive effect on the body's regulation of protein-degrading enzymes.[37-39]
- **Lycopene**, a carotenoid associated with the tomato's red color, supports efficient cellular communication, helps maintain healthy DNA, regulates hormonal metabolism, and promotes healthy prostate size and structure.[40-46]

Ultra Natural Prostate formula—now with **thymoquinone**—provides the latest scientifically validated, standardized botanical extracts shown to promote healthy prostate function. No other prostate protection formula provides such a broad array of nutrients to support the multiple factors involved in supporting the aging prostate gland.

The suggested daily dose of two softgels of ***Ultra*** **Natural Prostate** provides:

USPlus® Saw Palmetto CO2 DeepExtract™ (fruit) [providing 272 mg total fatty acids]	**320 mg**
Graminex® Flower Pollen Extract™ (from rye)	**252 mg**
Stinging and Dwarf nettle extracts (root)	**240 mg**
Beta-Sitosterol (from pine)	**180 mg**
ThymoQ™ Phospholipid Complex [Phospholipids, thymoquinone (10 mg)]	**170 mg**
Pygeum extract (bark)	**100 mg**
Pumpkin seed oil [providing 170 mg total fatty acids]	**200 mg**
AprèsFlex® Indian frankincense (Boswellia serrata) **extract** (gum resin) [providing 14 mg AKBA1]	**70 mg**
Proprietary Enterolactone Precursors Blend [HMRlignan™ Norway spruce (Picea abies) (knot wood) and Flax (seed) lignan extracts]	**20 mg**
Lycopene [from natural tomato extract (fruit)]	**10 mg**
Boron (as Albion® bororganic glycine)	**3 mg**

[1] **3-O-acetyl-11-keto-ß-boswellic acid**

A bottle of 60 softgels of **Ultra Natural Prostate** retails for **$38**. If a member buys four bottles, the price is reduced to **$26.25** per bottle.

References

1. *Cell Biochem Funct.* 2002;20:143-51.
2. *Drug Chem Toxicol.* 2003;26:87-98.
3. *Chem Biol Interact.* 2011;190:148-54.
4. *Urol Int.* 2013 Sep 3.
5. *Biochem Pharmacol.* 2012;83:443-51.
6. *Br J Pharmacol.* 2010;161:541-54.
7. *Mol Cancer Res.* 2008;6:1059-70.
8. *PLoS One.* 2013;8:e61342.
9. *J Cell Biochem.* 2011;112:3112-21.
10. Available at: http://www.sciencedirect.com/science/article/pii/S0023643810001404. Accessed September 16, 2013.
11. *Eur J Clin Nutr.* 2006 Jan;60(1):129-35.
12. *J Med Food.* 2008 Jun;11(2):207-14.
13. *Cancer Epidemiol Biomarkers Prev* 2008;17:3241-51.
14. *Ann N Y Acad Sci.* 2006 Nov;1089:201-17.
15. *Aging Male.* 2002 Jun;5(2):98-102.
16. *Acta Biochim Biophys Sin (Shanghai).* 2013 Sep;45 (9):709-19
17. *Pharmacology.* 2007;79(1):34-41.
18. *Mol Cell Biochem.* 2011 Aug;354(1-2):189-97.
19. *Phytomedicine.* 2007 Aug;14(7-8):568-79.
20. *Anticancer Agents Med Chem.* 2008 Aug;8(6):646-82.
21. *Curr Opin Urol.* 2005 Jan;15(1):45-8.
22. *Am J Chin Med.* 2004;32(3):331-8.
23. *Adv Ther.* 2010 Aug;27(8):555-63.
24. *J Inflamm (Lond).* 2013 Mar 14;10(1):11.
25. *US Plus Corp.* Unpublished study.
26. Available at: http://www.ucdenver.edu/academics/colleges/pharmacy/Resources/OnCampusPharmDStudents/ExperientialProgram/Documents/nutr_monographs/Monograph-pygeum.pdf. Accessed September 17, 2013.
27. *Endocrine.* 2007 Feb;31(1):72-81.
28. *Urol Int.* 2011;87(2):218-24.
29. *Nutr Res Pract.* 2009 Winter;3(4):323-7.
30. *J Med Food.* 1999;2(1):21-7.
31. *World J Urol.* 2002 Apr;19(6):426-35.
32. *Br J Urol .* 1997;80:427-32.
33. Available at: http://www.med.nyu.edu/content?ChunkIID=21555. Accessed September 17, 2013.
34. *Eur Urol.* 2009 Sep;56(3):544-51.
35. *Nihon Hinyokika Gakkai Zasshi.* 2002 May;93(4):539-47.
36. *BJU Int.* 2000 May;85(7):836-41.
37. *Anticancer Agents Med Chem.* 2010 May 1;10(4):346-51.
38. *Arch Pharm (Weinheim).* 2004 Apr;337(4):183-7.
39. *Toxicol Pathol.* 2004 Jan-Feb;32(1):73-8.
40. *BJU Int.* 2003 Sep;92(4):375-8.
41. *Nutr Cancer.* 2009 Nov;61(6):775-83.
42. *J Nutr.* 2008 Jan;138(1):49-53.
43. *Aktuelle Urol.* 2009 Jan;40(1):37-43.
44. *FASEB J.* 2004 Jun;18(9):1019-21.
45. *J Natl Cancer Inst.* 2002 Mar 6;94(5):391-8.
46. *Cancer Epidemiol Biomarkers Prev.* 2004 Mar;13(3):340-5.

From European Scientists!

A Longer-Lasting Form of

LACTASE

For Digestive Support!

Some people experience occasional digestive issues when consuming ***lactose***—the milk sugar found in **dairy** products.

Commercial **lactase supplements** may not provide sufficient protection or relief. The reason is that most lactase supplements quickly lose their protective ability.[1]

As a result, many people still continue to experience **digestive discomfort** from eating dairy foods even after taking standard lactase supplements.

Fortunately, scientists in Europe have developed a ***long-lasting*** **lactase** called **LACTO**SOLV™ that provides an effective solution.

Long-Lasting Support

Most lactase supplements function best in a highly *acidic* pH environment such as that of the stomach.[2,3] This means that standard **lactase** supplements have a very brief window of time during which they can attack the lactose load. Several capsules may be needed to break down an average lactose-containing meal.[1,3]

But **LACTO**SOLV™ **enteric-coated pellets** *become active* upon entering the nearly neutral pH environment of the **small intestine**.[1] The small intestine is where the digestive enzyme **lactase** is naturally produced to break down **lactose**.

LACTOSOLV™ greatly extends the window of activity of supplemental lactase, working over hours instead of merely minutes.[1]

This results in **longer-lasting** support for the digestion of foods containing lactose!

Enjoy Dairy Again with Less Worry!

When you take a **LACTO**SOLV™ **Long-Lasting Lactase** capsule 10-15 minutes before your first bite of dairy, you're free to enjoy your favorite dairy food while minimizing concern about later discomfort—secure in the assurance that your lactase supplement ***won't quit on you before its job is done!***[1]

The suggested dosage of one (1) capsule of Life Extension® **LACTO**SOLV™ **Long-Lasting Lactase** taken 10 to 15 minutes prior to consuming lactose-containing foods or beverages provides:

Lactase (from *Kluyveromyces lactis*)	**212 LAU****

** Lactase Activity Units

A box of 30 capsules of Life Extension® **LACTO**SOLV™ **Long-Lasting Lactase** retails for $30. If a member buys four boxes, the price is reduced to **$20.25** per box.

Item #01702

References

1. *Clin Translational Allergy.* 2011 August 12;1(Suppl 1):104.
2. *Rev Invest Clin.* 1996 Nov;48 Suppl:51-61.
3. *Appl Biochem Biotechnol.* 2006 Aug;134(2):179-91.

To order Life Extension® LACTOSOLV™ Long-Lasting Lactase, call 1-800-544-4440 or visit www.LifeExtension.com

IN THE NEWS

Positive Lifestyle Changes Associated with Longer Telomeres

The results of a study described in *The Lancet Oncology* reveal that improvements in diet, exercise, stress management, and social support are associated with longer telomeres (DNA-protein complexes at the end of chromosomes which shorten with cellular aging).*

The current study included 35 men with low-risk prostate cancer who had elected to undergo active surveillance. Ten men participated in the lifestyle intervention and 25 served as controls. Blood samples collected from the subjects at the beginning of the study and after five years were analyzed for peripheral-blood mononuclear cell telomere length and telomerase levels.

Men who engaged in the lifestyle program had telomeres that were **10%** longer on average at the end of the study, while the control group experienced an average **3%** decrease in length. Greater adherence to lifestyle recommendations was associated with a corresponding increase in telomere length.

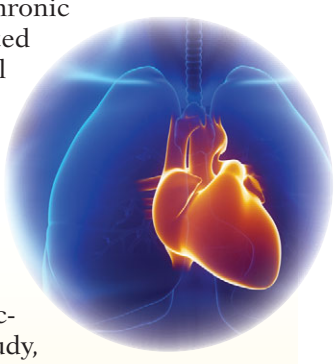
Editor's Note: The lifestyle program consisted of a diet high in whole foods, plant-based protein, fruit, vegetables, grains, and legumes that was low in fat and refined carbohydrates; a moderate aerobic exercise regimen, stress management consisting of yoga, meditation and relaxation, and weekly support group sessions.

—D. Dye

* *Lancet Oncol.* 2013 Sep 16.

Chronic Inflammation Impacts Healthy Aging

In the *Canadian Medical Association Journal*, Tasnime N. Akbaraly, PhD, of France's Institut National de la Santé et de la Recherche Médicale and colleagues report that high levels of interleukin-6, which are elevated during chronic inflammation, are associated with a reduction in successful aging, which they define as the absence of chronic diseases and disability coupled with optimal physical, cognitive, cardiovascular, and respiratory functioning.*



The study analyzed data from 3,044 middle-aged participants in the Whitehall II study, which examined 10,308 British civil servants every five years beginning in 1985. Subjects were categorized as having undergone successful aging, cardiovascular disease, noncardiovascular death, or normal aging over a 10-year follow up beginning in 1997-1999.

Elevated levels of interleukin-6 reduced the odds of experiencing successful aging by **47%**, elevated the risk of undergoing cardiovascular events by **64%**, and more than **doubled** the risk of noncardiovascular death in comparison with subjects whose levels were lower.

Editor's Note: A high level of interleukin-6 was defined as more than **2.0 nanograms per liter** at the two points at which it was measured. Supplements that help suppress IL-6 include: EPA, B6, DHEA, lycopene, luteolin, resveratrol, quercetin, and genistein among others.

—D. Dye

* *CMAJ.* 2013 Sep 16.

B Vitamin Supplementation Could Lower Stroke Risk

The results of a meta-analysis published in the journal *Neurology* indicate that supplementing with B vitamins could reduce the risk of experiencing a stroke.*

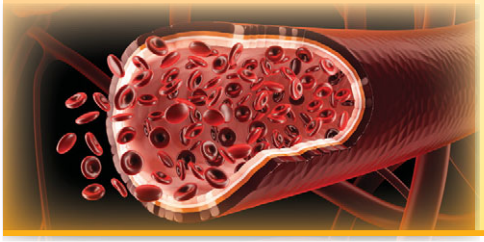
Yuming Xu of Zengzhou University and colleagues selected 14 randomized, double-blinded trials that included a total of 54,913 subjects for their analysis. B vitamins administered in the trials included folate or folic acid, vitamin B6 and vitamin B12, and control groups were given a placebo or a very low-dose supplement. Follow-up times ranged from 24 to 80 months, during which 2,471 strokes occurred.

All studies but one uncovered a decrease in supplemented subjects of serum homocysteine which, when elevated, is a risk factor for stroke. Reductions in serum homocysteine ranged from **3.1** to **10.4 mmol/L** in vitamin-supplemented groups. When all trial participants were analyzed, overall stroke risk was reduced by **7%** as a result of homocysteine reduction among supplemented participants in comparison with the control subjects.

Editor's Note: The authors conclude that, "B vitamin supplementation for homocysteine reduction significantly reduced stroke events, especially in subjects with certain characteristics who received appropriate intervention measure."

—D. Dye

* *Neurology*. 2013 Sep 18.



Antioxidant Could Prevent Chemo Side Effect

An article published in the *Annals of Neurology* reveals that ethoxyquin, an antioxidant frequently used as a preservative in pet food, could help prevent peripheral neuropathy in patients treated with the chemotherapy drug paclitaxel (Taxol®).* Peripheral neuropathy is characterized by pain, numbness, and tingling in the extremities that can often persist years after the drug has been discontinued.

By screening over two thousand compounds, Dr. Höke and his colleagues discovered that ethoxyquin and its derivatives protected against paclitaxel-induced peripheral neuropathy without affecting its ability to kill cancer cells. Giving ethoxyquin to mice treated with paclitaxel prevented two-thirds of the in-nerve degeneration that occurred in animals that did not receive the protective compound. The researchers hope to use the finding to develop a drug for humans undergoing paclitaxel treatment.

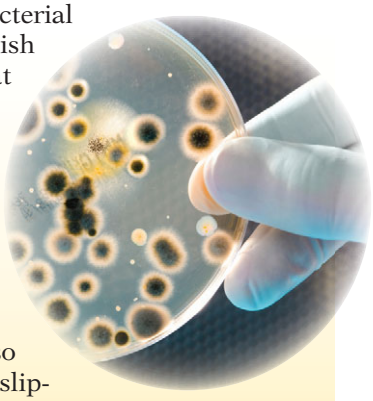
Editor's Note: The authors remark that, "Ethoxyquin and its novel derivatives as well as other classes of small molecules that act as heat shock protein 90 modulators may offer a new opportunity for development of drugs to prevent chemotherapy induced axonal degeneration."

—D. Dye

* *Ann Neurol*. 2013 Sep 19.

Weight Gain Linked to Poor Gut Bacteria

An article published in the journal *Nature* reports the MetaHIT consortium's finding of an association between gut bacterial "richness" and protection against obesity.*



The current research compared the gut bacterial genes of 169 obese and 123 nonobese Danish men and women. It was discovered that approximately one-fourth of the participants had up to **40%** fewer gut bacterial genes than the remainder of the study population and correspondingly fewer bacteria. This group also had less bacterial diversity. Subjects with low bacterial richness were significantly likely to have more adiposity or to be obese and to have gained more weight over the previous nine years. They were also more insulin resistant, more likely to be dyslipidemic, and had an increase in markers of inflammation and white blood cells, indicating a greater risk for diabetes or heart disease.

Editor's Note: The research team identified eight bacterial species as possibly preventive against weight gain. The findings could lead to new therapies for obesity or the development of diagnostic tests to identify those at risk of diseases linked to gut microbiome alterations.

—D. Dye

* *Nature*. 2013 Aug 29;500(7464):541-6.

Green Tea and Vitamin E Enhance Exercise Benefits in Older Men and Women

In an article published in the *Journal of the American College of Nutrition*, Israeli researchers report that drinking green tea and supplementing with vitamin E was associated with a reduction in waist circumference and fasting glucose among older adults who participated in a 12-week exercise program.*

Twenty-two men and women received three cups of green tea and **400 IU** vitamin E per day or a placebo over the course of an exercise program that involved 30 minutes of moderately intense walking six days per week. Although diet remained unchanged, all participants experienced a reduction in weight and fasting insulin levels.

Average waist circumference declined from 39.7 inches to 38.15 inches among men who received green tea and vitamin E, and women's waists declined from 37.7 inches to 33.5 inches by the end of the study. The green tea/vitamin E group additionally experienced a decrease in fasting glucose levels.

Editor's Note: Plasma protein carbonyls (a marker of oxidative stress) were also reduced, which was accompanied by a significant rise in red blood cell catalase activity at the end of the study period (indicating increased antioxidant protection) in the supplemented group.

—D. Dye

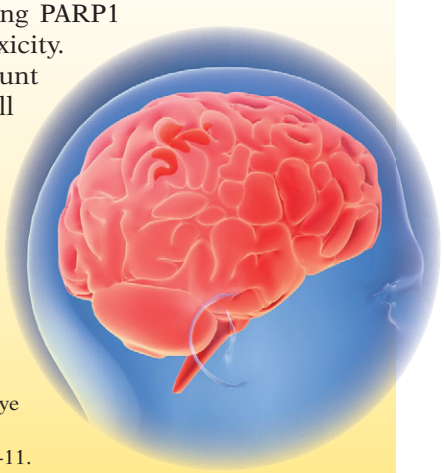
* *J Am Coll Nutr.* 2013 Feb;32(1):31-40.

Omega-3 Fatty Acid Could Help Protect the Brain From Effects of Alcohol

Results from a study presented at the 14th Congress of the European Society for Biomedical Research on Alcoholism, suggest a protective effect for docosahexaenoic acid (DHA), an omega-3 polyunsaturated fatty acid, against the development of dementia in alcoholics.*

Dr. Collins and his associates administered DHA or no treatment to cultured adult rat brain cells prior to exposure to an amount of alcohol four times the legal limit established for driving. They observed a **90%** reduction in neuroinflammation and neuronal death in DHA-treated cells in comparison to untreated cells. The team found that DHA suppressed PARP1, AQP4, and PLA2, which are factors potentiated by alcohol consumption, and that blocking PARP1 reduces binge alcohol-induced neurotoxicity.

Dr. Collins emphasized that the amount of alcohol consumed by abusers still needs to be reduced in order to help protect brain function.



Editor's Note: In a previous analysis of 143 studies, Dr. Collins found an association between moderate social drinking and a lower risk of dementia and cognitive impairment. However, consuming larger amounts of alcohol results in inflammation, leading to increased oxidative stress and brain cell death, which is responsible for the greater risk of dementia experienced by alcoholics.

—D. Dye

* 14th Congress of the European Society for Biomedical Research on Alcoholism, 2013 Sep 8-11. Warsaw, Poland.

Americans Are Living Longer and Healthier

A study described in the *American Journal of Public Health* may help put to rest concerns that the longer life span looked forward to by the average American is bought at the price of an increased period of disability.* In a recent article, Allison Rosen, MD, and her colleagues report that not only can younger Americans expect to live longer than their counterparts of twenty years ago, but they can also anticipate that more of those years will be spent healthy.

Dr. Rosen and her colleagues utilized data derived from the National Medical Expenditure Survey, National Health Interview Survey, Medical Expenditure Panel Survey, National Nursing Home Survey, and Medicare Current Beneficiary Survey. They determined that, in comparison with the quality-adjusted life expectancy (QALE) of two decades ago, the average 25-year-old living in the USA will experience 2.4 additional years of healthy life, and the average 65-year old will have 1.7 more years.

Editor's Note: "QALE tells us more than how long a person can expect to live," Dr. Rosen explained. "It tells us what the relative quality of those added years are in terms of physical, emotional, and mental well-being. Though many studies have measured this in different ways, this is really the first time we've been able to capture this type of information across the whole US population over an extended period."

—D. Dye

* *Am J Public Health.* 2013 Sep 12.

Alpha Lipoic Acid, Inositol Reduce Metabolic Syndrome in Postmenopausal Women

The journal *Trials* reported the outcome of a study which found a benefit for supplementing with alpha lipoic acid and inositol among postmenopausal women with metabolic syndrome.*

The trial included women who had three or more of five metabolic syndrome components, and who were at increased risk of breast cancer as determined by family history or history of borderline lesions. Participants were instructed to consume a low-calorie diet and received alpha lipoic acid and inositol, or a placebo for six months.

While the low-calorie diet slightly improved insulin resistance in the placebo group, a significant decrease in insulin occurred among **89.3%** of women who received alpha lipoic acid and inositol, and a reduction in insulin resistance was observed in **66.7%**. A greater percentage of women who received the supplements experienced reductions in triglycerides, waist circumference, and waist to hip ratio, as well as a significant increase in HDL.

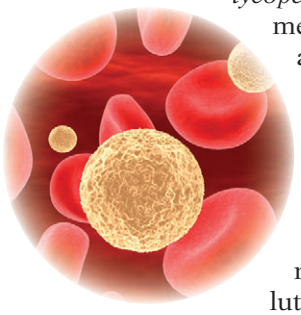
Editor's Note: Metabolic syndrome is a cluster of symptoms that increase the risk of cardiovascular disease and diabetes. Postmenopausal women with metabolic syndrome are at greater risk of breast cancer than the rest of the female population.

—D. Dye

* *Trials.* 2013 Aug 28;14(1):273.

Trial Finds Benefit for Lycopene and Lutein in Adults with Subclinical Atherosclerosis

The results of a trial reported in the *British Journal of Nutrition* reveal an association between supplementation with the carotenoids *lycopene* and *lutein* and a reduction in carotid intima-media thickness (CAIMT), which is a measure of atherosclerotic plaque.*



The study included 144 men and women with subclinical atherosclerosis, defined as CAIMT greater than **0.75 millimeters** among those aged 59 years or younger and greater than **0.85 millimeters** for subjects aged 60 and older. Participants were randomized to receive **20 milligrams** lutein, **20 milligrams** lutein plus **20 milligrams** lycopene, or a placebo daily for one year. Doppler ultrasonography conducted at the beginning and end of the trial evaluated carotid artery intima-media thickness.

While average carotid artery intima-media thickness did not change in the placebo group after a year, a significant reduction was observed in those who received lutein and among those who received lutein and lycopene.

Editor's Note: Participants who received both lutein and lycopene experienced the greatest reduction in CAIMT.

—D. Dye

* *Br J Nutr.* 2013 Sep 19.

Lower Diabetes Risk Found in Men with Higher Omega-3 Polyunsaturated Fatty Acid Levels

An article published in *Diabetes Care* reports an association between higher serum levels of omega-3 polyunsaturated fatty acids and a reduction in the risk of type II diabetes.*

Researchers at the University of Eastern Finland evaluated data from 2,212 men who participated in the Kuopio Ischaemic Heart Disease Risk Factor Study. Blood samples were analyzed for the omega-3 fatty acids EPA, DPA, DHA, and ALA, and hair samples were analyzed for mercury, a common contaminant of fish that may modify the effect of omega-3 fatty acids on diabetes risk by increasing insulin resistance.

Over a 19.3 year average follow-up, type II diabetes was diagnosed in 422 subjects. Men whose combined serum EPA, DPA, and DHA levels were among the top **25%** of participants had a risk of diabetes that was **one-third less** than those whose levels were among the lowest fourth.

Editor's Note: When individual long-chain fatty acids were analyzed, DHA and DPA emerged as protective against type II diabetes. No effect of mercury on diabetes risk was found.

—D. Dye

* *Diabetes Care.* 2013 Sep 11.

Preserve Youthful

CELLULAR ENERGY

with Next-Generation

LIPOIC ACID

Published studies have shown the critical importance of **lipoic acid** in supporting healthy mitochondrial function.

Unlike other forms of lipoic acid, **Super R-Lipoic Acid** is more bioavailable, stable, and potent, achieving 10-30 times higher peak blood levels than pure R-lipoic acid.[1] This unique **sodium-R-lipoate** can help you reach peak plasma concentrations within just 10-20 minutes[2] of supplementation.

Super R-Lipoic Acid provides more of the active "R" form of lipoic acid than any other supplement.

A bottle of **Super R-Lipoic Acid** containing 60 vegetarian capsules retails for $49. If a member buys four bottles, the cost is only **$33.75** per bottle. Each capsule contains **300 mg** of stabilized, Bio-Enhanced® **Super R-lipoic acid** supplying **240 mg** of **R-lipoic acid**. Suggested dose is one capsule daily.

References

1. Carlson DA, Young KL, Fischer SJ, Ulrich H. In: Packer L. Patel M. eds. *Lipoic Acid: Energy Production, Antioxidant Activity and Health Effects*. London: Taylor & Francis Publishers; 2008:235-70.
2. Carlson DA, Smith AR, Fischer SJ, Young KL, Packer L. *Altern Med Rev*. 2007 Dec;12(4):343-51.

To order **Super R-Lipoic Acid**,
call 1-800-544-4440
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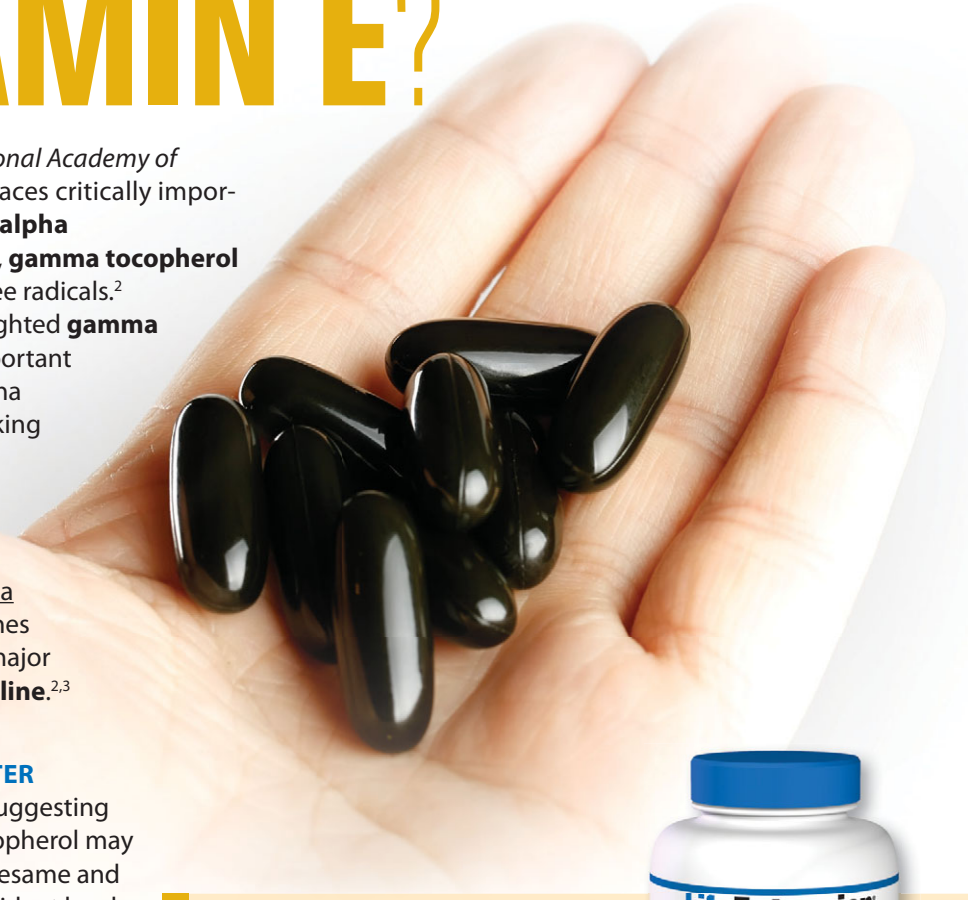
CAUTION: Because this product may lower blood glucose, consult your healthcare provider before taking this product if you are taking glucose lowering medication. Bio-Enhanced® is a registered trademark of Geronova Research, Inc.

ARE YOU TAKING THE OPTIMAL FORMS OF VITAMIN E?



According to the *Proceedings of the National Academy of Sciences*, alpha tocopherol (vitamin E) displaces critically important gamma tocopherol in the cells.[1] While **alpha tocopherol** inhibits free-radical production, **gamma tocopherol** is required to trap and neutralize existing free radicals.[2]

Prestigious scientific journals have highlighted **gamma tocopherol** as one of the most critically important forms of **tocopherols**, which includes d-alpha tocopherol (natural vitamin E) for those seeking optimal health benefits.

Most commercial vitamin E supplements contain little, if any, **gamma tocopherol**. They instead rely on **alpha tocopherol** as the primary ingredient. However, it is gamma tocopherol (not the alpha form) that quenches **peroxynitrite**, the free radical that plays a major role in the development of **age-related decline**.[2,3]

SESAME LIGNANS: THE NATURAL VITAMIN E BOOSTER

Life Extension® has uncovered research suggesting that adding **sesame lignans** to gamma tocopherol may significantly enhance its beneficial effects. Sesame and its lignans have been shown to boost antioxidant levels and help maintain already-normal blood pressure.*

In a human study that combined **gamma tocopherol** with **sesame lignans**, gamma tocopherol/sesame was **25% more effective** than gamma tocopherol/tocotrienols in suppressing tissue measurements for free-radical and inflammatory damage.[4,5] Since tocotrienols are considered nature's most potent antioxidants, the fact that low-cost gamma tocopherol with sesame is more effective is a remarkable finding.

Life Extension fortified the popular **Gamma E Tocopherol** supplement with standardized **sesame lignans** extract long ago. Consumers thus obtain superior benefits at a much **lower cost**.

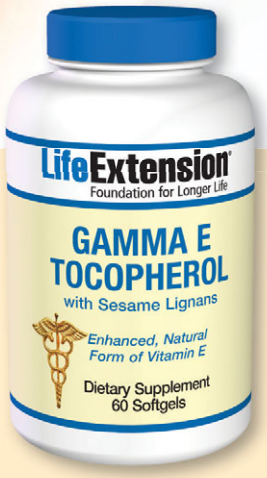
WORLD'S MOST COMPREHENSIVE VITAMIN E FORMULA!

The **Gamma E Tocopherol with Sesame Lignans** formula provides potent doses of critically important gamma **tocopherol** along with **sesame lignans** to augment its antioxidant effects. Suggested dose is one softgel once or twice daily.

The retail price for 60 softgels of **Gamma E Tocopherol with Sesame Lignans** is **$32**. If a member buys four bottles, the price is reduced to only **$21.75 per bottle**.

Each softgel of Gamma E Tocopherol with Sesame Lignans provides:

Gamma tocopherol	**197.45-269.25 mg**
Delta tocopherol	**71.8-107.7 mg**
Alpha tocopherol	**30.52-43.08 mg**
Beta tocopherol	**<17.95 mg**
Sesame seed *(Sesamum indicum)* lignan extract	**20 mg**



Item # 00759

Contains soybeans.

Antioxidant Vitamins & Cancer. Some scientific evidence suggests that consumption of antioxidant vitamins may reduce the risk of certain forms of cancer. However, the FDA does not endorse this claim because this evidence is limited and not conclusive.

NOTE: Those taking Super Booster do not usually require additional gamma tocopherol.

CAUTION: If you are taking anti-coagulant or anti-platelet medications, or have a bleeding disorder, consult your healthcare provider before taking this product.

References
1. *J Natl Cancer Inst*. 2000 Dec 20;92(24):1966-7.
2. *Proc Natl Acad Sci USA*. 1997 Apr 1; 94(7):3217-22.
3. *Atherosclerosis*. 1999 May;144(1):117-22.
4. *J Nutr*. 1992 Dec;122(12):2440-6.
5. *Lipids*. 1995 Nov;30(11):1019-28.

To order Gamma E Tocopherol with Sesame Lignans, call 1-800-544-4440 or visit www.LifeExtension.com

*** These statements have not been evaluated by the Food and Drug Administration. This product is not intended to diagnose, treat, cure, or prevent any disease.**

Advanced RESVERATROL Formula

In **2003**, the **Life Extension Foundation**® introduced a standardized ***resveratrol*** extract shown to favorably alter genes implicated in the aging process—many of the same genes that respond to **calorie restriction**.

Since then, we have identified additional compounds that simulate calorie restriction's ability to trigger youthful ***gene expression***—the process by which genes transmit signals that slow certain aspects of aging.

Compelling evidence reveals that certain compounds found in berries, such as **pterostilbene** and **fisetin**, possess potent "longevity gene" activators that work in synergy with **resveratrol**. For example, **fisetin** (found in strawberries) has been shown to ***stabilize*** resveratrol in the body by shielding it from metabolic breakdown,[1-10] thus extending its beneficial effects.

High-Potency Resveratrol with Synergistic Activators

Life Extension® members gain access to standardized ***trans-resveratrol*** combined with botanical extracts that favorably influence longevity gene expression. Unlike many commercial formulas, Life Extension standardizes to ***trans*-resveratrol**, which researchers contend is the most active constituent.

A bottle containing 60 vegetarian capsules of **Optimized Resveratrol with Synergistic Grape-Berry Actives** retails for $46. If a member buys four bottles, the price is reduced to **$31** per bottle. The suggested dose of one capsule a day provides:

Trans-Resveratrol	250 mg
Grape-Berry Actives	85 mg
Quercetin	60 mg
Trans-Pterostilbene	0.5 mg
Fisetin	10 mg

Item # 01430

CAUTION: If you are taking anti-coagulant or anti-platelet medications or have a bleeding disorder, consult your healthcare provider before taking this product.

References

1. *Cell.* 2006 Dec 15;127(6):1109-22.
2. *Endocrinology.* 2008 Jan;149(1):84-92.
3. *Crit Care Med.* 2004 Oct;32(10):2097-103.
4. *J Agric Food Chem.* 1999 Apr;47(4):1416-21.
5. *Arch Pharm Res.* 2002 Oct;25(5):561-71.
6. *Nutr Cancer.* 1999;35(1):80-6.
7. *Anticancer Agents Med Chem.* 2006 Sep;6(5):389-406.
8. *Nature.* 2006 Nov 16;444(7117):337-42.
9. *Nature.* 2004 Aug 5;430(7000):686-9.
10. *Xenobiotica.* 2000 Sep;30(9):857-66

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BY RAMON GONZALES

New Study Reveals *Four Nutrients* that *Lower PSA* and Slow Cancer Progression

Prostate cancer is a leading cause of cancer death among men. Yet, only about **15%** of new prostate cancer diagnoses require immediate and aggressive treatment.[1,2]

The majority of newly diagnosed prostate cancer cases have low- or intermediate-risk malignancies. For men with low risk malignancies, oncologists sometimes practice "watchful waiting" or "active surveillance," monitoring parameters such as **prostate-specific antigen** (PSA) to evaluate tumor progression.[3,4] This approach can delay the need for aggressive treatment, and in many cases is turning out to reduce or eliminate the need for surgery, chemo, or radiation therapy.[3]

During this period of watchful waiting, there is an additional option that has been shown to lower PSA. A landmark study from the United Kingdom has demonstrated that a combination of four foods—a fruit (pomegranate), an herb (green tea), a spice (turmeric), and a vegetable (broccoli)—concentrated into a pill, **dramatically slowed markers of prostate cancer growth by a median of nearly 64%**.[5]

Working closely with the **National Cancer Research Network**, this formula was developed based on extensive documentation showing how certain **foods** function to slow prostate cancer growth. We begin this report with a critical review of this groundbreaking study conducted on human prostate cancer patients.

Landmark UK Study: Food Pill Slows Evidence of Prostate Cancer Growth

In June of 2013, the **American Society of Clinical Oncology** included in its program a report on a "food pill" that had a dramatic impact on men with prostate cancer.[5] For those who don't know, the annual conference of the **American Society of Clinical Oncology** (ASCO) is where many cancer treatment breakthroughs are announced to the world.

The study reported at the **ASCO** conference was an exploration of the role of four polyphenol-rich **foods** with known anti-cancer properties.[5] The trial development team worked in partnership with the UK government's **National Cancer Research Network**, which ensured the highest scientific credibility and quality assurance. They extensively scrutinized the clinical and laboratory data for foods that have a high chance of an anti-cancer effect. They came up with a specific blend of four cancer-fighting foods concentrated into a capsule designed to be taken twice daily. They then set out to test its effect in the most rigorous of scientific trials—a double-blind placebo-controlled randomized trial within which they examined its effect on **prostate-specific antigen**, or **PSA**.

The researchers recruited 203 men aged 53 to 89 years (average age 74 years) with prostate cancer proven by biopsy.[5] Fifty-nine percent of the men had not yet undergone any treatment and were being followed closely with periodic PSA measurements, while **41%** had already had a radical intervention (surgery, chemotherapy, or radiation) but had relapsed with climbing PSA levels.

The subjects were then randomly assigned to receive either a twice-daily oral capsule containing a blend of **pomegranate seed**, **green tea**, **turmeric**, and **broccoli**, or an identical placebo for 6 months. At baseline, there were no significant differences between the two groups, except that the placebo group was on average 4 years older than the treatment group. Neither the doctors supervising the trial nor the men knew whether they were taking a placebo or the test product.

Why PSA Matters in Prostate Cancer

PSA and PSA kinetics are the primary markers to follow disease progress in men with known cancer of the prostate gland.[83,84] But PSA is more than just a marker; we now realize that it is an enzyme that degrades the matrix proteins holding cells together.[28] That is one way the cancer invades and spreads.

A tumor that produces a rapidly rising PSA, therefore, is one at risk for breaking out of the prostate gland itself and spreading either into local tissue or forming distant metastases, both of which place the patient at high risk of death.[85]

That's why physicians and patients should follow PSA levels carefully once a prostate tumor has been discovered. And that's why therapies that lower PSA are not just producing an encouraging marker, they are in fact demonstrably slowing disease progression and lowering the patient's risk of dying.

The men in the study had their PSA levels measured at baseline, at 3 months, and at 6 months, to determine the rate of rise. The results were remarkable.

In the placebo group, PSA levels rose by a median of **78.5%** over the 6-month period, while in the supplemented group, PSA rose by a median of only **14.7%,** a statistically significant **63.8%** difference.[5]

In addition, and importantly, **46%** of men in the supplemented group had a stable or lower PSA by the end of the study, compared with just **14%** of the placebo group; again, this was a significant difference, and suggested that in nearly half of the treated men, their cancers had stopped growing or had even regressed.

In another remarkable measure, just **7.4%** of supplemented men being monitored by active surveillance or watchful waiting required a change in management plan, while **26%** of those in the placebo group required a change in their management plan.[5] In other words, the supplement directly supported the decision to defer care and avoid painful, costly, and invasive procedures in this group of men.

Following the success of this trial, the research team is designing a range of new scientific trials involving this unique fruit and vegetable blend collaborating with academic cancer centers across the world. These include men already taking androgen deprivation therapies, or those in PSA remission following successful primary treatments such as surgery, brachytherapy, or radiotherapy. They are also partnering with clinicians outside the urology cancer field to determine its effect on osteoarthritis, chronic breast pain, hot flushes, and even tinnitus, and hopefully the results of these trials will be available by early 2015.

Let's now look more closely at each of the ingredients in this new prostate-cancer-fighting food pill, to see what each one brings uniquely to the formula and how each reinforces the other to reduce the risk of prostate cancer progression.

Pomegranate

Pomegranate compounds suppress enzymes in the intestine and liver that convert certain molecules (procarcinogens) into cancer-causing agents.[6,7] As it relates to those with prostate cancer, the active constituents in pomegranate have proven to be potent inducers of malignant cell death through **apoptosis**.[8-16]

During the development of androgen independence, prostate cancer cells are known to increase testosterone synthesis inside their own cells, which maintains cancer cell growth in the absence of significant amounts of circulating testosterone. Overexpression of the ***androgen receptor*** occurs in androgen-independent prostate cancer and has been proposed as another mechanism promoting the development of androgen independence. Pomegranate has been shown to inhibit expression of the ***androgen receptor*** and ***androgen synthesizing genes*** in prostate cells, which helps block an important survival mechanism utilized by prostate cancer cells to escape eradication.[17]

Multiple basic laboratory and human studies have demonstrated that pomegranate treatment, specifically various active compounds, slows PSA doubling time and reduces production of PSA in malignant prostate cells.[12,14,18,19]

What You Need to Know

Functional Foods as Powerful Combatants Against Prostate Cancer

- **Prostate cancer becomes a killer when it invades or metastasizes; prior to those events it can be detected and successfully treated.**
- **But too many men with prostate cancer undergo needless and invasive surgery, chemo-, or radiation therapy.**
- **A new pill containing concentrated forms of four functional foods has now been shown to significantly slow the rise of PSA, the major marker of prostate cancer progression.**
- **The components, pomegranate, green tea, turmeric, and broccoli, have all independently been shown to have protective effects on prostate tissue; a new study demonstrates that they can work together in concert to slow the disease in men who already have prostate cancer.**
- **Each food component works by different, but powerful, epigenetic mechanisms to modify the way prostate cells regulate their growth and development.**
- **Using all four in one simple pill optimizes both prevention and treatment of prostate cancer, without significant side effects.**

In one recent study, pomegranate juice treatment in men with rising PSA after surgery or radiotherapy resulted in a significant delay in PSA doubling time (the time it takes PSA levels to rise) from a mean of **15 months** before treatment to **54 months** following supplementation.[14] Another study found more modest, but still significant delay in doubling time, from **11.9** months to **18.8** months.[18]

Animal studies demonstrate additional anti-cancer activity in pomegranates. In a specialized mouse model of prostate cancer, **100%** of untreated mice developed palpable tumors within 20 weeks, compared to as low as **20%** in the group treated with pomegranate extract; the treated animals lived for up to a median of **92 weeks**, more than twice as long as the **43 weeks** survived by untreated mice.[20]

These remarkable results are observed in part because naturally occurring pomegranate polyphenols are concentrated in prostate tissue, facilitating their protective effects.[19] Once in the prostate, these polyphenols selectively inhibit cancer cell proliferation, leaving healthy prostate tissue relatively unaffected.[9,17] This is a potential "epigenetic" effect: pomegranate polyphenols decrease the expression of proteins that cancer cells use to support their rapid rate of replication.[11,15,16, 21]

Added prostate cancer-fighting benefits of pomegranate include reduction of the inflammation that drives cancer progression, suppression of new blood vessel growth within a forming prostate tumor, and increased expression of genes that keep cells clumped together normally, thereby inhibiting the invasive potential of prostate cancer.[13,22-24]

Green Tea

Green tea makes a unique contribution to the prostate-cancer-fighting pill as a result of a special combination of naturally occurring polyphenols called *catechins*.[25-28]

Studies show that one of green tea's catechins, **EGCG**, accumulates specifically in prostate tissue, where it selectively kills cancer cells (leaving healthy cells unaffected) and reduces serum PSA levels.[29-34]

In a further demonstration of the cancer-suppressing role of green tea, when researchers studied men with a pre-cancerous condition called *prostate intraepithelial neoplasia*, they found only one tumor after one year in the 30 men given green tea polyphenols, while the 30 placebo recipients developed nine cancers.[30] The treatment was safe, and as an extra bonus was found to reduce other lower urinary tract symptoms as well.

Green tea is already acknowledged as a cancer preventive in Japan because of epidemiological studies documenting prostate cancer risk reduction of up to **86%** in men who drink the most green tea.[31,35-37]

Laboratory studies point to still other anti-cancer effects from green tea. Its components reduce genetic expression and activity of androgen receptors that most prostate cancers need to survive.[34,38-40] Green tea also induces human cancer cell death by apoptosis through a variety of epigenetic mechanisms.[24,41,42] And recent studies reveal polyphenols in brewed green tea shut off new blood vessel growth, important in slowing cancer development.[26]

Turmeric

Turmeric's unique contribution to the prostate-cancer-fighting pill is its extraordinary anti-inflammatory properties, provided chiefly by its natural primary component, **curcumin**.[43,44] Reducing inflammation with curcumin reduces the metastases that ultimately kill prostate cancer patients.[45-48] Curcumin also down-regulates genes involved in adhesion, motility, and invasiveness that prostate cancer cells need to invade and spread.[49]

Curcumin specifically inhibits prostate cancer cell production of PSA by blocking its genetic expression.[50,51] At the same time, it also reduces activation of the androgen receptors on cancer cells that trigger increased production of PSA.[52,53]

But the whole turmeric root also contains important oils and other substances that enhance curcumin's absorption and have health benefits of their own, including anti-cancer actions.[54]

Turmeric's components also inhibit cancer cell proliferation, restore cancer cells' ability to die normally by apoptosis, and decrease the density of blood vessels needed for tumor expansion.[43] By modulating cell signaling mechanisms, curcumin arrests the out-of-control cell replication cycle typical in cancer.[55,56]

Curcumin also sensitizes cancer cells to chemo- and radiation therapy, as well as to the intrinsic "death factor" called **TRAIL** (*TNF-related apoptosis-inducing ligand*), one of the body's natural cancer-suppressing mechanisms.[57-59] Remarkably, these sensitizing effects are not found on normal, healthy cells, so they remain protected during treatment.[59]

The compound has also been found to block growth factors and androgen receptors used by cancer cells to support themselves.[60-62]

Broccoli

Broccoli's unique contribution to the prostate-cancer-fighting pill is its ability to up-regulate phase II detoxifying enzymes in gut and liver tissue, enabling the body to render harmless thousands of potentially carcinogenic molecules in our diet.[63-66] In addition, the naturally occurring sulfur-rich broccoli constituents *sulforaphane*, *indole-3-carbinol* (I3C), and others have now been identified as potent epigenetic regulators.[63,67-69]

These broccoli compounds control enzymes called *histone deacetylases* (HDAC) that regulate the genes encoded in DNA—including those responsible for promoting or suppressing cancer formation.[63,67-69] Known collectively as histone deacetylase (HDAC) inhibitors, such molecules are prime objectives of Big Pharma.[70,71]

Men with high consumption of broccoli and other cruciferous vegetables have a **40%** lower risk of invasive prostate cancer.[72] And in animal studies, broccoli feeding reduced prostate tumor weight by **42%** in prostate cancer-prone mice and suppressed growth of implanted human prostate cancer cells by **40%.**[68,73]

Broccoli compounds reduce PSA production as a result of slowing prostate cancer cell replication in laboratory cell culture models.[74-76] They appear to inhibit expression of the androgen receptors that prostate cancer needs to survive.[75]

Broccoli's other prostate cancer-fighting properties include inhibition of growth and transcription factors that are activated in malignancies, restoration of normal tumor suppressor genes, and increased production of apoptosis-inducing proteins.[77-82]

Summary

Prostate cancer is a paradox: Its typically slow growth rate makes it possible to treat if discovered early, but once it has metastasized, it is often lethal.

The combination of four widely-recognized cancer-fighting foods, **pomegranate**, **green tea**, **turmeric**, and **broccoli**, in a single twice-daily pill has now been shown to significantly reduce the rate of rise of PSA, the tumor marker that indicates progression and invasion of prostate cancer.[5]

This new pill appears to work by providing cancer-suppressing actions at a wide variety of targets. All of this pill's components have the capacity to cause favorable epigenetic changes, reversing the gene damage that leads to cancer development and restoring normal cancer suppression mechanisms.[11,15,16,25,41,42,49,63,67-69]

In a tightly controlled clinical trial, putting them together in a single pill was shown to be effective at slowing the growth of existing prostate cancers and preventing surgical and other side effect-prone procedures.

If you or someone you know suffers from prostate cancer, or is interested in preventing it, this new functional food pill, or its individual constituents, should be part of their daily program. ●

If you have any questions on the scientific content of this article, please call a Life Extension® Health Advisor at 1-866-864-3027.

Rerences

1. Bastian PJ, Boorjian SA, Bossi A, et al. High-risk prostate cancer: from definition to contemporary management. *Eur Urol.* 2012 Jun;61(6):1096-106.
2. Available at: http://www.cdc.gov/cancer/prostate/statistics/. Accessed September 17, 2013.
3. Loeb S, Berglund A, Stattin P. Population based study of use and determinants of active surveillance and watchful waiting for low and intermediate risk prostate cancer. *J Urol.* 2013 May 30.
4. Bul M, van den Bergh RC, Zhu X, et al. Outcomes of initially expectantly managed patients with low or intermediate risk screen-detected localized prostate cancer. *BJU Int.* 2012 Dec;110(11):1672-7.
5. Thomas R, Williams M, Sharma H, Chaudry A, Bellamy P. Summary of the National Cancer Research Network double-blind placebo controlled randomised trial. *J Clin Oncol.* 2013;31(Suppl; abs 5008).
6. Faria A, Monteiro R, Azevedo I, Calhau C. Pomegranate juice effects on cytochrome P450S expression: in vivo studies. *J Med Food.* 2007 Dec;10(4):643-9.
7. Saruwatari A, Okamura S, Nakajima Y, Narukawa Y, Takeda T, Tamura H. Pomegranate juice inhibits sulfoconjugation in Caco-2 human colon carcinoma cells. *J Med Food.* 2008 Dec;11(4):623-8.
8. Vicinanza R, Zhang Y, Henning SM, Heber D. Pomegranate juice metabolites, ellagic acid and urolithin A, synergistically inhibit androgen-independent prostate cancer cell growth via distinct effects on cell cycle control and apoptosis. *Evid Based Complement Alternat Med.* 2013;2013:247504.
9. Sineh Sepehr K, Baradaran B, Mazandarani M, Khori V, Shahneh FZ. Studies on the cytotoxic activities of Punica granatum L. var. spinosa (apple punice) extract on prostate cell line by induction of apoptosis. *ISRN Pharm.* 2012;2012:547942.
10. Lee ST, Wu YL, Chien LH, Chen ST, Tzeng YK, Wu TF. Proteomic exploration of the impacts of pomegranate fruit juice on the global gene expression of prostate cancer cell. *Proteomics.* 2012 Nov;12(21):3251-62.
11. Gasmi J, Sanderson JT. Growth inhibitory, antiandrogenic, and pro-apoptotic effects of punicic acid in LNCaP human prostate cancer cells. *J Agric Food Chem.* 2010 Nov 10.
12. Adhami VM, Khan N, Mukhtar H. Cancer chemoprevention by pomegranate: laboratory and clinical evidence. *Nutr Cancer.* 2009;61(6):811-5.
13. Pantuck AJ, Leppert JT, Zomorodian N, et al. Phase II study of pomegranate juice for men with rising prostate-specific antigen following surgery or radiation for prostate cancer. *Clin Cancer Res.* 2006 Jul 1;12(13):4018-26.
14. Malik A, Mukhtar H. Prostate cancer prevention through pomegranate fruit. *Cell Cycle.* 2006 Feb;5(4):371-3.
15. Malik A, Afaq F, Sarfaraz S, Adhami VM, Syed DN, Mukhtar H. Pomegranate fruit juice for chemoprevention and chemotherapy of prostate cancer. *Proc Natl Acad Sci U S A.* 2005 Oct 11;102(41):14813-8.
16. Albrecht M, Jiang W, Kumi-Diaka J, et al. Pomegranate extracts potently suppress proliferation, xenograft growth, and invasion of human prostate cancer cells. *J Med Food.* 2004 Fall;7(3):274-83.
17. Hong MY, Seeram NP, Heber D. Pomegranate polyphenols down-regulate expression of androgen-synthesizing genes in human prostate cancer cells overexpressing the androgen receptor. *J Nutr Biochem*. 2008 Dec;19(12):848-55.
18. Paller CJ, Ye X, Wozniak PJ, et al. A randomized phase II study of pomegranate extract for men with rising PSA following initial therapy for localized prostate cancer. *Prostate Cancer Prostatic Dis.* 2013 Mar;16(1):50-5.
19. Seeram NP, Aronson WJ, Zhang Y, et al. Pomegranate ellagitannin-derived metabolites inhibit prostate cancer growth and localize to the mouse prostate gland. *J Agric Food Chem.* 2007 Sep 19;55(19):7732-7.
20. Adhami VM, Siddiqui IA, Syed DN, Lall RK, Mukhtar H. Oral infusion of pomegranate fruit extract inhibits prostate carcinogenesis in the TRAMP model. *Carcinogenesis.* 2012 Mar;33(3):644-51.
21. Selvi BR, Batta K, Kishore AH, et al. Identification of a novel inhibitor of coactivator-associated arginine methyltransferase 1 (CARM1)-mediated methylation of histone H3 Arg-17. *J Biol Chem.* 2010 Mar 5;285(10):7143-52.

22. Sartippour MR, Seeram NP, Rao JY, et al. Ellagitannin-rich pomegranate extract inhibits angiogenesis in prostate cancer in vitro and in vivo. *Int J Oncol.* 2008 Feb;32(2):475-80.
23. Wang L, Ho J, Glackin C, Martins-Green M. Specific pomegranate juice components as potential inhibitors of prostate cancer metastasis. *Transl Oncol.* 2012 Oct;5(5):344-55.
24. Pitchakarn P, Chewonarin T, Ogawa K, et al. Ellagic Acid inhibits migration and invasion by prostate cancer cell lines. *Asian Pac J Cancer Prev.* 2013;14(5):2859-63.
25. Connors SK, Chornokur G, Kumar NB. New insights into the mechanisms of green tea catechins in the chemoprevention of prostate cancer. *Nutr Cancer.* 2012;64(1):4-22.
26. McCarthy S, Caporali A, Enkemann S, et al. Green tea catechins suppress the DNA synthesis marker MCM7 in the TRAMP model of prostate cancer. *Mol Oncol*. 2007 Sep;1(2):196-204.
27. O'Sullivan J, Sheridan J, Mulcahy H, Tenniswood M, Morrissey C. The effect of green tea on oxidative damage and tumour formation in Lobund-Wistar rats. *Eur J Cancer Prev.* 2008 Nov;17(6):489-501.
28. Pezzato E, Sartor L, Dell'Aica I, et al. Prostate carcinoma and green tea: PSA-triggered basement membrane degradation and MMP-2 activation are inhibited by (-)epigallocatechin-3-gallate. *Int J Cancer.* 2004 Dec 10;112(5):787-92.
29. Henning SM, Aronson W, Niu Y, et al. Tea polyphenols and theaflavins are present in prostate tissue of humans and mice after green and black tea consumption. *J Nutr.* 2006 Jul;136(7): 1839-43.
30. Bettuzzi S, Brausi M, Rizzi F, Castagnetti G, Peracchia G, Corti A. Chemoprevention of human prostate cancer by oral administration of green tea catechins in volunteers with high-grade prostate intraepithelial neoplasia: a preliminary report from a one-year proof-of-principle study. *Cancer Res.* 2006 Jan 15;66(2):1234-40.
31. Pandey M, Gupta S. Green tea and prostate cancer: from bench to clinic. *Front Biosci (Elite Ed).* 2009;1:13-25.
32. McLarty J, Bigelow RL, Smith M, Elmajian D, Ankem M, Cardelli JA. Tea polyphenols decrease serum levels of prostate-specific antigen, hepatocyte growth factor, and vascular endothelial growth factor in prostate cancer patients and inhibit production of hepatocyte growth factor and vascular endothelial growth factor in vitro. *Cancer Prev Res (Phila).* 2009 Jul;2(7):673-82.
33. Siddiqui IA, Zaman N, Aziz MH, et al. Inhibition of CWR22Rnu1 tumor growth and PSA secretion in athymic nude mice by green and black teas. *Carcinogenesis.* 2006 Apr;27(4):833-9.
34. Chuu CP, Chen RY, Kokontis JM, Hiipakka RA, Liao S. Suppression of androgen receptor signaling and prostate specific antigen expression by (-)-epigallocatechin-3-gallate in different progression stages of LNCaP prostate cancer cells. *Cancer Lett.* 2009 Mar 8;275(1):86-92.
35. Fujiki H, Suganuma M. Green tea: an effective synergist with anticancer drugs for tertiary cancer prevention. *Cancer Lett.* 2012 Nov 28;324(2):119-25.
36. Jian L, Lee AH, Binns CW. Tea and lycopene protect against prostate cancer. *Asia Pac J Clin Nutr.* 2007;16 Suppl 1:453-7.
37. Kurahashi N, Sasazuki S, Iwasaki M, Inoue M, Tsugane S. Green tea consumption and prostate cancer risk in Japanese men: a prospective study. *Am J Epidemiol.* 2008 Jan 1;167(1):71-7.
38. Harper CE, Patel BB, Wang J, Eltoum IA, Lamartiniere CA. Epigallocatechin-3-Gallate suppresses early stage, but not late stage prostate cancer in TRAMP mice: mechanisms of action. *Prostate.* 2007 Oct 1;67(14):1576-89.
39. Siddiqui IA, Asim M, Hafeez BB, Adhami VM, Tarapore RS, Mukhtar H. Green tea polyphenol EGCG blunts androgen receptor function in prostate cancer. *Faseb j.* 2011 Apr;25(4):1198-207.
40. Lee YH, Kwak J, Choi HK, et al. EGCG suppresses prostate cancer cell growth modulating acetylation of androgen receptor by anti-histone acetyltransferase activity. *Int J Mol Med.* 2012 Jul;30(1):69-74.
41. Gupta K, Thakur VS, Bhaskaran N, et al. Green tea polyphenols induce p53-dependent and p53-independent apoptosis in prostate cancer cells through two distinct mechanisms. *PLoS One.* 2012;7(12):e52572.
42. Hagen RM, Chedea VS, Mintoff CP, Bowler E, Morse HR, Ladomery MR. Epigallocatechin-3-gallate promotes apoptosis and expression of the caspase 9a splice variant in PC3 prostate cancer cells. *Int J Oncol.* 2013 Jul;43(1):194-200.
43. Dorai T, Cao YC, Dorai B, Buttyan R, Katz AE. Therapeutic potential of curcumin in human prostate cancer. III. Curcumin inhibits proliferation, induces apoptosis, and inhibits angiogenesis of LNCaP prostate cancer cells in vivo. *Prostate.* 2001 Jun 1;47(4):293-303.
44. Gupta SC, Patchva S, Aggarwal BB. Therapeutic roles of curcumin: lessons learned from clinical trials. *Aaps j.* 2013 Jan;15(1):195-218.
45. Rao KV, Samikkannu T, Dakshayani KB, et al. Chemopreventive potential of an ethyl acetate fraction from Curcuma longa is associated with upregulation of p57(kip2) and Rad9 in the PC-3M prostate cancer cell line. *Asian Pac J Cancer Prev.* 2012;13(3): 1031-8.
46. Cheng TS, Chen WC, Lin YY, et al. Curcumin-targeting pericellular serine protease matriptase role in suppression of prostate cancer cell invasion, tumor growth, and metastasis. *Cancer Prev Res (Phila).* 2013 May;6(5):495-505.
47. Killian PH, Kronski E, Michalik KM, et al. Curcumin inhibits prostate cancer metastasis in vivo by targeting the inflammatory cytokines CXCL1 and -2. *Carcinogenesis.* 2012 Dec;33(12):2507-19.
48. Sundram V, Chauhan SC, Ebeling M, Jaggi M. Curcumin attenuates beta-catenin signaling in prostate cancer cells through activation of protein kinase D1. *PLoS One.* 2012;7(4):e35368.
49. Herman JG, Stadelman HL, Roselli CE. Curcumin blocks CCL2-induced adhesion, motility and invasion, in part, through down-regulation of CCL2 expression and proteolytic activity. *Int J Oncol.* 2009 May;34(5):1319-27.
50. Yang L, Zhang LY, Chen WW, et al. Inhibition of the expression of prostate specific antigen by curcumin. *Yao Xue Xue Bao.* 2005 Sep;40(9):800-3.
51. Chung LC, Tsui KH, Feng TH, Lee SL, Chang PL, Juang HH. Curcumin provides potential protection against the activation of hypoxia and prolyl 4-hydroxylase inhibitors on prostate-specific antigen expression in human prostate carcinoma cells. *Mol Nutr Food Res.* 2011 Nov;55(11):1666-76.

52. Tsui KH, Feng TH, Lin CM, Chang PL, Juang HH. Curcumin blocks the activation of androgen and interlukin-6 on prostate-specific antigen expression in human prostatic carcinoma cells. *J Androl.* 2008 Nov-Dec;29(6):661-8.
53. Choi HY, Lim JE, Hong JH. Curcumin interrupts the interaction between the androgen receptor and Wnt/beta-catenin signaling pathway in LNCaP prostate cancer cells. *Prostate Cancer Prostatic Dis.* 2010 Dec;13(4):343-9.
54. Aggarwal BB, Yuan W, Li S, Gupta SC. Curcumin-free turmeric exhibits anti-inflammatory and anticancer activities: Identification of novel components of turmeric. *Mol Nutr Food Res.* 2013 Jul 12.
55. Teiten MH, Gaascht F, Cronauer M, Henry E, Dicato M, Diederich M. Anti-proliferative potential of curcumin in androgen-dependent prostate cancer cells occurs through modulation of the Wingless signaling pathway. *Int J Oncol.* 2011 Mar;38(3):603-11.
56. Guo H, Xu YM, Ye ZQ, Yu JH, Hu XY. Curcumin induces cell cycle arrest and apoptosis of prostate cancer cells by regulating the expression of IkappaBalpha, c-Jun and androgen receptor. *Pharmazie.* 2013 Jun;68(6):431-4.
57. Shankar S, Ganapathy S, Chen Q, Srivastava RK. Curcumin sensitizes TRAIL-resistant xenografts: molecular mechanisms of apoptosis, metastasis and angiogenesis. *Mol Cancer.* 2008;7:16.
58. Chendil D, Ranga RS, Meigooni D, Sathishkumar S, Ahmed MM. Curcumin confers radiosensitizing effect in prostate cancer cell line PC-3. *Oncogene.* 2004 Feb 26;23(8):1599-607.
59. Goel A, Aggarwal BB. Curcumin, the golden spice from Indian saffron, is a chemosensitizer and radiosensitizer for tumors and chemoprotector and radioprotector for normal organs. *Nutr Cancer.* 2010;62(7):919-30.
60. Hung CM, Su YH, Lin HY, et al. Demethoxycurcumin modulates prostate cancer cell proliferation via AMPK-induced down-regulation of HSP70 and EGFR. *J Agric Food Chem.* 2012 Aug 16.
61. Shah S, Prasad S, Knudsen KE. Targeting pioneering factor and hormone receptor cooperative pathways to suppress tumor progression. *Cancer Res.* 2012 Mar 1;72(5):1248-59.
62. Teiten MH, Gaigneaux A, Chateauvieux S, et al. Identification of differentially expressed proteins in curcumin-treated prostate cancer cell lines. *Omics.* 2012 Jun;16(6):289-300.
63. Clarke JD, Hsu A, Yu Z, Dashwood RH, Ho E. Differential effects of sulforaphane on histone deacetylases, cell cycle arrest and apoptosis in normal prostate cells versus hyperplastic and cancerous prostate cells. *Mol Nutr Food Res.* 2011 Jul;55(7):999-1009.

64. Rogan EG. The natural chemopreventive compound indole-3-carbinol: state of the science. *In Vivo*. 2006 Mar-Apr;20(2):221-8.
65. Joseph MA, Moysich KB, Freudenheim JL, et al. Cruciferous vegetables, genetic polymorphisms in glutathione S-transferases M1 and T1, and prostate cancer risk. *Nutr Cancer.* 2004;50(2):206-13.
66. Abdull Razis AF, Noor NM. Cruciferous vegetables: dietary phytochemicals for cancer prevention. *Asian Pac J Cancer Prev.* 2013;14(3):1565-70.
67. Dashwood RH, Ho E. Dietary histone deacetylase inhibitors: from cells to mice to man. *Semin Cancer Biol.* 2007 Oct;17(5):363-9.
68. Myzak MC, Tong P, Dashwood WM, Dashwood RH, Ho E. Sulforaphane retards the growth of human PC-3 xenografts and inhibits HDAC activity in human subjects. *Exp Biol Med (Maywood).* 2007 Feb;232(2):227-34.
69. Myzak MC, Dashwood WM, Orner GA, Ho E, Dashwood RH. Sulforaphane inhibits histone deacetylase in vivo and suppresses tumorigenesis in Apc-minus mice. *Faseb j.* 2006 Mar;20(3):506-8.
70. Gryder BE, Rood MK, Johnson KA, et al. Histone deacetylase inhibitors equipped with estrogen receptor modulation activity. *J Med Chem.* 2013 Jul 3.
71. Stettner M, Kramer G, Strauss A, et al. Long-term antiepileptic treatment with histone deacetylase inhibitors may reduce the risk of prostate cancer. *Eur J Cancer Prev.* 2012 Jan;21(1):55-64.
72. Kirsh VA, Peters U, Mayne ST, et al. Prospective study of fruit and vegetable intake and risk of prostate cancer. *J Natl Cancer Inst.* 2007 Aug 1;99(15):1200-9.
73. Canene-Adams K, Lindshield BL, Wang S, Jeffery EH, Clinton SK, Erdman JW, Jr. Combinations of tomato and broccoli enhance antitumor activity in dunning r3327-h prostate adenocarcinomas. *Cancer Res.* 2007 Jan 15;67(2):836-43.
74. Zhang J, Hsu BAJ, Kinseth BAM, Bjeldanes LF, Firestone GL. Indole-3-carbinol induces a G1 cell cycle arrest and inhibits prostate-specific antigen production in human LNCaP prostate carcinoma cells. *Cancer.* 2003 Dec 1;98(11):2511-20.
75. Chiao JW, Chung FL, Kancherla R, Ahmed T, Mittelman A, Conaway CC. Sulforaphane and its metabolite mediate growth arrest and apoptosis in human prostate cancer cells. *Int J Oncol.* 2002 Mar;20(3):631-6.
76. Han HY, Shan S, Zhang X, Wang NL, Lu XP, Yao XS. Down-regulation of prostate specific antigen in LNCaP cells by flavonoids from the pollen of Brassica napus L. *Phytomedicine.* 2007 May;14(5):338-43.
77. Traka MH, Spinks CA, Doleman JF, et al. The dietary isothiocyanate sulforaphane modulates gene expression and alternative gene splicing in a PTEN null preclinical murine model of prostate cancer. *Mol Cancer.* 2010;9:189.
78. Melchini A, Traka MH, Catania S, et al. Antiproliferative activity of the dietary isothiocyanate erucin, a bioactive compound from cruciferous vegetables, on human prostate cancer cells. *Nutr Cancer.* 2013;65(1):132-8.
79. Hahm ER, Singh SV. Sulforaphane inhibits constitutive and interleukin-6-induced activation of signal transducer and activator of transcription 3 in prostate cancer cells. *Cancer Prev Res (Phila).* 2010 Apr;3(4):484-94.
80. Choi S, Singh SV. Bax and Bak are required for apoptosis induction by sulforaphane, a cruciferous vegetable-derived cancer chemopreventive agent. *Cancer Res.* 2005 Mar 1;65(5):2035-43.
81. Ho E, Clarke JD, Dashwood RH. Dietary sulforaphane, a histone deacetylase inhibitor for cancer prevention. *J Nutr.* 2009 Dec;139(12):2393-6.
82. Traka M, Gasper AV, Melchini A, et al. Broccoli consumption interacts with GSTM1 to perturb oncogenic signalling pathways in the prostate. *PLoS One.* 2008;3(7):e2568.
83. Ilic D, Neuberger MM, Djulbegovic M, Dahm P. Screening for prostate cancer. *Cochrane Database Syst Rev.* 2013;1:Cd004720.
84. Van Neste L, Herman JG, Otto G, Bigley JW, Epstein JI, Van Criekinge W. The epigenetic promise for prostate cancer diagnosis. *Prostate.* 2012 Aug 1;72(11):1248-61.
85. Benchikh El Fegoun A, Villers A, Moreau JL, Richaud P, Rebillard X, Beuzeboc P. PSA and follow-up after treatment of prostate cancer. *Prog Urol.* 2008 Mar;18(3):137-44.

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- **Easily mixes into water or milk!**
- **Great Taste! –** Available in both **natural chocolate** and **natural vanilla** flavors.

The retail price for an 18.34 ounce container of **New Zealand Vanilla Flavored Whey Protein Concentrate** (**Item # 01770**) or for a 23.28 ounce container of **New Zealand Chocolate Flavored Whey Protein Concentrate** (**Item # 01771**) is $30. If a member purchases four bottles, the price is reduced to **$19.95** per bottle. **Contains milk.**

Item # 01770

Item # 01771

To order New Zealand Whey Protein Concentrate, call 1-800-544-4440 or visit www.LifeExtension.com

References

1. *J Appl Physiol.* 2003. 95(4):1717-27.
2. *Curr Genomics.* 2012 Dec;13(8):589-602.
3. Available at: http://www.innovatewithdairy.com/SiteCollectionDocuments/Mono_Immunity_0304.pdf. Accessed June 12, 2013.
4. *Curr Opin Clin Nutr Metab Care.* 2011 Nov;14(6):569-80.
5. *J Nutr.* 2006 Jan;136(1 Suppl):277S-80S.

*These statements have not been evaluated by the Food and Drug Administration. This product is not intended to diagnose, treat, cure, or prevent any disease.

GREEN TEA EXTRACT

When Life Extension® introduced standardized **green tea extract** in **1993**, the supplement was very expensive. As more research was published about green tea's multifaceted benefits, more companies competed to make **higher-potency** extracts at lower prices.

The good news for consumers is that they can obtain **high-potency** standardized green tea extract capsules at a fraction of the original price.

The Life Extension Foundation Buyers Club offers **98% green tea extracts** in either a **lightly caffeinated** or **decaffeinated** form. These **98%** extracts are standardized to provide high potencies of critical **EGCG**, the most important **polyphenol** found in green tea.

These highly concentrated **Mega Green Tea Extract Caps** contain **725 mg** of either **lightly caffeinated** or **decaffeinated 98%** standardized green tea extracts. The retail price for **100 vegetarian capsules** of **Mega Green Tea Extract** is **$30**.

If a member buys four bottles of **725 mg Mega Green Tea Extract** capsules, the price is reduced to **$21 per bottle**. Most people take just one capsule daily.

Item # 00953

Item # 00954

To order Mega Green Tea Extract, call 1-800-544-4440 or visit www.LifeExtension.com

NEW Four-Food Formula

Target PSA!

Breakthrough Research

A high percentage of men will endure some form of prostate-induced discomfort over the course of their lifetimes.[1]

A placebo-controlled, double-blind trial presented **September 2013** reported that a specific blend of **pomegranate**, **green tea**, **turmeric**, and **broccoli**—formulated together in a capsule called **Pomi-T™**—powerfully maintained healthy levels of *prostate specific antigen* (*PSA*)![2]

Life Extension® now offers this same capsule for men who are serious about supporting and protecting their prostate as they age—by **targeting PSA**. The four foods in **Pomi-T™** have healthful benefits for your entire body. But their constituent molecules, naturally present in food, have now been shown to concentrate within prostate tissue and provide a rich array of complementary, prostate-supporting, ***PSA-modulating*** mechanisms.[3-19]

POMEGRANATE

- Specifically concentrates in prostate tissue[3]
- Supports healthy *apoptosis*, your body's system of removing senescent cells when needed[4-6]
- Promotes healthy levels of inflammatory response, inhibits androgen receptor expression, and inhibits abnormal cell migration.[5,7,8]

GREEN TEA

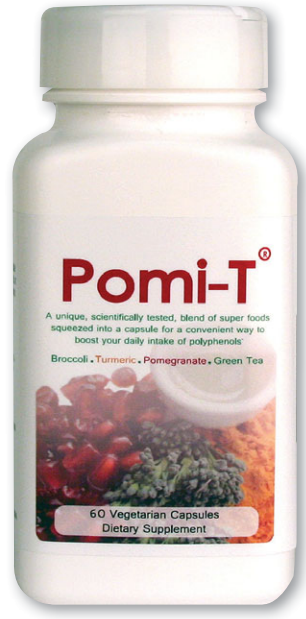
- *EGCG*, a green tea *catechin*, specifically concentrates in prostate tissue where it regulates *PSA* (*prostate specific antigen*) production to maintain healthy PSA levels[9,10]
- Helps modulate genetic expression and activity of *androgen receptors*[11]
- Supports body's natural defenses against oxidation.[12]

TURMERIC

- Promotes a healthy level of inflammatory response, chiefly due to its main component, *curcumin*[13]
- Helps modulate cell signaling mechanisms, inhibiting abnormal cell adhesion and migration.[14]
- Promotes healthy cell proliferation and apoptosis.[15]

BROCCOLI

- Helps regulate enzymes (*phase II detoxifying enzymes*) in gut and liver tissue that helps render harmful dietary molecules harmless[16]
- Helps promote healthy PSA levels[17]
- Supports regulation of cell growth and transcription factors and normal production of apoptosis-inducing proteins[18,19]



Item #01797

The novel and scientifically validated blend of food in **Pomi-T™** represents the ***next generation*** of targeted support for the aging prostate!

The suggested daily dosage of two vegetarian capsules of Pomi-T™ provides:

Pomi-T™ Super Foods Proprietary Blend	**960 mg**
Broccoli (florets and stalks) powder, Turmeric (root) powder Pomegranate (whole fruit) powder , and Green Tea (leaf) extract 5:1	

A bottle of 60 vegetarian capsules of **Pomi-T™** retails for $33.33. Members of the Life Extension Foundation pay only **$25** per bottle.

To order Pomi-T™, call 1-800-544-4440 or visit www.LifeExtension.com

References

1. Available at: http://eu-acme.org/europeanurology/upload_articles/Roehrborn.pdf. Accessed October 2, 2013.
2. *J Clin Oncol.* 2013;31(Suppl; abs 5008).
3. *Proteomics.* 2012 Nov;12(21):3251-62.
4. *J Agr Food Chem.* 2010 Nov 10.
5. *Mol Cancer Ther.* 2008 Sep;7(9):2662-71.
6. *Evid Based Complement Alternat Med.* 2013;2013:247504.
7. *Int J Oncol.* 2008 Feb;32(2):475-80.
8. *Transl Oncol.* 2012 Oct;5(5):344-55.
9. *J Nutr.* 2006 Jul;136(7):1839-43.
10. *Cancer Lett.* 2009 Mar 8;275(1):86-92.
11. *Int J Mol Med.* 2012 Jul;30(1):69-74.
12. *J Nutr Biochem.* 2012 Nov;23(11):1537-42.
13. *Aaps j.* 2013 Jan;15(1):195-218.
14. *Int J Oncol.* 2009 May;34(5):1319-27.
15. *Prostate.* 2001 Jun 1;47(4):293-303.
16. *Nutr Cancer.* 2004;50(2):206-13.
17. *Cancer.* 2003 Dec 1;98(11):2511-20.
18. *Cancer Prev Res (Phila).* 2010 Apr;3(4):484-94.
19. *PLoS One.* 2008;3(7):e2568.

BY WILLIAM FALOON

Impact of DIET on PROSTATE CANCER Risk and Mortality

If the information you are about to read could be turned into a patented **drug**, it would be worth ***billions of dollars*** of annual sales to whoever owned it.

What's regrettable is very few doctors provide this lifesaving data to their prostate cancer patients. A staggering number of lives could be spared if the **dietary changes** discussed in this article are widely implemented.

In the **February 2007** issue of ***Life Extension*** magazine®, we published an article titled "***Eating Your Way to Prostate Cancer***."

In the **April 2003** issue, we published an article titled ***"Eating Food Cooked at High Temperature Accelerates Aging."***

Since these articles were published, large numbers of confirmative studies have been conducted that substantiate what we warned about.

This article will describe recently published science showing how eating the wrong foods markedly increase one's risk of developing prostate cancer.

It also reveals data showing that men ***already*** diagnosed with **prostate cancer** who consume the wrong foods progress to advanced disease and death faster. >

Cancer cells are present in the prostate glands of many aging men, yet only one in six men are ever diagnosed with prostate cancer.[1,2] If one looks at what is required for a single cancer cell to develop into a detectable tumor, it becomes obvious that natural barriers exist to protect men against full-blown cancer.

Unfortunately, dietary choices in the Western world circumvent the body's protective barriers.[3] The end result is that most men unwittingly provide, through their **food** choices, biological fuel for existing prostate cancer cells to propagate and metastasize.

An understanding of the biological roles of diet and specific nutrients can enable aging men to achieve a considerable amount of control over whether isolated cancer cells in their prostate gland will ever show up as a clinically diagnosed disease.

The impact of the food we ingest on cell growth and death is so pronounced that it can be similar to the effects displayed by anticancer drugs—without the toxicities.

Don't Eat Overcooked Meat

Any meat (including fish) cooked at high temperatures creates dangerous carcinogens.[4] Scientists looked at men whose diets included high intake of **red meat** cooked at high temperatures, pan-fried, or well-done. Their findings published in **2012** showed specific ***gene expression*** changes that predisposed these men to **advanced** prostate cancer.[5] These kinds of studies show that one can exert a degree of control over their cell regulatory ***genes*** by avoiding overcooked meats.

Aggressive malignancies are those that rapidly propagate, infiltrate and metastasize.[6] A **2011** study evaluated almost 1,000 men and found that higher consumption of any ground beef or processed meats was associated with an increased risk of **aggressive** prostate cancer.[7] Men who ate ground beef showed the strongest association with a **130%** increased incidence. The association primarily reflected intake of grilled or barbequed meat, with more well-done meat conferring a higher risk of **aggressive prostate cancer**. In contrast, consumption of rare/medium cooked ground beef was not associated with aggressive prostate cancer.[7]

A **2011** study looked at dietary patterns of 726 newly diagnosed prostate cancer cases and compared them to 527 controls.[8] For advanced prostate cancer (but not localized disease), there was an associated **79%** increased risk in men who ate hamburgers, a **57%** increased risk with processed meats, a **63%** increased risk with grilled red meat, and a **52%** increased risk with well-done red meat.[8] This study corroborated others associating consumption of processed meat and red meat, especially when cooked at ***high temperatures***, with increased cases of **advanced prostate cancer**.[5,6]

Concern About Eggs and Milk

Large-scale studies associate egg consumption with sharply increased cancer risks.[9,10]

A **2011** study looked at **27,607** men who developed or died from prostate cancer over a 14-year period.[9] Men who consumed **2.5** or more eggs per week had an **81%** increased risk of lethal prostate cancer compared to those who consumed less than half an egg per week.[9] This study showed that consumption of eggs increased the risk of healthy men developing metastatic prostate cancer.

A **2013** evaluation was done using data from the famous **Physician's Health Study** to identify the impact of consumption of skim or whole milk on incidence and survival after diagnosis of prostate cancer.[11] This analysis involved 21,660 physicians who were followed for 28 years. Skim/low fat milk was associated with increased risk of low grade prostate cancer, whereas whole milk was associated with increased risk of **fatal** prostate cancers. In these men diagnosed with prostate cancer, consumption of whole milk was associated with a **117%** increased risk of progression to fatal disease.[11] This finding further substantiates the important role of diet even after prostate cancer is diagnosed.

The take-home lesson so far is if one has an elevated or rising PSA, it is especially prudent to avoid over cooked red meats, processed meat, eggs, and whole cow's milk.

Confusion About Omega-6 Fats

Omega-6 fats are essential to life. We are unable to make them in our body and must get them from foods.[12]

The problem is that Western diets have become so overloaded with ***omega-6s*** that our bodies have become poisoned with them. The typical American tends to consume up to 25 times more omega-6 fats than the healthier omega-3 fats.[12]

One reason we have become so overloaded with **omega-6s** is that in the rush to switch from **red meat** and other **saturated fats** such as lard, we have been gobbling down too many **omega-6-rich** foods. These include vegetable oils used in all kinds of processed and fried foods, margarine, salad dressing, mayonnaise, certain nuts, peanut butter, and even poultry, a meat with high omega-6 content.[13]

Commercial food companies deceivingly promote polyunsaturated vegetable oils like corn and safflower as healthy because of early studies showing reduced cardiovascular risk factors in those who consumed vegetable oils compared to animal-based fats such as butter.[14]

What You Need to Know

Prostate Cancer: Food For Thought

- Dietary choices in the Western world circumvent the body's protective barriers to cancer.
- Men who regularly consume certain plant foods have sharply lower rates of prostate cancer.
- High intakes of red meat cooked at high temperatures can result in specific gene expression changes that may predispose men to advanced prostate cancer.
- Large-scale studies associate egg consumption with sharply increased cancer risks.
- Skim/low fat milk was associated with increased risk of low grade prostate cancer, whereas whole milk was associated with increased risk of high-grade prostate cancers.
- Diets high in **omega-6 fats** and **saturated fats** are associated with ***greater*** prostate cancer risk, whereas increased intake of the type of **omega-3 fats** found in fish has been shown to confer protection.
- **Arachidonic acid**, found abundantly in eggs and chicken, is metabolized by the ***5-LOX enzyme*** to ***5-hydroxyeicosatetraeonic acid*** (5-HETE), a potent survival factor that prostate cancer cells use to escape destruction.
- Not only do 5-LOX products directly stimulate cancer cell propagation, but the breakdown products that 5-LOX produces from arachidonic acid (such as leukotriene B4, 5-HETE, and hydroxylated fatty acids) cause tissue destruction, chronic inflammation, and increased resistance of tumor cells to apoptosis (programmed cell destruction).

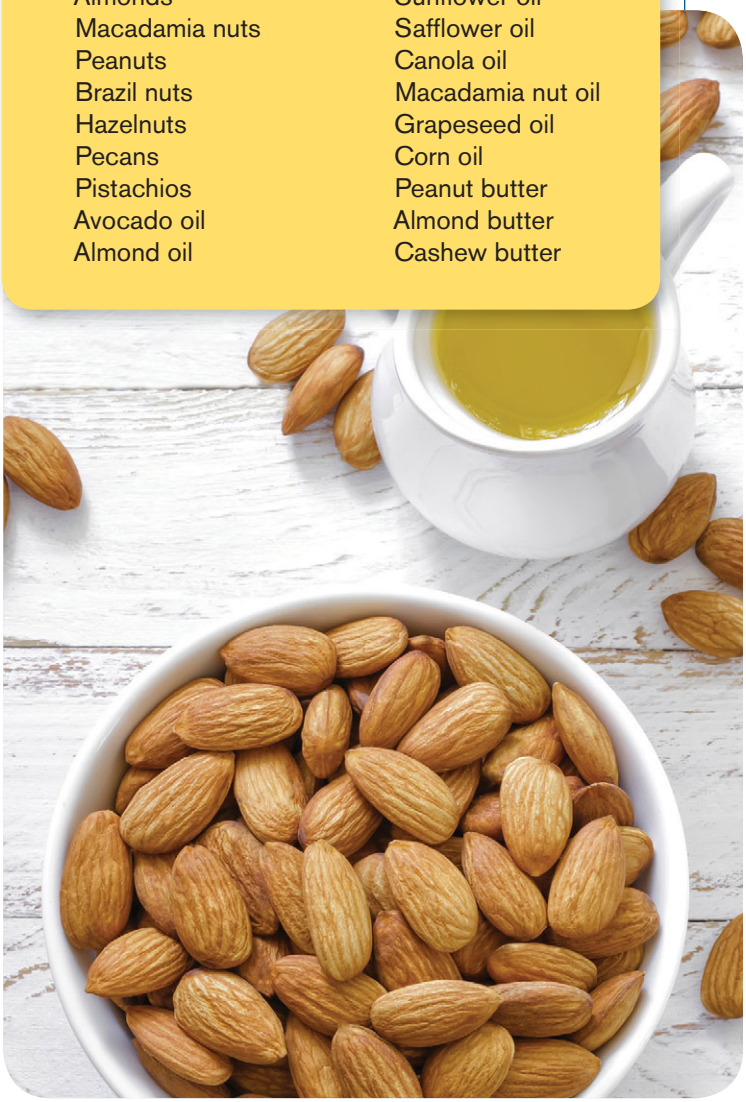
Remember that you require omega-6s to live, but not in the large ***quantity*** consumed in the typical American diet. This means you want to lower the percentage of calories in your diet that comprise of ***omega-6*** fats.

The chart below lists foods high in omega-6 fats. Eating any of these foods in moderation is not a problem, but when they comprise a high percentage of your overall diet, your body becomes overloaded with ***omega-6s***, which sets the stage for a wide variety of disorders. We next describe how a high intake of omega-6 fats contributes to prostate cancer.

Table 1

DIETARY SOURCES OF OMEGA-6 FATS[13]

Avocados	Peanut oil
Almonds	Sunflower oil
Macadamia nuts	Safflower oil
Peanuts	Canola oil
Brazil nuts	Macadamia nut oil
Hazelnuts	Grapeseed oil
Pecans	Corn oil
Pistachios	Peanut butter
Avocado oil	Almond butter
Almond oil	Cashew butter



Role of Omega-6 Fats in Prostate Cancer

Diets high in **omega-6 fats** and **saturated fats** are associated with ***greater*** prostate cancer risk, whereas increased intake of the type of **omega-3 fats** found in fish has been shown to confer protection.[15-17]

Based on consistent epidemiological findings across a wide range of human populations, scientists have sought to understand why eating the wrong kinds of fat (saturated and omega-6 fats) provokes a stimulatory effect on prostate cancer.[15,17]

To ascertain what happens after we eat bad fats, all one has to do is look at the metabolic breakdown pathways that these fats follow in the body, as shown in the chart on the next page (Figure 1). For example, let us assume that for dinner, you eat a steak (a source of saturated fat), potato (a high-glycemic starch) and a salad with a typical dressing of soybean and/or safflower oils (omega-6 fats).

As can be seen in the flow chart, omega-6 fats can convert to ***arachidonic acid*** in the body. Meat itself contains arachidonic acid.[18] One way that the body rids itself of *excess* arachidonic acid is by provoking a dangerous metabolizing pathway through ***5-lipoxygenase*** (5-LOX).

It is well established that **5-LOX** products stimulate prostate cancer cell proliferation via several well-defined mechanisms.[19-21] High glycemic foods also promote formation of 5-LOX in the body, via activation of enzymes involved in the formation of arachidonic acid.[18]

Arachidonic acid, found abundantly in eggs and chicken, is metabolized by the ***5-LOX enzyme*** to ***5-hydroxyeicosatetraenoic acid*** (5-HETE), a potent survival factor that prostate cancer cells use to escape destruction.[18,22,23]

The flow chart (Figure 1) clearly demonstrates how consuming a diet rich in ***arachidonic acid*** provokes the production of dangerous **5-LOX** products, which can promote prostate cancer progression.[18-23] In addition to 5-HETE, 5-LOX also metabolizes arachidonic acid to **leukotriene B4** and other pro-inflammatory agents that promote cancer.[24]

The chart (Table 1) on this page provides a long list of foods that are high in ***arachidonic acid.*** Just because a food is listed on this chart does not mean you have to avoid it. It is wise, however, to pick which high-arachidonic acid foods are that important compared to ones you may not even realize you're consuming.

Figure 1: How Common Foods Convert to Deadly Compounds in the Body

Consumption of arachidonic acid-rich foods such as egg yolk, red meat, poultry, and organ meat.

Consumption of arachidonic acid precursors/stimulating foods such as omega-6 fats and high-glycemic carbohydrates.

EXCESS ARACHIDONIC ACID IN THE BODY

Increased production of **5-lipoxygenase** (5-LOX) (facilitates the propagation, infiltration, and metastasis of cancer cells)

Increased production of 5-hydroxyeicosatetraenoic acid **(5-HETE)** (interferes with programmed cancer cell death [apoptosis])

Excess accumulation of **leukotriene B4** (proinflammatory compound that attacks the joints, arterial wall, and other tissues)

Flow chart showing how the body metabolizes common foods via the 5-lipoxygenase (5-LOX) pathway.

5-LOX Is Over-Expressed in Prostate Cancer

Based on studies showing that consumption of foods rich in omega 6 fatty acids is associated with higher incidences of prostate cancer, scientists sought to determine how much of the 5-LOX enzyme is present in malignant versus benign prostate tissues.[25]

Using biopsy samples taken from living human patients, the researchers found that 5-LOX mRNA levels were an astounding **six-fold greater** in malignant prostate tissues compared with benign tissues. This study also found that levels of 5-HETE were **2.2-fold greater** in malignant versus benign prostate tissues.[26] The scientists concluded this study by stating that selective inhibitors of **5-LOX** may be useful in the prevention or treatment of patients with prostate cancer.[26]

5-LOX Promotes Tumor Growth Factors

As the evidence mounts that ingesting "bad fats" increases prostate cancer risk, scientists are evaluating the effects of 5-LOX on various growth factors involved in the progression, angiogenesis, and metastasis of cancer cells.

One study found that 5-LOX activity is required to stimulate prostate cancer cell growth by ***epidermal growth factor*** (EGF) and other tumor cell proliferating factors produced in the body.[19] When **5-LOX** levels were reduced, the cancer cell stimulatory effect of EGF and other growth factors was diminished.[19]

In a mouse study, an increase in 5-LOX resulted in a corresponding increase in ***vascular endothelial growth factor*** (VEGF), a key growth factor that tumor cells use to stimulate new blood vessel formation (angiogenesis) into the tumor. **5-LOX inhibitors** have been shown to reduce tumor angiogenesis along with a host of other growth factors.[27]

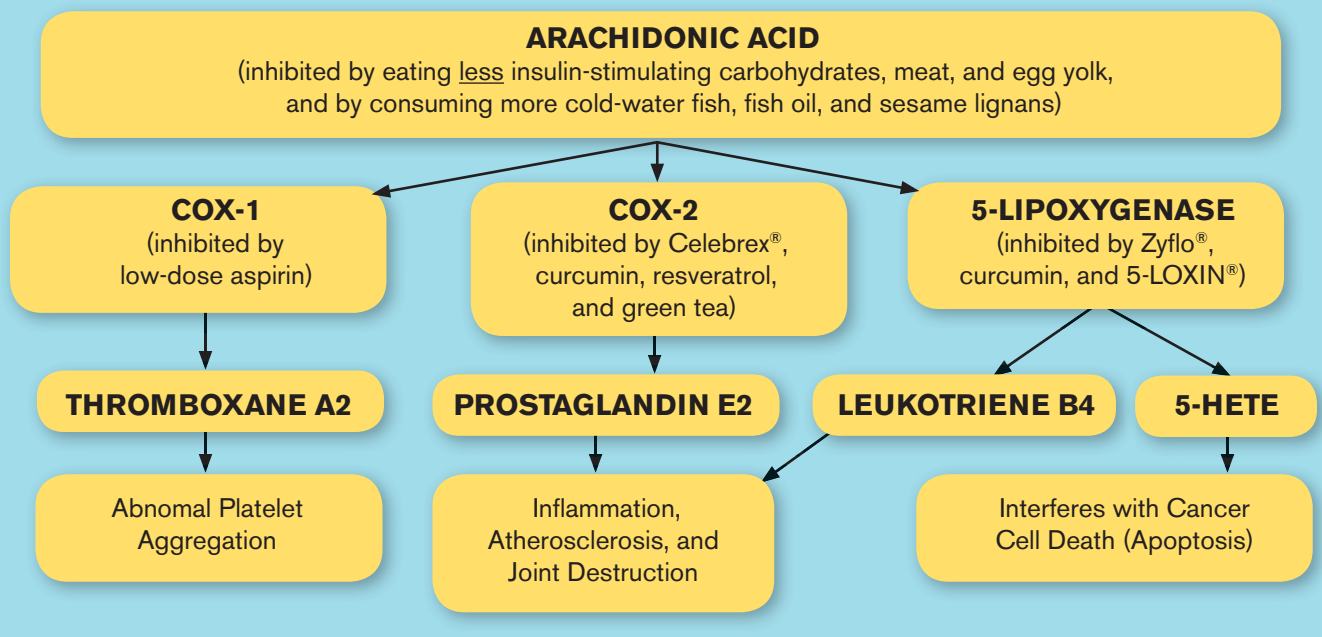
In both androgen-dependent and androgen-independent human prostate cancer cell lines, the inhibition of **5-LOX** has consistently been shown to halt the growth stimulatory action of 5-LOX and prompt rapid and massive apoptosis (cancer cell destruction).[20,22,28,29]

Omega-3 Fatty Acids: A First Line of Defense

One reason that **fish oil** supplements have become so popular is that their beneficial **EPA/DHA** fatty acids can help reduce the production of ***arachidonic acid-derived*** tumor promoting byproducts in the body.[30-33] As shown on the flow chart below (Figure 2), if ***arachidonic acid*** levels are reduced, there would be a corresponding suppression of **5-LOX** and its metabolic byproducts **5-HETE** and **leukotriene B4**.

Figure 2: Arachidonic Acid's Destructive Cascade

To better understand the pathways by which arachidonic acid can cause arthritic, carcinogenic, and cardiovascular conditions, the flow chart below shows how arachidonic acid cascades down into damaging compounds in the body.



Once one understands the lethal 5-LOX cascades, it is easy to see why people who excessively consume foods rich in **arachidonic acid**, and those who fail to reduce the production of arachidonic acid metabolites (such as 5-HETE) by ensuring adequate intake of ***omega-3*** fatty acids, are setting themselves up for prostate cancer and a host of inflammatory disorders (including atherosclerosis).

Nutrients That Suppress 5-LOX

Health-conscious people already take nutrients like **curcumin** and **fish oil** that help to lower 5-LOX activity in the body.[34,35] Studies show that **lycopene** and **saw palmetto** extract also help to suppress 5-LOX.[36,37] The suppression of 5-LOX by these nutrients may partially account for their favorable effects on the prostate gland.

As humans age, however, chronic inflammatory processes can cause the over-expression of 5-LOX in the body.[38] For maturing males, the result of excess 5-LOX may be the epidemic of prostate cancer observed as men age.[2]

Based on the cumulative knowledge that 5-LOX itself and its metabolic products can promote the progression and metastasis of prostate cancer cells, it would appear advantageous to take aggressive steps to suppress this lethal enzyme.[36]

This can be done by avoiding foods that promote 5-LOX formation in the body and taking supplements that inhibit 5-LOX via differing pathways.

Research Substantiating Boswellia

Specific extracts from the **boswellia** plant selectively inhibit ***5-lipoxygenase*** (5-LOX) a potent inducer of inflammation and carcinogenic byproducts.[39,40]

Boswellia extracts have been used for centuries, particularly in India as anti-inflammatory agents.[41] In several well-controlled human studies, ***boswellia*** has been shown to be effective in alleviating various chronic inflammatory disorders.[42-46]

Scientists have discovered that the specific constituent in boswellia responsible for suppressing **5-LOX** is **AKBA** (*3-O-acetyl-11-keto-B-boswellic acid*).[41] Boswellia-derived AKBA binds directly to **5-LOX** and inhibits its activity.[41] Other boswellic acids only partially and incompletely inhibit 5-LOX.[41,47]

Formulas containing high concentrations of **AKBA** from **boswellia** have been developed based on its ability to treat inflammatory disorders. Standardized **boswellia** extracts have long been included in prostate support nutrient formulas for the purpose of suppressing excess **5-LOX**.

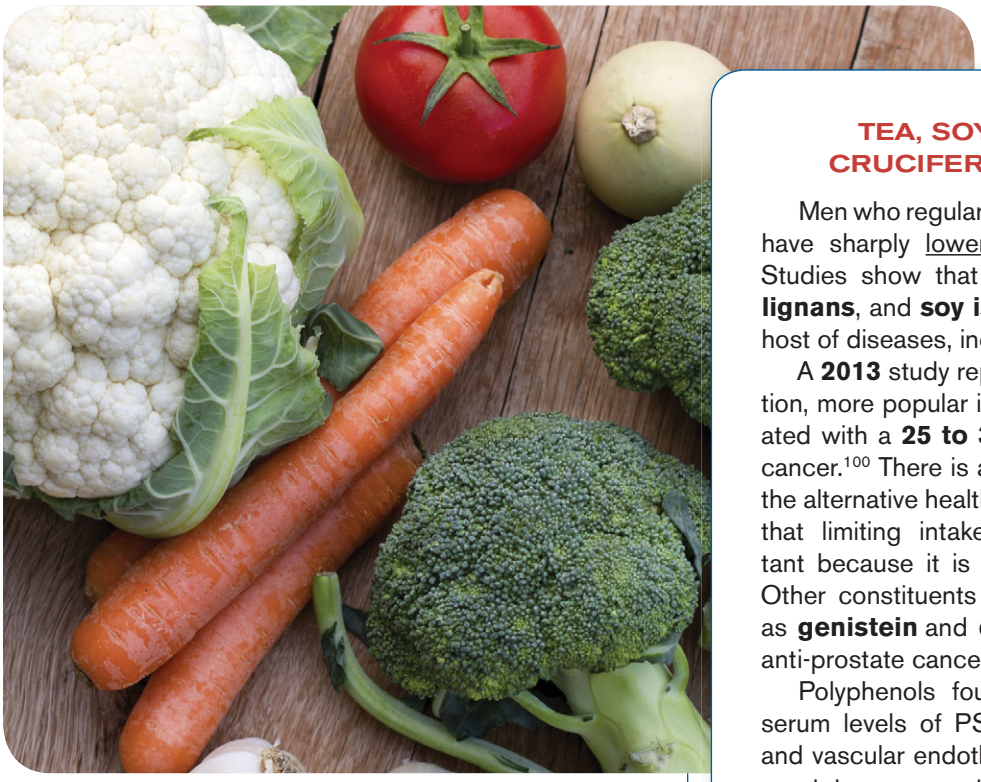
MULTIPLE DANGERS OF EXCESS ARACHIDONIC ACID

In response to arachidonic acid overload, the body increases its production of enzymes like 5-lipoxygenase (5-LOX) to degrade arachidonic acid.[48] Not only do 5-LOX products directly stimulate cancer cells propagation, but the breakdown products that 5-LOX produces from arachidonic acid (such as leukotriene B4, 5-HETE, and hydroxylated fatty acids) cause tissue destruction, chronic inflammation, and increased resistance of tumor cells to apoptosis (programmed cell destruction).[19-21,48-58]

It is important to understand that 5-LOX is not the only dangerous enzyme the body produces to break down arachidonic acid. As can be seen in the chart on the previous page, both cyclooxygenase-1 and cyclooxygenase-2 (COX-1 and COX-2) also participate in the degradation of arachidonic acid.

COX-1 causes production of thromboxane A2, which can promote abnormal arterial blood clotting (thrombosis), resulting in heart attack and stroke.[59-63] **Thromboxane A2** is also involved in tumor metastasis. [64,65] COX-2 is directly involved in cancer cell propagation, while its breakdown product (prostaglandin E2) promotes chronic inflammation.[56,66-68] Most health-conscious people already inhibit the COX-1 and COX-2 enzymes by taking low-dose aspirin, curcumin, green tea, and various plant flavonoids such as pomegranate. [61,69-82]

A more integrative approach to this problem, however, would be to also reduce dietary levels of **arachidonic acid**, which is the precursor of 5-HETE and leukotriene B4.[83]



Prostate-Protecting Properties of Boswellia

Tumor necrosis factor-alpha (TNF-alpha) is a pro-inflammatory cytokine that often increases in aging people.[84]

From the standpoint of keeping prostate cancer cells in check, **boswellia** has been shown to prevent the TNF-alpha-induced expression of a protein-degrading enzyme called ***matrix metalloproteinase*** (MMP).[85] Cancer cells use the MMP enzyme to tear apart natural barriers in the body that would normally encase them.[86] Prostate cancer cells are notorious for inducing the production of this enzyme (TNF-alpha) that causes containment structures within the prostate gland to vanish, thus enabling the cancerous prostate cells to break through healthy prostate tissue and eventually metastasize.[87,88]

Prostate cancer cells use adhesion molecules (known as VCAM-1 and ICAM-1) to facilitate their spread throughout the body. Boswellia has been shown to prevent the up-regulation of these adhesion molecules, which are directly involved in inflammatory processes.[85] Chronic inflammation is tightly linked to the induction of aberrant angiogenesis used by cancer cells to facilitate the growth of new blood vessels (angiogenesis) into tumors.[89]

The potent **5-LOX-inhibiting** properties of **boswellia**, and its ability to suppress other inflammatory factors such as TNF-alpha, make it an important nutrient for those concerned with prostate cancer.[41,85]

TEA, SOY, LIGNANS, AND CRUCIFEROUS VEGETABLES

Men who regularly consume certain plant foods have sharply lower rates of prostate cancer.[90] Studies show that **cauliflower**, **broccoli**, **flax lignans**, and **soy isoflavones** protect against a host of diseases, including **prostate cancer**.[91-99]

A **2013** study reported that soy food consumption, more popular in Asian populations, is associated with a **25 to 30%** reduced risk of prostate cancer.[100] There is a lot of confusion about soy in the alternative health community. Everyone agrees that limiting intake of **soybean oil** is important because it is loaded with **omega-6** fats.[13] Other constituents found in soy, however, such as **genistein** and **daidzein** have demonstrated anti-prostate cancer mechanisms.[101-107]

Polyphenols found in **green tea** decrease serum levels of PSA, hepatocyte growth factor, and vascular endothelial growth factor (VEGF) in prostate cancer patients.[108-113]

The FDA says, however, that there is insufficient evidence to claim that green tea consumption protects against prostate cancer.[114] Life Extension issued a rebuttal to the FDA position on green tea and prostate cancer in the November 2005 edition of ***Life Extension*** magazine®.

Urgent Need to Alter Dietary Patterns

Those consuming Western diets predispose themselves to cancer.[3] It is encouraging that we know what food groups increase prostate cancer risk and what foods/nutrients reduce it.

All aging men should shift their diet towards foods that protect against prostate cancer. Those with rising or elevated PSA should be especially diligent in avoiding dietary factors that can fuel the growth of prostate tumors.[115]

The lethal impact of cancer-promoting foods may be mitigated by taking supplements such as **green tea**, **curcumin**, **fish oil**, **pomegranate**, and **boswellia**, along with regular inclusion of **cruciferous vegetables** and other healthy foods in one's diet. ●

If you have any questions on the scientific content of this article, please call a Life Extension® Health Advisor at 1-866-864-3027.

References

1. Available at: http://www.cancer.org/cancer/prostatecancer/detailedguide/prostate-cancer-key-statistics. Accessed August 26, 2013.
2. Available at: http://eu-acme.org/europeanurology/upload_articles/Roehrborn.pdf. Accessed October 2, 2013.
3. Erdelyi I, Levenkova N, Lin EY, et al. Western-style diets induce oxidative stress and dysregulate immune responses in the colon in a mouse model of sporadic colon cancer. *J Nutr.* 2009 Nov;139(11):2072-8.
4. Available at: http://www.cancer.gov/cancertopics/factsheet/Risk/cooked-meats. Accessed October 7, 2013.
5. Joshi AD, Corral R, Catsburg C, et al. Red meat and poultry, cooking practices, genetic susceptibility and risk of prostate cancer: results from a multiethnic case-control study. *Carcinogenesis*. 2012 Nov;33(11):2108-18.
6. Available at: http://www.cancer.gov/dictionary?cdrid=46053. Accessed October 2, 2013.
7. Punnen S, Hardin J, Cheng I, Klein EA, Witte JS. Impact of meat consumption, preparation, and mutagens on aggressive prostate cancer. *PLoS One*. 2011 6(11):e27711.
8. John EM, Stern MC, Sinha R, Koo J. Meat consumption, cooking practices, meat mutagens, and risk of prostate cancer. *Nutr Cancer*. 2011 63(4):525-37.
9. Richman EL, Kenfield SA, Stampfer MJ, Giovannucci EL, Chan JM. Egg, red meat, and poultry intake and risk of lethal prostate cancer in the prostate-specific antigen-era: incidence and survival. *Cancer Prev Res (Phila)*. 2011 Dec;4(12):2110-21.
10. Aune D, De Stefani E, Ronco AL, et al. Egg consumption and the risk of cancer: a multisite case-control study in Uruguay. *Asian Pac J Cancer Prev*. 2009;10(5):869-76.
11. Song Y, Chavarro JE, Cao Y, et al. Whole milk intake is associated with prostate cancer-specific mortality among U.S. male physicians. *J Nutr*. 2013 Feb;143(2):189-96.
12. Available at: http://umm.edu/health/medical/altmed/supplement/omega6-fatty-acids. Accessed October 3, 2013.
13. Available at: http://nutritiondata.self.com/foods-00014100000000000000-w.html. Accessed October 3, 2013.
14. Mekki N, Charbonnier M, Borel P, et al. Butter differs from olive oil and sunflower oil in its effects on postprandial lipemia and triacylglycerol-rich lipoproteins after single mixed meals in healthy young men. *J Nutr.* 2002 Dec;132(12):3642-9.
15. Newcomer LM, King IB, Wicklund KG, Stanford JL. The association of fatty acids with prostate cancer risk. *Prostate*. 2001 Jun 1;47(4):262-8.
16. Leitzmann MF, Stampfer MJ, Michaud DS, et al. Dietary intake of n-3 and n-6 fatty acids and the risk of prostate cancer. *Am J Clin Nutr*. 2004 Jul;80(1):204-16.
17. Pelser C, Mondul AM, Hollenbeck AR, Park Y. Dietary fat, fatty acids, and risk of prostate cancer in the NIH-AARP diet and health study. *Cancer Epidemiol Biomarkers Prev.* 2013 Apr;22(4):697-707
18. Sears B, Ricordi C. Anti-inflammatory nutrition as a pharmacological approach to treat obesity. *J Obes*. 2011;2011.
19. Hassan S, Carraway RE. Involvement of arachidonic acid metabolism and EGF receptor in neurotensin-induced prostate cancer PC3 cell growth. *Regul Pept*. 2006 Jan 15;133(1-3):105-14.
20. Moretti RM, Montagnani MM, Sala A, Motta M, Limonta P. Activation of the orphan nuclear receptor RORalpha counteracts the proliferative effect of fatty acids on prostate cancer cells: crucial role of 5-lipoxygenase. *Int J Cancer*. 2004 Oct 20;112(1):87-93.
21. Ghosh J, Myers CE. Arachidonic acid stimulates prostate cancer cell growth: critical role of 5-lipoxygenase. *Biochem Biophys Res Commun*. 1997 Jun 18;235(2):418-23.
22. Ghosh J, Myers CE. Inhibition of arachidonate 5-lipoxygenase triggers massive apoptosis in human prostate cancer cells. *Proc Natl Acad Sci U S A.* 1998 Oct 27;95(22):13182-7.
23. Sundaram S, Ghosh J. Expression of 5-oxoETE receptor in prostate cancer cells: critical role in survival. *Biochem BiophysRes Commun*. 2006 Jan 6;339(1):93-8.
24. Larré S, Tran N, Fan C, et al. PGE2 and LTB4 tissue levels in benign and cancerous prostates. *Prostaglandins Other Lipid Mediat.* 2008 Dec;87(1-4):14-9.
25. Ritch CR, Wan RL, Stephens LB, et al. Dietary fatty acids correlate with prostate cancer biopsy grade and volume in Jamaican men. *J Urol*. 2007 Jan;177(1):97-101; discussion 101.
26. Gupta S, Srivastava M, Ahmad N, Sakamoto K, Bostwick DG, Mukhtar H. Lipoxygenase-5 is overexpressed in prostate adenocarcinoma. *Cancer.* 2001 Feb 15;91(4):737-43.
27. Ye YN, Liu ES, Shin VY, Wu WK, Cho CH. Contributory role of 5-lipoxygenase and its association with angiogenesis in the promotion of inflammation-associated colonic tumorigenesis by cigarette smoking. *Toxicology*. 2004 Oct 15;203(1-3):179-88.
28. Ghosh J. Inhibition of arachidonate 5-lipoxygenase triggers prostate cancer cell death through rapid activation of c-Jun N-terminal kinase. *Biochem Biophys Res Commun*. 2003 Jul 25;307(2):342-9.
29. Anderson KM, Seed T, Vos M et al. 5-Lipoxygenase inhibitors reduce PC-3 cell proliferation and initiate nonnecrotic cell death. *Prostate*. 1998 Nov 1;37(3):161-73.
30. Norris PC, Dennis EA. Omega-3 fatty acids cause dramatic changes in TLR4 and purinergic eicosanoid signaling. *Proc Natl Acad Sci U S A*. 2012 May 29;109(22):8517-22.
31. Barham JB, Edens MB, Fonteh AN, et al. Addition of eicosapentaenoic acid to gamma-linolenic acid-supplemented diets prevents serum arachidonic acid accumulation in humans. *J Nutr*. 2000 Aug;130(8):1925-31.

32. Adan Y, Shibata K, Sato M, Ikeda I, Imaizumi K. Effects of docosahexaenoic and eicosapentaenoic acid on lipid metabolism, eicosanoid production, platelet aggregation and atherosclerosis in hypercholesterolemic rats. *Biosci Biotechnol Biochem*. 1999 Jan;63(1):111-9.
33. Schwartz J. Role of polyunsaturated fatty acids in lung disease. *Am J Clin Nutr*. 2000 Jan;71(1 Suppl):393S-6S.
34. Taccone-Gallucci M, Manca-di-Villahermosa S, Battistini L, et al. N-3 PUFAs reduce oxidative stress in ESRD patients on maintenance HD by inhibiting 5-lipoxygenase activity. *Kidney Int*. 2006 Apr;69(8):1450-4.
35. Gupta SC, Patchva S, Aggarwal BB. Therapeutic roles of curcumin: lessons learned from clinical trials. *AAPS J*. 2013 Jan;15(1):195-218.
36. Hazai E, Bikadi Z, Zsila F, Lockwood SF. Molecular modeling of the non-covalent binding of the dietary tomato carotenoids lycopene and lycophyll, and selected oxidative metabolites with 5-lipoxygenase. *Bioorg Med Chem*. 2006 Oct 15;14(20):6859-67.
37. Bonvissuto G, Minutoli L, Morgia G, et al. Effect of Serenoa repens, lycopene, and selenium on proinflammatory phenotype activation: an in vitro and in vivo comparison study. *Urology*. 2011 Jan;77(1):248.e9-16.
38. Qu T, Uz T, Manev H. Inflammatory 5-LOX mRNA and protein are increased in brain of aging rats. *Neurobiol Aging*. 2000 Sep-Oct;21(5):647-52.
39. Safayhi H, Rall B, Sailer ER, Ammon HP. Inhibition by boswellic acids of human leukocyte elastase. *J Pharmacol Exp Ther*. 1997 Apr;281(1):460-3.
40. Safayhi H, Sailer ER, Ammon HP. Mechanism of 5-lipoxygenase inhibition by acetyl-11-keto-beta-boswellic acid. *Mol Pharmacol*. 1995 Jun;47(6):1212-6.
41. Siddiqui MZ. Boswellia serrata, a potential antiinflammatory agent: an overview. *Indian J Pharm Sci*. 2011 May;73(3):255-61.
42. Kimmatkar N, Thawani V, Hingorani L, Khiyani R. Efficacy and tolerability of Boswellia serrata extract in treatment of osteoarthritis of knee--a randomized double blind placebo controlled trial. *Phytomedicine*. 2003 Jan;10(1):3-7.
43. Ammon HP. Boswellic acids (components of frankincense) as the active principle in treatment of chronic inflammatory diseases. *Wien Med Wochenschr*. 2002 152(15-16):373-8.
44. Gupta I, Parihar A, Malhotra P, et al. Effects of gum resin of Boswellia serrata in patients with chronic colitis. *Planta Med*. 2001 Jul;67(5):391-5.
45. Gerhardt H, Seifert F, Buvari P, Vogelsang H, Repges R. Therapy of active Crohn disease with Boswellia serrata extract H 15. *Z Gastroenterol*. 2001 Jan;39(1):11-7.
46. Gupta I, Gupta V, Parihar A, et al. Effects of Boswellia serrata gum resin in patients with bronchial asthma: results of a double-blind, placebo-controlled, 6-week clinical study. *Eur J Med Res*. 1998 Nov 17;3(11):511-4.
47. Sailer ER, Subramanian LR, Rall B, et al. Acetyl-11-keto-beta-boswellic acid (AKBA): structure requirements for binding and 5-lipoxygenase inhibitory activity. *Br J Pharmacol*. 1996 Feb;117(4):615-8.
48. Jiang WG, Douglas-Jones AG, Mansel RE. Aberrant expression of 5-lipoxygenase-activating protein (5-LOXAP) has prognostic and survival significance in patients with breast cancer. *Prostaglandins Leukot Essent Fatty Acids*. 2006 Feb;74(2):125-34.
49. Yoshimura R, Matsuyama M, Mitsuhashi M, et al. Relationship between lipoxygenase and human testicular cancer. *Int J Mol Med*. 2004 Mar;13(3):389-93.
50. Zhang L, Zhang WP, Hu H, et al. Expression patterns of 5-lipoxygenase in human brain with traumatic injury and astrocytoma. *Neuropathology*. 2006 Apr;26(2):99-106.
51. Soumaoro LT, Iida S, Uetake H, et al. Expression of 5-lipoxygenase in human colorectal cancer. *World J Gastroenterol*. 2006 Oct 21;12(39):6355-60.
52. Hoque A, Lippman SM, Wu TT, et al. Increased 5-lipoxygenase expression and induction of apoptosis by its inhibitors in esophageal cancer: a potential target for prevention. *Carcinogenesis*. 2005 Apr;26(4):785-91.
53. Zhi H, Zhang J, Hu G, et al. The deregulation of arachidonic acid metabolism-related genes in human esophageal squamous cell carcinoma. *Int J Cancer*. 2003 Sep 1;106(3):327-33.
54. Rubinsztajn R, Wronska J, Chazan R. Urinary leukotriene E4 concentration in patients with bronchial asthma and intolerance of non-steroids anti-inflammatory drugs before and after oral aspirin challenge. *Pol Arch Med Wewn*. 2003 Aug;110(2):849-54.
55. Subbarao K, Jala VR, Mathis S, et al. Role of leukotriene B4 receptors in the development of atherosclerosis: potential mechanisms. *Arterioscler Thromb Vasc Biol*. 2004 Feb;24(2):369-75.
56. Laufer S. Role of eicosanoids in structural degradation in osteoarthritis. *Curr Opin Rheumatol*. 2003 Sep;15(5):623-7.
57. Hennig R, Ding XZ, Tong WG, et al. 5-Lipoxygenase and leukotriene B(4) receptor are expressed in human pancreatic cancers but not in pancreatic ducts in normal tissue. *Am J Pathol*. 2002 Aug;161(2):421-8.
58. Ding XZ, Iversen P, Cluck MW, Knezetic JA, Adrian TE. Lipoxygenase inhibitors abolish proliferation of human pancreatic cancer cells. *Biochem Biophys Res Commun*. 1999 Jul 22;261(1):218-23.
59. de Leval X, Hanson J, David JL, et al. New developments on thromboxane and prostacyclin modulators part II: prostacyclin modulators. *Curr Med Chem*. 2004 May;11(10):1243-52.
60. Cheng Y, Austin SC, Rocca B, et al. Role of prostacyclin in the cardiovascular response to thromboxane A2. *Science*. 2002 Apr 19;296(5567):539-41.
61. Catella-Lawson F. Vascular biology of thrombosis: platelet-vessel wall interactions and aspirin effects. *Neurology*. 2001 57(5 Suppl 2):S5-S7.
62. James MJ, Penglis PS, Caughey GE, Demasi M, Cleland LG. Eicosanoid production by human monocytes: does COX-2 contribute to a self-limiting inflammatory response? *Inflamm Res*. 2001 May;50(5):249-53.
63. Garcia Rodriguez LA. The effect of NSAIDs on the risk of coronary heart disease: fusion of clinical pharmacology and pharmacoepidemiologic data. *Clin Exp Rheumatol*. 2001 Nov;19(6 Suppl 25):S41-4.
64. Nie D, Lamberti M, Zacharek A, et al. Thromboxane A(2) regulation of endothelial cell migration, angiogenesis, and tumor metastasis. *Biochem Biophys Res Commun*. 2000 Jan 7;267(1):245-51.
65. Dassesse T, de Leval X, de Leval L, Pirotte B, Castronovo V, Waltregny D. Activation of the thromboxane A2 pathway in human prostate cancer correlates with tumor Gleason score and pathologic stage. *Eur Urol*. 2006 Nov;50(5):1021-31.
66. Wang D, Wang H, Shi Q, et al. Prostaglandin E(2) promotes colorectal adenoma growth via transactivation of the nuclear peroxisome proliferator-activated receptor delta. *Cancer Cell*. 2004 Sep;6(3):285-95.
67. Onguru O, Casey MB, Kajita S, Nakamura N, Lloyd RV. Cyclooxygenase-2 and thromboxane synthase in non-endocrine and endocrine tumors: a review. *Endocr Pathol*. 2005 16(4):253-77.
68. Wang D, Dubois RN. Prostaglandins and cancer. *Gut*. 2006 Jan;55(1):115-22.
69. Feldman M, Cryer B, Rushin K, Betancourt J. A comparison of every-third-day versus daily low-dose aspirin therapy on serum thromboxane concentrations in healthy men and women. *Clin Appl Thromb Hemost*. 2001 Jan;7(1):53-7.
70. Zhang F, Altorki NK, Mestre JR, Subbaramaiah K, Dannenberg AJ. Curcumin inhibits cyclooxygenase-2 transcription in bile acid- and phorbol ester-treated human gastrointestinal epithelial cells. *Carcinogenesis*. 1999 Mar;20(3):445-51.
71. Bengmark S. Curcumin, an atoxic antioxidant and natural NFkappaB, cyclooxygenase-2, lipooxygenase, and inducible nitric oxide synthase inhibitor: a shield against acute and chronic diseases. *JPEN J Parenter Enteral Nutr*. 2006 Jan;30(1):45-51.
72. Park C, Kim GY, Kim GD, et al. Induction of G2/M arrest and inhibition of cyclooxygenase-2 activity by curcumin in human bladder cancer T24 cells. *Oncol Rep*. 2006 May;15(5):1225-31.
73. Hong J, Bose M, Ju J, et al. Modulation of arachidonic acid metabolism by curcumin and related beta-diketone derivatives: effects on cytosolic phospholipase A(2), cyclooxygenases and 5-lipoxygenase. *Carcinogenesis*. 2004 Sep;25(9):1671-9.

74. Yoysungnoen P, Wirachwong P, Bhattarakosol P, Niimi H, Patumraj S. Effects of curcumin on tumor angiogenesis and biomarkers, COX-2 and VEGF, in hepatocellular carcinoma cell-implanted nude mice. *Clin Hemorheol Microcirc*. 2006 34(1-2):109-15.
75. Tunstall RG, Sharma RA, Perkins S, et al. Cyclooxygenase-2 expression and oxidative DNA adducts in murine intestinal adenomas: modification by dietary curcumin and implications for clinical trials. *Eur J Cancer*. 2006 Feb;42(3):415-21.
76. Lee J, Im YH, Jung HH, et al. Curcumin inhibits interferon-alpha induced NF-kappaB and COX-2 in human A549 non-small cell lung cancer cells. *Biochem Biophys Res Commun*. 2005 Aug 26;334(2):313-8.
77. Hong J, Smith TJ, Ho CT, August DA, Yang CS. Effects of purified green and black tea polyphenols on cyclooxygenase- and lipoxygenase-dependent metabolism of arachidonic acid in human colon mucosa and colon tumor tissues. *Biochem Pharmacol*. 2001 Nov 1;62(9):1175-83.
78. Ahmed S, Rahman A, Hasnain A, et al. Green tea polyphenol epigallocatechin-3-gallate inhibits the IL-1 beta-induced activity and expression of cyclooxygenase-2 and nitric oxide synthase-2 in human chondrocytes. *Free Radic Biol Med*. 2002 Oct 15;33(8):1097-105.
79. Shukla M, Gupta K, Rasheed Z, Khan KA, Haqqi TM. Bioavailable constituents/metabolites of pomegranate (Punica granatum L) preferentially inhibit COX2 activity ex vivo and IL-1beta-induced PGE2 production in human chondrocytes in vitro. *J Inflamm (Lond)*. 2008 Jun 13;5:9.
80. Rosillo MA, Sánchez-Hidalgo M, Cárdeno A, et al. Dietary supplementation of an ellagic acid-enriched pomegranate extract attenuates chronic colonic inflammation in rats. *Pharmacol Res*. 2012 Sep;66(3):235-42.
81. Hämäläinen M, Nieminen R, Asmawi MZ, Vuorela P, Vapaatalo H, Moilanen E. Effects of flavonoids on prostaglandin E2 production and on COX-2 and mPGES-1 expressions in activated macrophages. *Planta Med*. 2011 Sep;77(13):1504-11.
82. O'Leary KA, de Pascual-Tereasa S, Needs PW, Bao YP, O'Brien NM, Williamson G. Effect of flavonoids and vitamin E on cyclooxygenase-2 (COX-2) transcription. *Mutat Res*. 2004 Jul 13;551(1-2):245-54.
83. Available at: http://www.jlr.org/content/33/3/323.full.pdf. Accessed October 4, 2013.
84. Gupta S, Chiplunkar S, Kim C, Yel L, Gollapudi S. Effect of age on molecular signaling of TNF-alpha-induced apoptosis in human lymphocytes. *Mech Ageing Dev*. 2003 Apr;124(4):503-9.
85. Roy S, Khanna S, Shah H, et al. Human genome screen to identify the genetic basis of the anti-inflammatory effects of Boswellia in microvascular endothelial cells. *DNA Cell Biol*. 2005 Apr;24(4):244-55.
86. Katiyar SK. Matrix metalloproteinases in cancer metastasis: molecular targets for prostate cancer prevention by green tea polyphenols and grape seed proanthocyanidins. *Endocr Metab Immune Disord Drug Targets*. 2006 Mar;6(1):17-24.
87. Rodríguez-Berriguete G, Sánchez-Espiridión B, Cansino JR, et al. Clinical significance of both tumor and stromal expression of components of the IL-1 and TNF- signaling pathways in prostate cancer. *Cytokine*. 2013 Sep 21.
88. Mizokami A, Gotoh A, Yamada H, Keller ET, Matsumoto T. Tumor necrosis factor-alpha represses androgen sensitivity in the LNCaP prostate cancer cell line. *J Urol*. 2000 Sep;164(3 Pt 1):800-5.
89. Rajashekhar G, Willuweit A, Patterson CE, et al. Continuous endothelial cell activation increases angiogenesis: evidence for the direct role of endothelium linking angiogenesis and inflammation. *J Vasc Res*. 2006 43(2):193-204.
90. Chan R, Lok K, Woo J. Prostate cancer and vegetable consumption. *Mol Nutr Food Res*. 2009 Feb;53(2):201-16.
91. Heald CL, Ritchie MR, Bolton-Smith C, Morton MS, Alexander FE. Phyto-oestrogens and risk of prostate cancer in Scottish men. *Br J Nutr*. 2007 Aug;98(2):388-96.
92. Hedelin M, Klint A, Chang ET, et al. Dietary phytoestrogen, serum enterolactone and risk of prostate cancer: the cancer prostate Sweden study (Sweden). *Cancer Causes Control*. 2006 Mar;17(2):169-80.
93. Kumar NB, Cantor A, Allen K, et al. The specific role of isoflavones in reducing prostate cancer risk. *Prostate*. 2004 May 1;59(2):141-7.
94. Lee MM, Gomez SL, Chang JS, et al. Soy and isoflavone consumption in relation to prostate cancer risk in China. *Cancer Epidemiol Biomarkers Prev*. 2003 Jul;12(7):665-8.
95. McCann SE, Ambrosone CB, Moysich KB, et al. Intakes of selected nutrients, foods, and phytochemicals and prostate cancer risk in western New York. *Nutr Cancer*. 2005 53(1):33-41.
96. Vij U, Kumar A. Phyto-oestrogens and prostatic growth. *Natl Med J India*. 2004 Jan;17(1):22-6.
97. Sonoda T, Nagata Y, Mori M, et al. A case-control study of diet and prostate cancer in Japan: possible protective effect of traditional Japanese diet. *Cancer Sci*. 2004 Mar;95(3):238-42.
98. Clarke JD, Dashwood RH, Ho E. Multi-targeted prevention of cancer by sulforaphane. *Cancer Lett*. 2008 Oct 8;269(2):291-304.
99. Abdull Razis AF, Noor NM. Cruciferous vegetables: dietary phytochemicals for cancer prevention. *Asian Pac J Cancer Prev*. 2013;14(3):1565-70.
100. Kimura T. East meets West: ethnic differences in prostate cancer epidemiology between East Asians and Caucasians. *Chin J Cancer*. 2012 Sep;31(9):421-9.
101. Chen Y, Zaman MS, Deng G, et al. MicroRNAs 221/222 and genistein-mediated regulation of ARHI tumor suppressor gene in prostate cancer. *Cancer Prev Res (Phila)*. 2011 Jan;4(1):76-86.
102. Lakshman M, Xu L, Ananthanarayanan V, et al. Dietary genistein inhibits metastasis of human prostate cancer in mice. *Cancer Res*. 2008 Mar 15;68(6):2024-32.
103. Davis JN, Singh B, Bhuiyan M, Sarkar FH. Genistein-induced upregulation of p21WAF1, downregulation of cyclin B, and induction of apoptosis in prostate cancer cells. *Nutr Cancer*. 1998 32(3):123-31.
104. Davis JN, Kucuk O, Sarkar FH. Genistein inhibits NF-kappa B activation in prostate cancer cells. *Nutr Cancer*. 1999 35(2):167-74.
105. Ozasa K, Nakao M, Watanabe Y, et al. Serum phytoestrogens and prostate cancer risk in a nested case-control study among Japanese men. *Cancer Sci*. 2004 Jan;95(1):65-71.
106. Park HJ, Jeon YK, You DH, Nam MJ. Daidzein causes cytochrome c-mediated apoptosis via the Bcl-2 family in human hepatic cancer cells. *Food Chem Toxicol*. 2013 Oct;60:542-9.
107. Dong X, Xu W, Sikes RA, Wu C. Combination of low dose of genistein and daidzein has synergistic preventive effects on isogenic human prostate cancer cells when compared with individual soy isoflavone. *Food Chem*. 2013 Dec 1;141(3):1923-33.
108. Henning SM, Aronson W, Niu Y, et al. Tea polyphenols and theaflavins are present in prostate tissue of humans and mice after green and black tea consumption. *J Nutr*. 2006 Jul;136(7):1839-43.
109. Bettuzzi S, Brausi M, Rizzi F, Castagnetti G, Peracchia G, Corti A. Chemoprevention of human prostate cancer by oral administration of green tea catechins in volunteers with high-grade prostate intraepithelial neoplasia: a preliminary report from a one-year proof-of-principle study. *Cancer Res*. 2006 Jan 15;66(2):1234-40.
110. Pandey M, Gupta S. Green tea and prostate cancer: from bench to clinic. *Front Biosci (Elite Ed)*. 2009;1:13-25.
111. McLarty J, Bigelow RL, Smith M, Elmajian D, Ankem M, Cardelli JA. Tea polyphenols decrease serum levels of prostate-specific antigen, hepatocyte growth factor, and vascular endothelial growth factor in prostate cancer patients and inhibit production of hepatocyte growth factor and vascular endothelial growth factor in vitro. *Cancer Prev Res (Phila)*. 2009 Jul;2(7):673-82.
112. Siddiqui IA, Zaman N, Aziz MH, et al. Inhibition of CWR22Rnu1 tumor growth and PSA secretion in athymic nude mice by green and black teas. *Carcinogenesis*. 2006 Apr;27(4):833-9.
113. Chuu CP, Chen RY, Kokontis JM, Hiipakka RA, Liao S. Suppression of androgen receptor signaling and prostate specific antigen expression by (-)-epigallocatechin-3-gallate in different progression stages of LNCaP prostate cancer cells. *Cancer Lett*. 2009 Mar 8;275(1):86-92.
114. Available at: http://www.foxnews.com/story/2005/07/06/fda-rejects-green-tea-cancer-claims/. Accessed October 4, 2013.
115. Available at: http://www.whfoods.com/genpage.php?tname=nutrient&dbid=84#foodchart. Accessed October 4, 2013.

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- Pomegranate
- Black soybean hull
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References

1. *J Agric Food Chem.* 2008;56:7796-802.
2. *J Agric Food Chem.* 2008 Feb 13;56(3):630-5.
3. *Mol Nutr Food Res.* 2007 Jun;51(6):652-64.
4. *J Agric Food Chem.* 2006 Dec 13;54(25):9329-39.
5. *Br J Nutr.* 2009 Nov 24:1-4.
6. American Chemical Society. Aug 23, 2010.

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References

1. *Int J Neurosci*. 1992 Nov-Dec;67(1-4):127-44.
2. *Curr Opin Neurobiol.* 2013 Feb 2. pii: S0959-4388(13)00027-5.
3. *Prog Neurobiol.* 2000 Jan;60(1):13-35.
4. *J Nutr.* 2012 Dec;142(12):2236S-2244S.
5. *J Exp Biol.* 2002 Dec;205(Pt 23):3679-87.
6. Available at: http://www.tamu.edu/faculty/bmiles/lectures/amcat.pdf. Accessed February 14, 2013.
7. *Amino Acids.* 2012 June 8.
8. *J Clin Invest.* 1999 April 15;103(8):1169–78.

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EFFERVESCENT VITAMIN C-MAGNESIUM CRYSTALS

Effervescent Vitamin C-Magnesium Crystals contains no harsh, synthetic chemicals.[12,13]

Effervescent Vitamin C-Magnesium Crystals is safe for up to three times per week, since it contains only nutrients that can provide other benefits.

Effervescent Vitamin C-Magnesium Crystals is not a fiber—so it never creates more fecal bulk than you can easily evacuate.[14,15]

Occasional constipation is one of the most frequent gastrointestinal complaints in the United States, particularly among women and the elderly.[1] To address this issue, Life Extension® offers a dose-adjustable nutritional solution—**Effervescent Vitamin C-Magnesium Crystals**—to provide immediate **relief from occasional constipation**.

THE PROBLEM

A series of rhythmic muscle contractions move food through the digestive tract.[2] But highly processed foods and a lack of quality nutrition can occasionally result in normal but temporarily ineffective movement of waste through the colon.

NUTRITIONAL SUPPORT

Vitamin C is an antioxidant that scavenges free radicals in the body and protects tissues from oxidative stress.[3-5] Vitamin C is a vital cofactor to the formation of collagen, the connective tissue that supports arterial walls, skin, bones, and teeth.[4,5]

Magnesium is a cofactor in hundreds of enzymatic processes within cells, helps maintain healthy blood pressure levels already within normal range, improves the metabolic profile, beneficially impacts insulin resistance and inflammation. Research shows many Americans do *not* obtain adequate magnesium in their diets.[6-11]

Effervescent Vitamin C-Magnesium Crystals has been developed to help provide relief from occasional constipation.

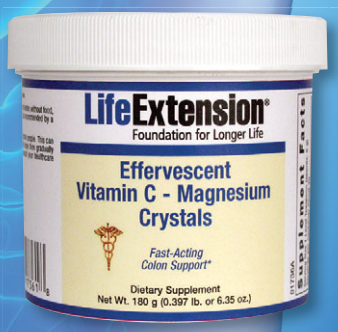
Effervescent Vitamin C-Magnesium Crystals can be used in varying doses depending on individual need. The suggested starting dose should be one (1) level teaspoon of **Effervescent Vitamin C-Magnesium Crystals**, taken on an **empty stomach**, mixed in 8 ounces of water. Follow immediately with drinking 8 additional ounces of water.

Each level teaspoon (approx 6 grams) provides:

- **4,500 milligrams** of vitamin C (as ascorbic acid)
- **4 milligrams** of vitamin B6 (as pyridoxine hydrochloride) and
- **250 milligrams** of magnesium (as magnesium carbonate)

Some people will need to take one teaspoon of **Effervescent Vitamin C-Magnesium Crystals** on an empty stomach up to three times a week. Always follow by drinking an additional 8 ounces of water.

A bottle of 180 grams of Life Extension® **Effervescent Vitamin C-Magnesium Crystals** retails for $20. If a member buys four bottles, the price is reduced to only **$13.50 per bottle**.



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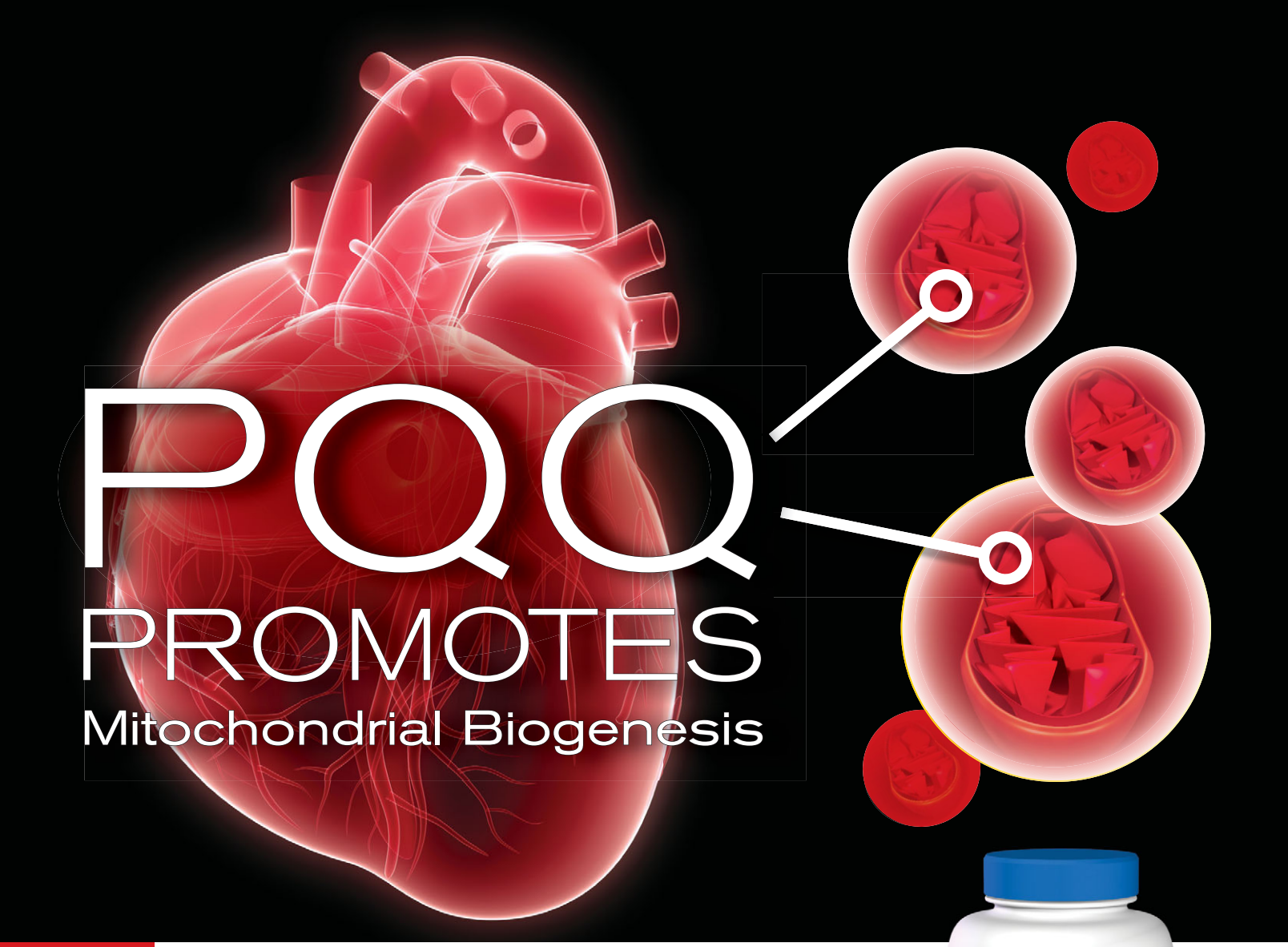
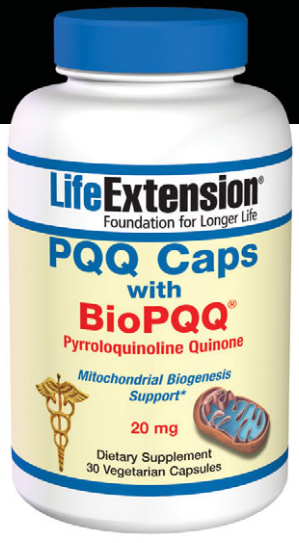
References

1. Available at: http://digestive.niddk.nih.gov/ddiseases/pubs/constipation/.
2. Available at: http://www.nlm.nih.gov/medlineplus/ency/article/002282.htm.
3. *J Am Coll Nutr.* 2003 Feb;22(1):18-35.
4. *Am J Clin Nutr.* 1999 Jun;69(6):1086-107.
5. *Altern Med Rev.* 2003 Nov;8(4):359-77.
6. *Adv Nutr.* 2013 May 1;4(3):378S-83S.
7. *J Hypertens.* 2008 Jan;26(1):44-52.
8. *Magnes Res.* 2007 Jun;20(2):107-29.
9. *Magnes Res.* 2010 Jun;23(2):73-80.
10. *Curr Opin Lipidol.* 2008 Feb;19(1):50-6.
11. *J Nutr.* 2003 Sep;133(9):2879-82.
12. *BMC Pediatr.* 2012 Nov 15;12:178.
13. Available at: http://www.ewg.org/skindeep/ingredient/704983/POLYETHYLENE_GLYCOL/.
14. *Am J Gastroenterol.* 1997 Jan;92(1):95-8.
15. *World J Gastroenterol.* 2012 Sep 7;18(33):4593-6.

To order Life Extension® Effervescent Vitamin C-Magnesium Crystals, call 1-800-544-4440 or visit www.LifeExtension.com





Item #01647

Critical Importance of Mitochondria

In 1983, **Life Extension**® was the first to introduce **CoQ10** as a proven method to enhance **mitochondrial** energy production.

CoQ10 has since gained universal recognition for its role in supporting cellular performance throughout the body.[1-6]

In an unprecedented breakthrough, a compound called **PQQ** *(pyrroloquinoline quinone)* has been shown to support ***mitochondrial biogenesis***—the spontaneous generation of **new mitochondria** in aging cells.[7] **PQQ** is available as a low-cost dietary supplement.

Mitochondria are cellular energy generators that supply virtually all the power your body requires for a healthy life span. An abundance of published studies underscores the critical importance of the ***mitochondria*** to overall health, especially as we age.[8-14] Energy-intensive organs like the heart and brain are *dense* with mitochondria.

Until recently, the only natural ways for aging individuals to increase the number of mitochondria in their bodies were long-term calorie restriction or exhaustive physical activity—which are difficult or impractical for most people to implement.

PQQ offers a viable alternative.

The Ultimate Cell Rejuvenator

The enormous amount of energy generated within the mitochondria exposes them to constant free radical attack. The resulting ***mitochondrial decay*** is a hallmark of aging.

PQQ protects and augments delicate mitochondrial structures to promote *youthful* cellular function in **three** distinct ways:

- **Antioxidant power.** Like CoQ10, **PQQ** is a highly potent antioxidant. Its extraordinary molecular stability enables it to facilitate thousands of biochemical reactions in the mitochondria, without breaking down, for maximum antioxidant and bioenergetic support.[15]
- **Favorably modulates gene expression.** PQQ activates *genes* that promote formation of **new mitochondria**[7]—and beneficially interacts with genes directly involved in mitochondrial health. These same genes also support **healthy body weight**, normal **fat** and **sugar metabolism**, and **youthful cellular proliferation**.[16]
- **Mitochondrial defense.** Mitochondria possess their *own* DNA, distinct from the DNA contained in the nucleus. Unfortunately, compared to nuclear DNA, mitochondrial DNA is relatively unprotected. PQQ's antioxidant potency and favorable gene expression profile act to support mitochondrial defense.

Vital Protection for the Aging Heart and Brain

PQQ is an **essential nutrient**, meaning your body cannot make it on its own. A growing body of research indicates that PQQ's unique nutritional profile supports heart health and cognitive function—alone and in combination with CoQ10.[17,18] This comes as no surprise, given how much energy these vital organs need.

Research shows that **PQQ** supports **heart cell function** in the presence of free radicals and promotes blood flow in heart muscle.[19]

When taken in combination with **CoQ10**, just **20 mg per day** of **PQQ** has been shown to promote **memory**, **attention**, **and cognition** in maturing individuals.[20]

A Breakthrough Weapon in the Battle Against Aging

Life Extension® has identified a purified, highly potent form of PQQ from Japan that is produced through a unique fermentation process. The result is the highest quality PQQ available on the market today called **BioPQQ**®.

A bottle containing **30 20 mg** vegetarian capsules of **PQQ Caps with BioPQQ**® retails for $40. If a member buys four bottles, the price is reduced to **$27** per bottle.

The recommended daily dose for **PQQ** is **20 mg**. Those taking **Mitochondrial Energy Optimizer** or **Mitochondria Basics** only require an additional **10 mg** of **PQQ** since these formulas already provide **10 mg** of **PQQ**. The retail price for **30 10 mg PQQ** caps is $24. If a member buys four bottles, the price is reduced to only **$16.50** per bottle. (Item #01500)

BioPQQ® is a registered trademark of MGC (Japan).

To order PQQ Caps with BioPQQ® standalone or any other PQQ-containing formula call 1-800-544-4440 or visit www.LifeExtension.com

References

1. *Mitochondrion*. 2007 Jun;7 Suppl:S103-11.
2. *Mech Ageing Dev*. 1978 Mar;7(3):189-97.
3. *Arch Biochem Biophys*. 1992 Jun;295(2):230-4.
4. *Lipids*. 1989 Jul;24(7):579-84.
5. *Biogerontology*. 2002;3(1-2):37-40.
6. *Exp Gerontol*. 2004 Feb;39(2):189-94.
7. *J Biol Chem*. 2010 Jan 1;285:142-52.
8. *Biochimie*. 1999 Dec;81(12):1131-2.
9. *Lancet*. 1989 Mar 25;1(8639):642-5.
10. *Curr Opin Clin Nutr Metab Care*. 2010 Jul 7.
11. *Age (Dordr)*. 2010 Mar 20.
12. *Ageing Res Rev*. 2010 Jun 25.
13. *Cell Mol Life Sci*. 2010 Jun 25.
14. *Zhonghua Yi Xue Za Zhi* (Taipei). 2001 May;64(5):259-70.
15. *J Nutr*. 2000 Apr;130(4):719-27.
16. Entrez Gene: PARGC1A peroxisome proliferator-activated receptor gamma, coactivator 1 alpha [Homo sapiens] GeneID: 10891.
17. *Cardiovasc Drugs Ther*. 2004 Nov;18(6):421-31.
18. *J Cardiovasc Pharmacol Ther*. 2006 Jun;11(2):119-28.
19. *Biochem Biophys Res Commun*. 2007 Nov 16;363(2):257-62.
20. *FOOD Style*. 2009;21:13(7)50-3. [Tokyo].

BY WILLIAM FALOON

THE Avodart®- Proscar® DEBATE

Elevated levels of **dihydrotestosterone** (DHT) contribute to **benign prostate enlargement**.[1]

Based on evidence that **DHT** is also involved in **prostate cancer**,[2] two large studies were conducted in aging men to see if **drugs** that reduce **DHT** also lower **prostate cancer risk**.[3-5]

One study evaluated the drug **Avodart®** (dutasteride) and the other **Proscar®** (finasteride).[3,4] Both of these drugs inhibit the ***5-alpha reductase*** enzyme, thus blocking the conversion of testosterone to much more powerful **DHT**.[5]

Findings from the two studies showed both drugs reduce prostate cancer risk by about **23-25%**.[3,4] These drugs also substantially reduce symptoms of benign prostate hyperplasia.[1,5]

Some doctors, however, were concerned that in men who did develop prostate cancer, more in the group taking either of these drugs (Avodart® or Proscar®) developed **high-grade** prostate cancer.[3,4] This is a justified concern. **High-grade** prostate cancer requires aggressive therapeutic intervention and is more challenging to cure.[6]

This article will reveal overlooked findings showing that Avodart® or Proscar® do not increase **high-grade** prostate cancer risk and may reduce it. >

When prostate cancer is suspected, the typical diagnostic procedure is a **needle biopsy** of the prostate gland.[7] The biopsied specimen is sent to a pathologist to determine the "grade" of any suspicious structures observed from the biopsied specimen.[7]

The "grade" is determined by the "**Gleason**" scoring system.[7] It is based on microscopic tumor patterns assessed by a pathologist while interpreting the biopsied specimen. The Gleason "grade" is a fundamental determinate used today to estimate low-grade, intermediate-grade, or high-grade malignancy.[7]

The Gleason score is one measure of a patient's specific risk of dying due to prostate cancer.[8] Once diagnosis of prostate cancer is made on biopsy, the Gleason score strongly influences decisions regarding options for therapy.[8] Here is how Gleason numbers are correlated with tumor grade:[7]

Gleason score under 7: Low-grade
Gleason score of 7: Intermediate-grade
Gleason score over 7: High-grade

The higher the Gleason score, the more ***aggressive*** the tumor is likely to act and the worse the patient's prognosis.[8]

Problems With Gleason Testing

Physicians and lay people often overestimate the degree of certainty when it comes to diagnostic testing. This is clearly seen with tests like **Gleason scoring**, which is open to the interpretation of the individual pathologist examining the biopsied specimen and other variables. Several studies show that significant percentages of Gleason scores are graded too high or too low.[9-12]

One way that Gleason scores are found to be sometimes erroneous is to compare tissue obtained from surgical **prostatectomy** to what was removed during the fine **needle biopsy** on the same patient.[10,12] There is far more tissue volume to examine from surgically-removed prostate glands compared with the relatively minute amounts obtained from needle biopsies, thus enabling more accurate Gleason score-grading of surgically-removed samples.

As it relates to men taking drugs that dramatically collapse the size of the prostate gland (like Proscar® and Avodart®), pathologists have noted that a consequence may be to induce lower-grade cancer to resemble higher-grade cancer.[4,13,14] They have stated that in men taking drugs like Avodart® or Proscar®, there would be a "***grading bias***" in which Gleason scores would indicate a worse grade tumor than really exists.

Proscar® Study Subjects Had Lower Rates of High-Grade Tumors

In the study evaluating Proscar® over a 7-year period, there was a **25%** reduction in the risk of **prostate cancer**, but with an apparent increase in the risk of **high-grade** disease (as measured by **Gleason** scores).[15]

A further analysis of the data, however, revealed the contrary. When examining tissue taken from men who underwent **radical prostatectomy** (complete removal of prostate gland), there was a **27%** reduction in **high-grade** disease in the **Proscar®** group as measured by **Gleason** scoring.[15]

It turned out that there was a biopsy-sensitivity issue in the Proscar® group that resulted in **high-grade** Gleason scores being assigned to some men that were really **low-grade**.[15]

The startling finding that Proscar® (finasteride) may reduce **high-grade** prostate cancer was revealed in a study titled "***Finasteride Does Not Increase the Risk of High-Grade Prostate Cancer: A Bias-Adjusted Modeling Report***."[15]

This study was published in the journal ***Cancer Prevention Research***, but has been largely overlooked by the media, the FDA, and many physicians.

Shrinking Prostate Gland Makes High-Grade Cancer Easier To Detect

The impact of **Avodart®** or **Proscar®** on the size (volume) of the prostate gland is profound. Either drug reduces prostate gland volume by **17-25%** over a relatively brief period of time.[4,14]

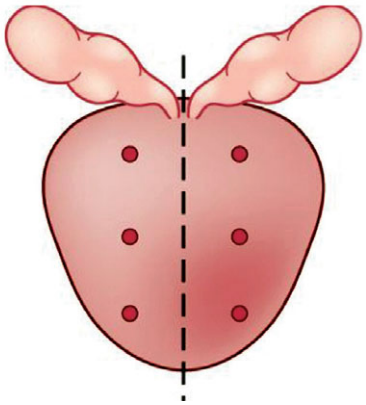
Avodart® or Proscar® has been shown to reduce **PSA** more significantly in the presence of no cancer or **low-grade** prostate cancer.[16-18] This effect can better enable physicians to identify cases of suspicious **high-grade** disease, since PSA levels don't drop as low or stay as low in the presence of **high-grade** prostate cancer.[18,19]

By reducing the size of the prostate gland, drugs like Avodart® or Proscar® can improve ***sensitivity*** of

prostate biopsy and digital rectal exam.[15] To understand this concept, understand that there were a minimum of 6-core biopsies done in the Proscar® study and 10-core biopsies for the Avodart® trial.[4,15] These fine needle biopsies only remove a small percentage of tissue from a prostate gland. The larger the size of a prostate gland, the easier it is to miss malignant regions.

By reducing the bulk of the prostate gland, it was far easier to "hit" malignancies with a needle biopsy in men taking Avodart® or Proscar® compared to biopsies performed on the larger glands of those taking placebo.[4,15]

Needle biopsies of the prostate gland are only about **75%** accurate to begin with.[20] So it may be easy to understand why needle biopsies uncovered more **high-grade** tumors in men taking Avodart® or Proscar® compared to the placebo arm.



Prostate gland marking a 6-core needle biopsy. Note how many areas of the gland may be missed when performing needle biopsies. The larger the gland, the more likely a needle biopsy may miss a tumor mass.[10]

How Much Did Prostate Glands Shrink?

As noted, the median prostate volume in men taking **finasteride** was **25%** lower compared to the **placebo** group, which represents a huge relative reduction in bulky prostate tissues.[21]

A group of scientists calculated prostate gland volume differences along with other variables that were omitted when compiling the initial report on finasteride. When adjusting for all the variables, these scientists demonstrated a **45%** lower risk of prostate cancer in the finasteride group.[21] The scientists noted that, ***"Adjustment for gland volume and number of cores biopsied (i.e., sampling density) eliminated the differences in high-grade cancer between the two arms."***[21]

What You Need to Know

Prostate Biopsies: Size Matters

- Elevated levels of **dihydrotestosterone (DHT)** are involved in **prostate cancer** and contribute to **benign prostate enlargement.**
- In separate studies evaluating the prostate cancer protective benefit of **Proscar®** and **Avodart®**, medications to reduce DHT levels, there was a **22-25%** reduction in the risk of **prostate cancer**, but with an apparent increase in the risk of **high-grade** disease (as measured by **Gleason** scores).
- **Avodart®** or **Proscar®** have been shown to reduce prostate gland volume by **17-25%** over a relatively brief period of time.
- A review of several published reports attribute the higher Gleason scores observed in the groups taking **Avodart®** or **Proscar®** to the fact that it was easier to find **high-grade** cancers in the shrunken glands of men taking these drugs compared to the much larger glands of men in the placebo group.
- By reducing the size of the prostate gland, **Avodart®** or **Proscar®** can improve sensitivity of prostate biopsy and digital rectal exam.

Their published paper was titled: "***Detection Bias Due to the Effect of Finasteride on Prostate Volume: A Modeling Approach for Analysis of the Prostate Cancer Prevention Trial.***" According to these scientists, when all co-variables were added in there was a trend toward **12%** fewer **high-grade** prostate cancers amongst men taking **finasteride**.[21]

The conclusions from this analysis published in the ***Journal of the National Cancer Institute*** were:

"Although analyses using postrandomization data require cautious interpretation, these results suggest that sampling density bias alone could explain the excess of high-grade cancers among the finasteride-assigned participants in the PCPT."[21]

A review of several published reports attribute the higher Gleason scores observed in the groups taking the ***5-alpha reductase*** inhibitors (Avodart® or Proscar®) to the fact that it was easier to find **high-grade** cancers in the shrunken glands of men taking these drugs compared to the much larger glands of men in the placebo group.[22,23]

The fact that there are published reports defending the safety of Proscar® and Avodart® does not mean the matter is settled.[22-24] The debate may continue for years or decades. Aging men at risk for prostate cancer, however, do not have the luxury of waiting for uniform consensus.

Conclusion of Independent Analysis of Proscar® (finasteride)

The researchers who conducted the analysis showing that Proscar® (finasteride) may reduce **high-grade** prostate cancer risk concluded their published paper by stating:

"Men must weigh the established benefits of a ***25% reduction*** *in prostate cancer (estimated to be* ***30%*** *in the present analysis),* ***decreased urinary symptoms****, and decreased complications of an enlarged prostate against the established side effects, which include reduced sexual function. We found* ***no evidence*** *that* ***finasteride increased*** *the* ***risk*** *of high-grade prostate cancer in the PCPT. Therefore, we conclude that men 55 years or older have no need to be concerned about an increased risk of high-grade prostate cancer with finasteride."*[15]

Cancer Prevention Research - May 18, 2008
"*Finasteride Does Not Increase the Risk of High-Grade Prostate Cancer: A Bias-Adjusted Modeling Approach*"

Role of Estrogen

Estrogen is a cell growth promoter that has been implicated in the development of prostate cancer.[25,26]

Life Extension members have long been urged to keep estradiol (an estrogen) levels in the range of **18-30 pg/mL**, yet many aging men present with estradiol levels around **40 pg/mL** or higher, which markedly increase all-cause mortality.[27]

In a published analysis of the Proscar® study, scientists looked at levels of various sex hormones beyond just DHT. They found that men with the highest pretreatment concentrations of **testosterone** were associated with a **36%** reduced rate of prostate cancer when taking Proscar®.[28] These same scientists also noted

men with the highest level of **estrone** (an estrogen) had a **38%** higher risk when taking Proscar®.[28]

This study supports the theory that when prostate cancer cells are deprived of a primary ***growth factor*** like **DHT**, they may readily adapt to utilizing **estrogen** to fuel propagation.[28] The doctors who conducted this study concluded:

Further research is needed to evaluate whether "low post-treatment serum estrogens may identify men more likely to benefit from the use of finasteride to prevent prostate cancer."[28]

Life Extension's long-standing position has been for aging men to have their **estrogen** blood level tested and if it is elevated, initiate ***aromatase-inhibiting*** therapy to suppress estrogen to safe ranges. This may be of particular importance for men seeking to impede or reverse the course of prostate cancer. It also helps explain why some men taking Proscar® developed prostate cancer despite suppressing their DHT level.

The Proscar® (Finasteride) Studies

The **Prostate Cancer Prevention Trial** (PCPT) was a large-scale, long-term randomized, placebo-controlled study designed to evaluate if **Proscar®** (finasteride) could reduce risk of prostate cancer.[14]

Participants in this PCPT study were all aged 55 years or older and had baseline PSA levels less than or equal to **3 ng/mL**. One group received **5 mg/ day** of finasteride and the other a placebo.[3]

This study was initiated based on multiple lines of evidence available in the early 1990s that suggested that treatment with **finasteride** (Proscar®) would reduce a man's risk of developing prostate cancer. Finasteride functions to inhibit the ***5-alpha-reductase*** enzyme, which then lowers ***dihydrotestosterone*** (DHT) levels.[21]

The plan was to evaluate the prevalence of prostate cancer in each group (finasteride and placebo) during the 7-year trial. About 15 months before the trial was scheduled to end, however, it was terminated because it had already met its primary objective.[14]

The PCPT study demonstrated a **24.8%** reduction in the prevalence of prostate cancer with finasteride treatment. An unanticipated finding, however, was that cancers with a **high-grade** Gleason score of 7-10 were more common in men treated with finasteride (**6.4%**) than in men treated with placebo (**5.1%**).[21]

To put these percentages of **high-grade** Gleason scores into perspective, they suggest that if all **18,882** men who entered the trial were given the placebo, **963** of them would have been diagnosed with **high-grade** disease. If all 18,882 men had taken finasteride, **1,208** men would have been diagnosed with **high-grade** disease. The difference is **245** more men being diagnosed with **high-grade** disease based on this assumption.

Of these **18,882** men, however, **4,323** would have contracted any grade of prostate cancer if all were given **placebo** based upon the results of the study, whereas only **3,134** would have contracted any grade of prostate cancer if all were given **finasteride.**[21] That's a difference of **1,189** men who would have avoided prostate cancer altogether during the study trial period if they all took **finasteride**.

We at ***Life Extension*** are well aware that **high-grade** prostate cancer grows faster and is more likely to spread beyond the prostate gland.[6] Depending on your long-term longevity objectives, however, the data showing **1,189** fewer men developing any form of prostate cancer compared to **245** more men being diagnosed with **high-grade** disease might favor the **finasteride** group. And as you've read already, it was much easier to **detect** prostate cancer in men taking finasteride, meaning that the drug itself should not be blamed for the higher rate of diagnosis.[21]

As we've shown, there appears to be no increase in **high-grade** disease in men taking finasteride, just higher rates of biopsy detection based on smaller size prostate volume, along with misinterpreted pathologies of biopsies that later showed **27%** fewer **high-grade** cases in men taking finasteride based on examination of surgically-removed prostate glands.[14]

The Avodart® (Dutasteride) Study

A study involving over 8,000 men was initiated to ascertain if **Avodart®** (dutasteride) could reduce prostate cancer risk over a 4-year period.[4] The criteria to participate in this trial were:

- Age between 50 and 75 years
- PSA level of **2.5** to **10 ng/mL**
- A single pre-study negative needle biopsy of the prostate
- A prostate volume ≤ **80 mL**

Patients were randomized to receive **0.5 mg** of Avodart® daily or placebo. All patients received 10-core prostate biopsies at baseline and 10-core prostate biopsies at 2 years and at 4 years after study enrollment.[4]

Here are summary results of the trial:[4]

- The mean age of the men enrolled was 63 years in each arm.
- The mean PSA level of the patients in each arm at baseline was **5.9 ng/mL**.
- Avodart® reduced the risk of **prostate cancer** by **22.8%** compared to placebo over the 4 years of the study.
- Avodart® reduced the rate of **acute urinary retention** by **77.3%** compared with placebo.
- The Avodart® group showed a **33%** increase in high-grade (8-10) **Gleason scores 0.9%** for Avodart® compared to **0.6%** for placebo.

*"If our conclusion that **finasteride** accelerates the **detection** of high-grade cancer yet may not promote its development is correct, then the implications regarding the clinical impact of this drug are quite favorable. The occurrence of lower-grade tumors of questionable clinical significance would be **reduced**, and the **early detection** of more serious tumors would be **enhanced**."*[21]

Journal of the National Cancer Institute- 2007
"Detection Bias Due to the Effect of Finasteride on Prostate Volume: A Modeling Approach for Analysis of the Prostate Cancer Prevention Trial"

The higher number of high-grade Gleason scores in the Avodart® group can be attributed to the same factors identified in the finasteride (PCPT) study, such as higher rates of biopsy detection based on smaller prostate gland size in men taking Avodart®, along with biopsy bias based on collapsing prostate glands that may have made some tumors appear higher-grade than they really were.[4]

The **FDA**'s response, however, was to issue a label change for Avodart® and Proscar® to warn of the increased risk of being diagnosed with a higher-grade prostate cancer while taking these drugs.[29] This warning provides little benefit to aging men who are routinely prescribed these drugs to treat benign prostate hyperplasia. It creates confusion as patients query their doctor as to why a drug that FDA says is potentially dangerous is being prescribed to them.

In **2012**, the results of another study (*Lancet*) were released showing that Avodart® was effective in slowing the progression of **low-grade** prostate tumors in **38%** of men undergoing active surveillance (watchful waiting).[30] This study of 302 men diagnosed with low-grade prostate cancer used 12-core biopsies obtained at 1.5 and 3 years. This *Lancet* study showed there to be slightly fewer (**14%**) **higher-grade** tumors in the Avodart group compared to placebo (**16%**).[30]

A study published in May **2013** evaluated 82 men with very low-risk prostate cancer who underwent active surveillance (watchful waiting) and were treated with a *5-alpha reductase inhibitor* drug over a 3-year period. The results demonstrated the safety of the drugs and noted that at the first re-staging biopsy, **54%** of the subjects no longer had prostate cancer.[31] This small study helps substantiate the value of Avodart® or Proscar® for low-risk prostate cancer patients, but is not relevant to those with **high-grade** tumors that often require aggressive treatment.

We Must Avoid A "Tomato Effect"

"***The Tomato Effect***" was first described in the ***Journal of the American Medical Association*** in 1984.[33] It analogized how doctors historically have ignored or rejected efficacious treatments that did not fit with accepted theories of disease prevention/treatment at the time.

"The Tomato Effect" is named for a period from the 1600s to early 1800s in America where tomatoes were considered poisonous and therefore unsafe to eat. This fear persisted despite the fact that Americans knew Europeans were regularly eating tomatoes with no ill effects.

The perception of the tomato changed in **1820** when a man ate a tomato on the steps of a New Jersey courthouse to prove they are safe.[33] Within a decade, Americans were regularly eating tomatoes that for over **200 years** were considered poisonous.

In today's world, we have an opposite problem that nonetheless can create a lethal "tomato effect" when it comes to rejecting lifesaving therapies. Physicians and patients are overloaded with information and lack the time to analyze data to accurately determine safety and efficacy.

Humans have a strong propensity to remember negative details. This human failing has caused many physicians and patients to reject *5-alpha reductase inhibitors* because they recall something about more **high-grade** prostate tumors in men taking Proscar® or Avodart®. Never mind hard facts showing the opposite. People today want a succinct summary, a curbside explanation, and not too many distracting details.

As we have repeatedly shown in this article, what appeared to be more high-grade tumors in two studies of Proscar® and Avodart® were apparently based on a **mistaken interpretation** of the data.

Sensitivity Analysis Supports Safety of *5-alpha Reductase Inhibitors*

Another independent analysis of the prostate-gland shrinking effects of Proscar was conducted and published in the ***Journal of the American Statistical Association***.[32]

In technical terms, this study is called a "***sensitivity analysis***," which in lay language may be explained as allowing a reviewer to assess the impact that changes in certain parameters will have on a study's conclusions. By way of example, here is one quote from this study:

"Because finasteride shrinks the prostate volume, the 6-core biopsies covered a larger area of the prostate for cases in the finasteride arm and hence were probably more likely to detect high-grade prostate cancer than on the placebo arm."[32]

To validate this statement, the researchers noted that the ability to detect **high-grade** prostate cancer in the **placebo** group was **21%** lower than in the **finasteride** arm.[32] The reason the researchers knew this is that biopsies of prostate glands surgically removed showed that slightly more men in the **placebo** arm had **high-grade** prostate cancer than those taking **finasteride**, yet the needle biopsies erroneously reflected the opposite. For those who enjoy seeing the math, here is how the researchers calculated this:

"In the placebo group the sensitivity of biopsy for high-grade detection was 45% (55 biopsy high-grades / 123 prostatectomy high-grades), compared to 66% on finasteride (76 biopsy high-grades / 115 prostatectomy high-grades), suggesting a substantial downward bias in detecting high-grade cancer on placebo relative to finasteride."[32]

The following chart helps explain the ***sensitivity analysis*** described in the preceding paragraph: [32]

	Placebo	Finasteride
Number of **biopsy** specimens detecting **high-grade** cancer	55	76
Number of **surgery** specimens detecting **high-grade** cancer	123	115
Percentage of **high-grade** cancers detected at **biopsy**	**45%**	**66%**

This chart shows finasteride improved detection of **high-grade** prostate tumors in biopsies, but there were not more **high-grade** tumors in men taking finasteride when **surgical** specimens were examined.

In the haste of today's busy medical practices, we are concerned that huge numbers of men who could benefit enormously from *5-alpha reductase inhibitors* will not be prescribed them. We hope ***Life Extension*** members appreciate the effort we have made to analyze the data so that they can make rational choices when confronted with real or potential low-grade prostate cancer.

Worst Case Scenario: Assume We Are Wrong?

We have provided solid evidence that Avodart® (dutasteride) or Proscar® (finasteride) do not increase **high-grade** prostate cancer risk. But what if we are wrong?

Here is what would happen under such circumstance using the **Prostate Cancer Prevention Trial** (PCPT) study for reference:

- More than **238,000** men will be diagnosed with **prostate cancer** in **2013**.[34]
- If all these men had taken Proscar®, about **57,120** of them (**24%**) would avoid it.
- Based upon the results of the PCPT study, if none of these men took Proscar®, **52,598** would have **high-grade** (Gleason score ≥ **7**) disease as opposed to **65,840** who would be diagnosed with **high-grade** disease (assuming Proscar® somehow causes high-grade disease).[32]
- So each year, **57,120** men would avoid prostate cancer altogether, but **8,720** more men would be diagnosed with **high-grade** disease (assuming Proscar® (or Avodart®) really cause it).
- Under this worst case scenario, one could argue there would be greater numbers of beneficial outcomes (as opposed to adverse ones) if all men took Proscar® (or Avodart®).

We at ***Life Extension***® don't recommend these drugs for all men. They appear effective for reducing risk of **low-grade** prostate cancer and helping to better diagnose **high-grade** prostate cancer by shrinking prostate gland volume and better enabling the PSA marker to identify high-grade malignancy.

Our opposition might state that most men over age 69 with low-grade prostate cancer don't have to be concerned because they are likely to die of something else before their prostate cancer spreads to other parts of the body.

While this may be the case for typical men over age 69, it's a far cry from the longevity objectives of ***Life Extension*** members. And low-grade prostate cancers do kill some men and are the most prevalent form of prostate cancer diagnosed.

With all due respect to **Patrick Walsh, MD**, who is advocating that urologists change the medical classification of **low-grade** prostate malignancy to remove the word "cancer" so as not to create psychological stress in aging men, and to avoid overly aggressive medical procedures, pretending **low-grade** malignancies are something else will not make them go away.

The documentation presented in this issue of ***Life Extension*** magazine® that **low-grade** prostate cancers may be reversible in some men using a variety of inexpensive drugs, nutrients and dietary changes mandates that aging men have annual PSA blood tests and other diagnostics needed to assess the health of their prostate gland. If high-grade disease is detected, it is curable in its early stages, whereas the more prevalent low-grade prostate cancers are often controllable or reversible without requiring side effect-prone treatments.

New 18-Year Study Confirms Benefits of Finasteride

As we were finalizing this article, a new study was published in the ***New England Journal of Medicine*** that further verified the safety and efficacy of ***finasteride*** in the prevention of prostate cancer.[35]

This study meticulously followed all the men in the original **Prostate Cancer Prevention Trial** for up to **18 years**.[35]

The findings showed that long-term **prostate cancer risk** was reduced by about **33%** in men who had received **finasteride** compared to the placebo group.[35] This approximate **33%** reduction in prostate cancer incidence was ***greater*** than the original study findings that looked at these same men over a shorter (7-year) time period.[3,35]

Of men who did develop prostate cancer, those in the finasteride group had a **17%** greater chance of high-grade disease, yet long-term mortality data was virtually identical in both groups.[3] This adds a tremendous weight of evidence as to the safety of finasteride since if it really caused an increase in high-grade disease, more men in the finasteride group would be expected to have died sooner.

In addition, the **17%** greater chance of high-grade disease seen in this long-term follow up was far lower than the **25.5%** seen in the early phase of the **Prostate Cancer Prevention Trial**.[3,35] The authors of this new study emphasized that the reason that more men in the finasteride group were found with high grade disease was "detection bias." As we stated earlier, 5-alpha reductase inhibitor drugs like ***finasteride*** (**Proscar**®) and ***dutasteride*** (**Avodart**®), markedly shrink prostate gland volume, thus making detection of tumors much more efficient.[14] Proscar® or Avodart® do not appear to cause high-grade tumors, they just make finding them much easier, which is of significant importance in obtaining curative treatment before these aggressive cancer cells escape from the confines of the prostate gland.

An editorial accompanying this ***New England Journal of Medicine*** study stated:

"For men who choose regular prostate cancer screening, the use of finasteride meaningfully reduces the risk of prostate cancer and thus the morbidity associated with treatment of the disease."[36]

In maintaining the conventional party line that recommends against **PSA screening**, the editorial also stated:

"Men who are aware of and understand the benefits, risks, and uncertainties associated with the use of finasteride for prevention may make a rational decision to take the drug to reduce the potential harms of PSA screening. Of course, another way to reduce the harm of screening is to choose not to be screened."[36]

Said differently, the author of this editorial is stubbornly sticking to irrational conventional dogma that advises men to avoid prostate cancer **screening** because of side effects that may occur during needle biopsy or treatment. The data the author is reporting, however, clearly shows that by taking just finasteride alone for a relatively short time period, an aging man can reduce the risk he will ever contract prostate cancer (and thus the need for "harmful" diagnostics and treatment) by **33%**![35]

There is evidence to suggest that prostate cancer risk reduction would have been greater had these men continued taking finasteride. As Life Extension reveals in this month's issue, there are many ***other*** steps men can take to slash low- and high-grade prostate cancer risk, and at the same time, reduce overall incidence of degenerative disease.

Medical Technology Is Regressing!

We are witnessing a lethal regression in the use of technologies that could spare tens of thousands of aging men from prostate cancer deaths each year. Instead of seeking to incorporate proven methods to reduce side effects associated with conventional treatment, doctors are telling patients today to avoid screening. While this will save Medicare and Medicaid big dollars in the short-term, the epidemic of metastatic prostate cancer that will manifest in 5-10 years will extract a horrific toll of human suffering, premature death, and catastrophic costs to government healthcare systems.

Treating metastatic prostate cancer is a prolonged and extremely expensive process. Death can be postponed, but the side effects of treating advanced disease are often harsh.

A Real World Example of What This Nation Faces

When taking on the federal government and medical establishment like ***Life Extension*** routinely does, we seek to be meticulously accurate in everything we publish. Our credibility is at stake in every one of these scientific debates.

A friend of mine used to have his blood tested annually using Life Extension's comprehensive **Male Panel** that includes **PSA**. He retired 7 years ago at the age of 60 and received "free" healthcare from his union (and later Medicare). So he stopped using Life Extension's testing and instead let his doctor prescribe annual blood tests.

Each year he would have his blood tested, and each year his doctor said his results were fine. What my friend did not know is that the doctor stopped testing for PSA. When my friend started developing health problems his wife contacted me and said his doctors could not figure out what was wrong. I suggested he have his blood tested using our comprehensive **Male Panel**.

His PSA came back at **31**. He appears to have metastatic disease and is undergoing aggressive treatment. He wrote me that he was shocked his doctor had not tested for PSA.

What happened to my friend is occurring throughout the United States right now. Doctors are following federal government guidelines and are intentionally omitting PSA screening. This devolution in health care must be reversed.

Startling Statistic Reported by *New England Journal of Medicine*

In reporting on the long-term data showing that finasteride slashed prostate cancer risk, the authors of the ***New England Journal of Medicine*** editorial opened by stating:

"With the advent of prostate specific antigen (PSA) testing in the 1980s, the rate of diagnosis of prostate cancer rose dramatically… The timing and magnitude of the 44% reduction in prostate cancer mortality after the widespread adoption of PSA testing suggests that both screening and treatment improvements have contributed to this decline."[35]

The authors then go on to list all the side effects of treatment that prompted the federal government to suggest men should avoid PSA screening. Recommending against **PSA screening** will go down as one of the great travesties in medical history.

Prostate cancer is one of the most prevalent malignancies striking aging men. Technology developed four decades ago has resulted in a steep drop in prostate cancer-related deaths. Yet our federal government proclaimed in **2012** that this technology (PSA screening) should be abandoned.

Don't be victimized by this nonsense. ●

References

1. Andriole G, Bruchovsky N, Chung LW, et al. Dihydrotestosterone and the prostate: the scientific rationale for 5alpha-reductase inhibitors in the treatment of benign prostatic hyperplasia. *J Urol*. 2004 Oct;172(4 Pt 1):1399-403.
2. Available at: http://www.cancer.gov/newscenter/qa/2008/PCPTQandA. Accessed October 1, 2013.
3. Thompson IM, Goodman PJ, Tangen CM, et al. The influence of finasteride on the development of prostate cancer. *N Engl J Med*. 2003 Jul 17;349(3):215-24.
4. Andriole GL, Bostwick DG, Brawley OW, et al; REDUCE Study Group. Effect of dutasteride on the risk of prostate cancer. *N Engl J Med*. 2010 Apr 1;362(13):1192-202.
5. Available at: http://www.fda.gov/Drugs/DrugSafety/InformationbyDrugClass/ucm258424.htm. Accessed September 28, 2013.
6. Tewari A, Divine G, Chang P, et al. Long-term survival in men with high grade prostate cancer: a comparison between conservative treatment, radiation therapy and radical prostatectomy--a propensity scoring approach. *J Urol*. 2007 Mar;177(3):911-5.
7. Available at: http://www.cancer.org/cancer/prostatecancer/detailedguide/prostate-cancer-diagnosis. Accessed September 28, 2013.
8. Available at: http://prostate-cancer.org/the-gleason-score-a-significant-biologic-manifestation-of-prostate-cancer-aggressiveness-on-biopsy/. Accessed September 2, 2013.
9. Shapiro RH, Johnstone PA. Risk of Gleason grade inaccuracies in prostate cancer patients eligible for active surveillance. *Urology*. 2012 Sep;80(3):661-6.
10. Moreira Leite KR, Camara-Lopes LH, Dall'Oglio MF, et al. Upgrading the Gleason score in extended prostate biopsy: implications for treatment choice. *Int J Radiat Oncol Biol Phys*. 2009 Feb 1;73(2):353-6.
11. Berglund RK, Masterson TA, Vora KC, Eggener SE, Eastham JA, Guillonneau BD. Pathological upgrading and up staging with immediate repeat biopsy in patients eligible for active surveillance. *J Urol*. 2008 Nov;180(5):1964-7.

12. Nayyar R, Singh P, Gupta NP, et al. Upgrading of Gleason score on radical prostatectomy specimen compared to the pre-operative needle core biopsy: an Indian experience. *Indian J Urol*. 2010 Jan-Mar;26(1):56-9.
13. Bostwick DG, Qian J, Civantos F, Roehrborn CG, Montironi R. Does finasteride alter the pathology of the prostate and cancer grading? *Clin Prostate Cancer.* 2004 Mar;2(4):228-35.
14. Available at: http://www.medscape.com/viewarticle/705804. Accessed September 29, 2013.
15. Available at: http://cancerpreventionresearch.aacrjournals.org/content/1/3/174.full. Accessed September 29, 2013.
16. Kaplan SA, Ghafar MA, Volpe MA, Lam JS, Fromer D, Te AE. PSA response to finasteride challenge in men with a serum PSA greater than 4 ng/ml and previous negative prostate biopsy: preliminary study. *Urology*. 2002 Sep;60(3):464-8.
17. Handel LN, Agarwal S, Schiff SF, Kelty PJ, Cohen SI. Can effect of finasteride on prostate-specific antigen be used to decrease repeat prostate biopsy? *Urology*. 2006 Dec;68(6):1220-3.
18. Available at: http://www.medscape.com/viewarticle/734687. Accessed September 29, 2013.
19. Krejcarek SC, Chen MH, Renshaw AA, Loffredo M, Sussman B, D'Amico AV. Prediagnostic prostate-specific antigen velocity and probability of detecting high-grade prostate cancer. *Urology*. 2007 Mar;69(3):515-9.
20. Taira AV, Merrick GS, Galbreath RW, et al. Performance of transperineal template-guided mapping biopsy in detecting prostate cancer in the initial and repeat biopsy setting. *Prostate Cancer Prostatic Dis*. 2010 Mar;13(1):71-7.
21. Cohen YC, Liu KS, Heyden NL, et al. Detection bias due to the effect of finasteride on prostate volume: a modeling approach for analysis of the Prostate Cancer Prevention Trial. *J Natl Cancer Inst*. 2007 Sep 19;99(18):1366-74.
22. Kulkarni GS, Al-Azab R, Lockwood G, et al. Evidence for a biopsy derived grade artifact among larger prostate glands. *J Urol*. 2006 Feb;175(2):505-9
23. Lucia MS, Epstein JI, Goodman PJ, et al. Finasteride and high-grade prostate cancer in the Prostate Cancer Prevention Trial. *J Natl Cancer Inst*. 2007 Sep 19;99(18):1375-83.
24. Monga N, Sayani A, Rubinger DA, Wilson TH, Su Z. The effect of dutasteride on the detection of prostate cancer: A set of meta-analyses. *Can Urol Assoc J*. 2013 Mar-Apr;7(3-4):E161-7.
25. Nelles JL, Hu WY, Prins GS. Estrogen action and prostate cancer. *Expert Rev Endocrinol Metab*. 2011 May;6(3):437-451.
26. Carruba G. Estrogen and prostate cancer: an eclipsed truth in an androgen-dominated scenario. *J Cell Biochem*. 2007 Nov 1;102(4):899-911.
27. Jankowska EA, Rozentryt P, Ponikowska B. Circulating estradiol and mortality in men with systolic chronic heart failure. *JAMA*. 2009 May 13;301(18):1892-901.
28. Kristal AR, Till C, Tangen CM, et al. Associations of serum sex steroid hormone and 5 -androstane-3 ,17 -diol glucuronide concentrations with prostate cancer risk among men treated with finasteride. *Cancer Epidemiol Biomarkers Prev*. 2012 Oct;21(10):1823-32.
29. Available at: http://www.fda.gov/drugs/drugsafety/ucm258314.htm. Accessed September 6, 2013.
30. Fleshner NE, Lucia MS, Egerdie B, et al. Dutasteride in localised prostate cancer management: the REDEEM randomised, double-blind, placebo-controlled trial. *Lancet*. 2012 Mar 24;379(9821):1103-11.
31. Shelton PQ, Ivanowicz AN, Wakeman CM, et al. Active surveillance of very-low-risk prostate cancer in the setting of active treatment of benign prostatic hyperplasia with 5 -reductase inhibitors. *Urology*. 2013 May;81(5):979-84.
32. Shepherd BE, Redman MW, Ankerst DP. Does finasteride affect the severity of prostate cancer? A causal sensitivity analysis. *J Am Stat Assoc*. 2008 Dec 1;103(484):1392-404.
33. Goodwin JS, Goodwin JM. The tomato effect. Rejection of highly efficacious therapies. *JAMA*. 1984 May 11;251(18):2387-90.
34. Available at: http://www.pcf.org/site/c.leJRIROrEpH/b.5800851/k.645A/Prostate_Cancer_FAQs.htm. Accessed September 28, 2013.
35. Thompson IM Jr, Goodman PJ, Tangen CM, et al. Long-term survival of participants in the prostate cancer prevention trial. *N Engl J Med*. 2013 Aug 15;369(7):603-10.
36. Available at: http://www.nejm.org/doi/full/10.1056/NEJMe1307059. Accessed September 10, 2013.

ASTAXANTHIN Formula
with *Increased* Bio-availability

Astaxanthin is a fat-soluble carotenoid compound. The challenge to deriving maximum benefits is its normally limited absorption—as low as about **50%.**[1,2] Assimilation of astaxanthin is impeded by limited uptake and intestinal degradation.

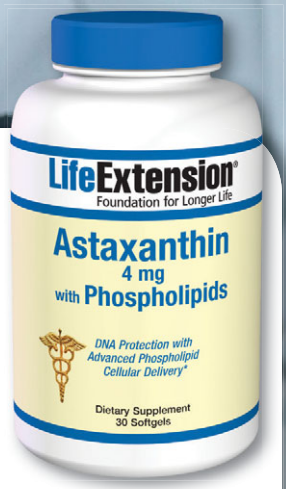
Astaxanthin 4 mg with Phospho-lipids combines **4 milligrams** of natural astaxanthin with a *proprietary blend* of ***phospholipids***.

By incorporating phospholipids, scientific study shows that carotenoid ***absorption*** may be enhanced ***several-fold***.[3]

Astaxanthin 4 mg with Phospholipids uses four different phospholipids to facilitate maximum absorption of **astaxanthin** into the bloodstream, where it is transported to cells throughout the body.

ASTAXANTHIN

Each softgel of **Astaxanthin with Phospho-lipids** provides **4 mg** of natural astaxanthin along with **80 mg** of proprietary phospholipid blend. Just one softgel a day provides tremendous systemic cellular support!



A bottle of 30 softgels of **Astaxanthin 4 mg with Phospholipids** retails for $16. If a member buys four bottles, the price is reduced to **$10.50** per bottle. **Contains soybeans.**

Item #01720

References

1. *Mol Nutr Food Res*. 2012 Sep;56(9):1385-97.
2. *Eur J Pharm Sci*. 2003 Jul; 19(4):299-304.
3. *Int J Pharm*. 2011 Jun 30; 412(1-2):99-105.

To order Astaxanthin 4 mg with Phospholipids, call 1-800-544-4440 or visit www.LifeExtension.com

NEW!

Fast-acting and Quickly Absorbed… for a Restful Night's Sleep

LIQUID MELATONIN

The consequences of **sleep deprivation** go far beyond fatigue and diminished performance. Sleep deprivation can impact the immune system, the nervous system, memory and cognitive impairment, mood, and more.[1]

Ultimately, lack of sleep leads to an overall poor quality of life.

If you're one of the more than **20 million** Americans who suffer from occasional sleep problems,[2] you don't have to settle for frustrating nights of tossing and turning.

A new, fast-acting **LIQUID melatonin** may enable you to…

TAKE BACK CONTROL OF YOUR SLEEP!

Melatonin is well known for its ability to regulate your body's internal clock. However, as you grow older, the secretion of melatonin declines significantly as the pineal gland becomes calcified.[3,4]

Fortunately, melatonin has been studied and shown to be effective for managing disturbances in circadian rhythms.[5,6]

A meta-analysis of 17 studies concluded that melatonin supplementation ***decreases*** **the time it takes to fall asleep** while ***increasing*** **sleep efficiency** and **total sleep duration**.[7]

In fact, melatonin has been shown to increase the speed of falling asleep—and the quality of sleep—*in about* ***60%*** *of people who use it*.[8,9]

NEW MELATONIN LIQUID DROPS!

Not all people benefit from melatonin when it's in the form of a capsule or tablet. However, some report that by applying melatonin *liquid* drops under their tongue at bedtime for immediate absorption, they are able to sleep better. While any kind of liquid melatonin has been reported to work, Life Extension has developed melatonin liquid drops that are completely free of **sugars**.

This new soothing **Fast-Acting Liquid Melatonin** has a great tasting natural citrus vanilla flavor and is quickly absorbed for a restful night's sleep.

An increase in age doesn't have to mean an increase in sleep problems. Consider making **Liquid Melatonin** a part of *your* **healthy sleep program**.

The retail price for 1 bottle of **Fast Acting Liquid Melatonin** is $12. If a member buys 4 bottles, the price is reduced to **$8.25** a bottle. Seven drops provide about **1 mg** of melatonin and there are approximately **1,180** drops in each bottle. Most people place one to two full eyedroppers under their tongues at night which provides **3** to **6 mg** of melatonin.

ITEM# 01734

WHY WE NEED SLEEP

Decades of clinical research document that a good night's rest supports nearly all systems of the body, including:

- Skin health and youthful appearance[10,11]
- Healthy collagen formation[12]
- Insulin levels already within normal range[13,14]
- Healthy body weight[15,16]
- Glucose levels already within normal range[17,18]
- Blood pressure already within normal range[13,19]
- Healthy cell division[20]
- Cardiovascular health[21,22]
- A good mood[23]

References

1. Available at: http://www.webmd.com/sleep-disorders/features/important-sleep-habits
2. Available at: http://www.nlm.nih.gov/medlineplus/tutorials/sleepdisorders/nr249104.pdf
3. *Exp Gerontol.* 2001 Jul;36(7):1083-100.
4. *J Pineal Res.* 1994 May;16(4):178-83.
5. *Neuroimmunomodulation.* 2006;13(3):133-44.
6. *Travel Med Infect Dis.* 2008 Jan;6(1-2):17-28.
7. *Sleep Med Rev.* 2005;9(1):41-50.
8. *Clin Pharmacol Ther.* 1995 May;57(5):552-8.
9. *Actas Esp Psiquiatr.* 2000 Sep-Oct;28(5):325-9.
10. *J Invest Dermatol.* 2001 Aug;117(2):309-17.
11. *Bioengineering of the Skin: Skin Surface Imaging and Analysis.* Boca Raton, FL: CRC Press LLC; 1997:337.
12. *Med Hypotheses.* 2010 Dec;75(6):535-7.
13. *Obes Rev.* 2009 Nov;10 Suppl 2:37-45.
14. *Science.* 2010 Dec 3;330(6009):1349-54.
15. *J Clin Sleep Med.* 2007 Dec 15;3(7):681-8.
16. *Obesity (Silver Spring).* 2009 Apr;17(4):767-71.
17. *Horm Res.* 2007;67 Suppl 1:2-9.
18. *Ann N Y Acad Sci.* 2008;1129:287-304.
19. *Am J Hypertens.* 2010 Dec;23(12):1286-91.
20. *Chronobiol Int.* 2011 Feb;28(1):76-80.
21. *Prog Cardiovasc Dis.* 2009 Jan-Feb;51(4):294-302.
22. *Sleep.* 2010 Aug 1;33(8):1037-42.
23. *Psychiatry Clin Neurosci.* 2003 Jun;57(3):265-70.

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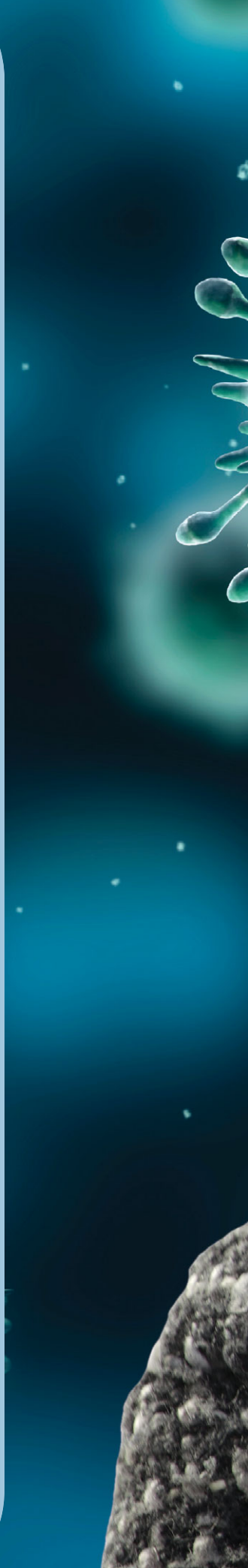
ENHANCED Winter Wellness *Against* COLDS & FLU



It's one of the top 10 killers in the US, causing an average estimate of over 30,000 people to die each year.[1,2] It's not heart disease or cancer or diabetes… *it's the flu.*

Most people associate the flu with muscle pain, coughing, sore throat, fatigue, and other symptoms, but the flu can turn into a deadly infection.[2,3]

Scientists have found two ingredients that *prime* the immune system to defend against the onslaught of influenza and other seasonal pathogens that can result in serious illness and even death.[2,4,5] >

The Deadly Complications of Influenza

If you think of the flu as merely a seasonal risk or inconvenience, think again. Although known for uncomfortable symptoms such as sore throat, nasal discharge, chills, fever, muscle pain, headaches, coughing, nausea, and fatigue[3,6]—the harsh reality is that tens of thousands of Americans die from influenza infection in an average year.

Potentially lethal results of the flu can include either direct ***viral pneumonia*** or secondary ***bacterial pneumonia***,[7,8] and complications of chronic conditions such as ***congestive heart failure*** and ***chronic obstructive pulmonary disease*** (***COPD***).[9]

Almost **90%** of *all* American deaths caused by influenza are among those over **65 years old**.[10] One reason is the **immune senescence** suffered by virtually all aging individuals. Vaccines function by eliciting an antibody response against specific viruses . The ability to generate an antibody response to influenza vaccines is severely compromised in the elderly.[11]

But the elderly are not the *only* ones at risk of flu-related death. **High-risk groups** also include pregnant women, the immunocompromised, children under age two, and people who have chronic illnesses such as asthma, diabetes, heart disease.[12]

The Best Defense Against the Flu

Receiving an **annual flu shot** is an effort many individuals, particularly those over age 65, make in an attempt to prevent both influenza infection and its deadly outcomes.[13] The reason is that it mobilizes what is known as **adaptive** or **acquired immunity**.[14] After the body has been "primed" with specific, non-infective viruses in the form of a vaccine, the ***immune system*** can then make **antibodies** to protect against future infection with these viruses.[14]

However, for a flu vaccine to even begin to protect against the influenza virus contained within it, the vaccinated individual ***must first have sound immune function***—so that the immune system can **properly** respond to stimulation by the vaccine's antigen.[15]

The trouble is that, in those with ***weakened*** immunity—such as the elderly population—vaccine stimulation triggers only a **limited** antibody response, thus limiting the effectiveness of the vaccine.[16,17]

That means, despite being vaccinated, aging individuals remain highly susceptible to infection. This can be one reason why up to **91%** of those 65 and over who get a flu shot may still be susceptible to getting the flu![18]

Shocking Flu Statistics

On average, influenza is estimated to cause over **30,000** deaths in the United States annually.[1]

The **antibody response** of elderly patients to influenza vaccine has been shown to be blunted.[11]

Complications of viral influenza infection may involve **several organ systems**.[22]

Flu shots **fail** to protect older persons from the most virulent strains up to **91%** of the time.[18]

The flu vaccine's effectiveness among the general population is only about **56%**.[18]

Flu-related **deaths** for persons over age 85 are **16 times greater** than that of slightly younger persons aged 65-69.[23]

Flu infection is estimated to cause more than **200,000 hospitalizations** annually in the United States.[22]

Chronic medical conditions–such as heart disease, lung disease, diabetes, kidney disease, liver disease, dementia, and stroke–are all risk factors for potentially **lethal** influenza complications.[12]

The most frequent serious flu complications are **pulmonary**, such as primary influenza pneumonia, secondary bacterial pneumonia, or chronic pulmonary diseases.[7-9]

Influenza A caused by H5N1 virus ("avian flu") often infects **young**, previously healthy persons–with a **fatality** rate of about **60%**, usually due to respiratory failure.[24]

Neurologic complications of influenza, such as encephalopathy, are most common in **children**.[25]

Increased rates of **schizophrenia** were noted in offspring of women who had the flu in the second pregnancy trimester, implying fetal developmental brain effects.[26]

Abnormal cardiac findings were found in **43%** of adult flu patients, suggesting influenza pneumonia may *predispose* patients to serious cardiac complications such as myocarditis and pericarditis.[27]

But there's good news. Scientists have recently found a way to boost the effectiveness of the flu vaccine. Exciting new evidence shows that, taken together for two weeks prior to vaccination, the amino acids **L-theanine** and **L-cystine** enhance the efficacy of the flu vaccine in certain subsets of elderly subjects.[19] This delivers strong protection against the flu virus—and its deadly complications.

These two compounds do not enhance the vaccine itself; instead, they help boost the immune system's acquired immune response, giving your body the tools it needs to effectively utilize the vaccine.[19]

Better Together

When these complementary amino acids were used **together** in animal studies, they increased immune response.[4,20]

In one study, researchers gave both L-theanine and L-cystine orally to mice for 10 days. Six days after infection with influenza, the treated mice had lower lung concentrations of the virus. Ten days after infection, there was a significant enhancement of key anti-influenza-virus **antibodies** (called *immunoglobulin G* or *IgG*).[4]

Scientists realized that the ***co-administration*** of L-cystine and L-theanine could ***restore age-related impairment*** of immune competence, helping to prevent influenza and other viral infections—and in turn, preventing deadly complications.[4]

Based on this knowledge, scientists set out to determine if these two substances could boost vaccine effectiveness by targeting (and enhancing) the immune system itself.

Boosting Vaccine Effectiveness!

To establish this effect in people, researchers designed a randomized, placebo-controlled study in which both of these amino acids were tested in healthy elderly humans. For the study, 65 nursing home residents aged 65 or over were randomly divided into two groups. The test group received **280 milligrams** of *L-theanine* and **700 milligrams** of *L-cystine* **once a day** for **14 days**. The other group received a placebo for the same amount of time.[19]

On day 15, all participants were given a flu vaccine containing three influenza strains.

The scientists found that certain subsets of the L-theanine and L-cystine group had an **increased** rate of ***seroconversion***, the precise point at which the immune system develops *antibody protection* against a microorganism as a result of immunization. Notably, the increased seroconversion rate occurred among

Boosting Vaccine Effectiveness

- **On average each year, it is estimated that over 30,000 Americans die from influenza.**
- **The recommended annual flu shot protects older Americans from a virulent strain as infrequently as 9% of the time and protects the general population only 56% of the time. One of the reasons is that in the elderly, who are far more likely to have generalized weakened immunity, vaccine stimulation triggers only a limited antibody response.**
- **Taken together for two weeks prior to vaccination, the amino acids L-theanine and L-cystine enhance efficacy of the flu vaccine in a subset of elderly subjects. This delivers stronger protection against both the flu virus—and its deadly complications.**
- **Remarkably, this same combination has been shown to reduce the incidence of the common cold by 58%.**

The Aging Immune System

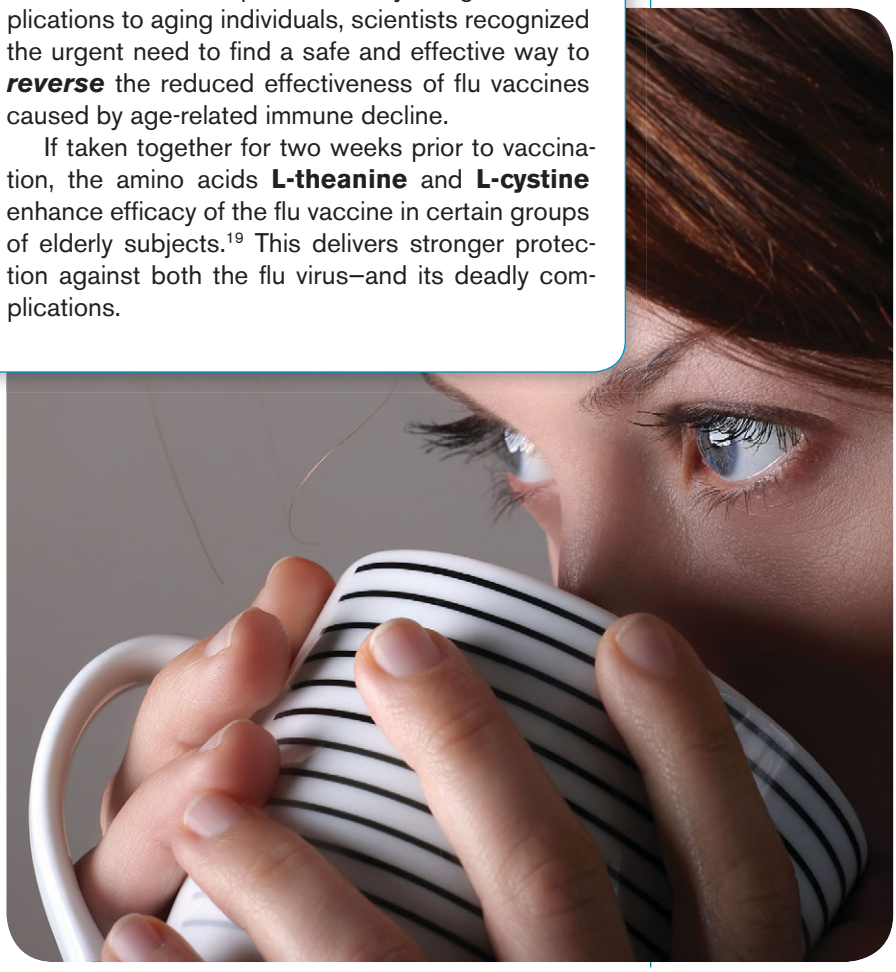
A compromised immune system can present an opportunity for a simple bout of the flu to quickly progress to full-blown pneumonia, which is the ***eighth*** leading cause of death for Americans.[2]

Nutritional deficiencies among the elderly can lower immune defenses.[28] For instance, deficiency of iron, vitamin B12, or folate is a common cause of the increased incidence of anemia in the elderly, and this in turn is associated with a greater risk of infectious diseases.[5] In fact, malnutrition at any age causes a decline in immune function and increased susceptibility to infection.[5,28-30]

Further compounding the problem, millions of doctors erroneously prescribe **antibiotics** to patients seeking relief for symptoms of viral infections. Persistent misuse of antibiotics leads to potentially serious treatment complications, greater risk of death, and may contribute to the development of antibiotic-resistant pathogens.[31]

As numerous strains of influenza viruses continue to evolve and pose a deadly danger of complications to aging individuals, scientists recognized the urgent need to find a safe and effective way to ***reverse*** the reduced effectiveness of flu vaccines caused by age-related immune decline.

If taken together for two weeks prior to vaccination, the amino acids **L-theanine** and **L-cystine** enhance efficacy of the flu vaccine in certain groups of elderly subjects.[19] This delivers stronger protection against both the flu virus–and its deadly complications.



subjects with low serum total protein or hemoglobin, potential indicators of compromised health.[19]

The report concluded that, "***Co-administration of L-cystine and L-theanine before vaccination may enhance the immune response to influenza vaccine in elderly subjects with low serum total protein or hemoglobin***."

In another human study, this same combination has been shown to reduce the incidence of the **common cold** by **58%**.[5]

Reduce the Risk of Common Cold

If co-administration of these two amino acids could boost the *effectiveness* of the **flu vaccine**, scientists reasoned that it might also help lower the *incidence* of the **common cold**.

The common cold is the *most prevalent human illness*.[5] The majority of cases are acute viral infections of the upper respiratory tract. Conventional treatments such as analgesic agents and antihistamines only help alleviate some of the symptoms, such as sneezing and runny nose.[5]

Because common colds can lead to serious complications in ***elderly*** and immune-compromised individuals,[21] scientists set out to determine if L-theanine and L-cystine, could also reduce the incidence of the common cold.

For the placebo-controlled study, 176 healthy men were asked to take a total of **700 milligrams** of *L-cystine* and **280 milligrams** *L-theanine* per day, in two divided doses.[5]

Over a five-week period, the L-theanine and L-cystine group developed **58% fewer colds** than the placebo group.[5] Among those experiencing colds, the symptoms of fever and chills were significantly reduced in the theanine/cystine supplemented group.[5]

The study team reported that, *together*, L-theanine and L-cystine represent an **effective and safe** natural ingredient to suppress the common cold—producing no more side effects than placebo.[5]

Summary

The **flu** can mean more than symptoms such as muscle pain, nausea, and sore throat.[3] On average, over 30,000 Americans die annually from influenza.[1]

To help prevent death from the flu's lethal secondary infections and other complications, many people choose to receive an annual flu shot.[13] However, because older adults often have a weakened immune system, the vaccine may only be effective as infrequently as **9%** of the time—and only **56%** of the time in the general population.[16-18]

Priming the Immune System

In order for any vaccine to effectively do its job, it needs to work hand-in-hand with a healthy immune system. Studies have shown that the older you are, the less effective the flu vaccine becomes. This is a direct result of an age-related decline in immune response.

The amino acids **L-theanine** and **L-cystine** are known for their ability to boost factors of the immune system that are diminished with age: glutathione and interleukin-2.[19,32,33]

Glutathione is the major antioxidant that *neutralizes* free radicals and reactive oxygen compounds and is essential for the immune system to exert its full potential.[19]

Interleukin-2 is a cytokine that is important for antibody production and for the differentiation, long-term growth, and proper functioning of T cells.[18,34]

L-theanine, an amino acid and phytochemical found mainly in tea leaves (*Camellia sinensis*), is an immune booster.[35,36] Theanine is known to stimulate glutathione.[19] Theanine and glutathione have been shown to promote a certain subset of white blood cells known as gamma delta T lymphocytes that play a vital role in the production of interleukin-2.[18,36] Evidence indicates that a greater intake of L-theanine helps to **prime** gamma delta T cells, activating them to a state of readiness.[36,37]

L-theanine also enhances the immune system by stimulating the release of immune system proteins called *cytokines*.[19,36]

L-theanine also contributes to the absorption of another amino acid important to the immune responsiveness: **L-cystine**.[19] The amino acid L-cystine is a precursor to the antioxidant glutathione. L-cystine is converted to glutathione, which stimulates gamma delta T-cells to release the immune factor *interleukin-2*.[19]

However, when taken together for two weeks prior to vaccination, the amino acids **L-theanine** and **L-cystine** boost the efficacy of the flu vaccine in certain elderly subjects by enhancing the immune system itself.[19] The result is enhanced protection against both the flu virus—and its deadly complications.

Remarkably, this same combination has been shown to reduce the incidence of the **common cold** by **58%**.[5] ●

If you have any questions on the scientific content of this article, please call a Life Extension® Health Advisor at 1-866-864-3027.

References

1. Kemmerly SA. Influenza update. *Ochsner J*. 2000 Oct;2(4):224-7.
2. Available at: http://www.cdc.gov/nchs/data/nvsr/nvsr61/nvsr61_06.pdf. Accessed September 21, 2013.
3. Available at: http://www.flu.gov/symptoms-treatment/symptoms/index.html#. Accessed September 21, 2013.
4. Takagi Y, Kurihara S, Higashi N, et al. Combined administration of (L)-cystine and (L)-theanine enhances immune functions and protects against influenza virus infection in aged mice. *J Vet Med Sci*. 2010 Feb;72(2):157-65.
5. Kurihara S, Hiraoka T, Akutsu M, Sukegawa E, Bannai M, Shibahara S. Effects of (L)-cystine and (L)-theanine supplementation on the common cold: a randomized, double-blind, and placebo-controlled trial. *J Amino Acids*. 2010;2010:307475.

6. Available at: http://www.cdc.gov/flu/about/disease/symptoms.htm. Accessed September 30, 2013.
7. Ballinger MN, Standiford TJ. Postinfluenza bacterial pneumonia: host defenses gone awry. *J Interferon Cytokine Res*. 2010 Sept;30(9):643-52.
8. Jain S, Kamimoto L, Bramley AM, Schmitz AM, et al. Hospitalized patients with 2009 H1N1 influenza in the United States, April-June 2009. *N Engl J Med*. 2009 Nov 12;361(20):1935-44.
9. Schanzer DL, Langley JM, Tam TW. Co-morbidities associated with influenza-attributed mortality, 1994-2000, Canada. *Vaccine*. 2008 Aug 26;26(36):4697-703.
10. Centers for Disease Control and Prevention (CDC). Estimates of deaths associated with seasonal influenza—United States, 1976-2007. *MMWR Morb Mortal Wkly Rep*. 2010 Aug 27;59(33):1057-62.
11. Castle SC. Clinical relevance of age-related immune dysfunction. *Clin Infect Dis.* 2000;31:578-85.
12. Available at: http://www.cdc.gov/flu/about/disease/high_risk.htm. Accessed September 23, 2013.
13. Available at: http://www.cbsnews.com/8301-504763_162-57521511-10391704/officials-urge-flu-vaccine-for-unpredictable-2012-2013-season/. Accessed September 23, 2013.
14. Available at: http://www.vhcinfo.org/serviceMembers.asp?page=immunoBasics&title=Immunology%20Basics. Accessed September 23, 2013.
15. Reber AJ, Chirkova T, Kim JH, et al. Immunosenescence and challenges of vaccination against influenza in the aging population. *Aging Dis*. 2012 Feb;3(1):68-90.
16. Liu WM, van der Zeijst BA, Boog CJ, Soethout EC.Hum. Aging and impaired immunity to influenza viruses: implications for vaccine development. *Vaccin*. 2011 Jan-Feb;7 Suppl:94-8.
17. Lambert ND, Ovsyannikova IG, Pankratz VS, Jacobson RM, Poland GA. Understanding the immune response to seasonal influenza vaccination in older adults: a systems biology approach. *Expert Rev Vaccines*. 2012 Aug;11(8):985-94.
18. Centers for Disease Control and Prevention (CDC). Interim adjusted estimates of seasonal influenza vaccine effectiveness - United States, February 2013. *MMWR Morb Mortal Wkly Rep*. 2013 Feb 22;62(7):119-23.
19. Miyagawa K, Hayashi Y, Kurihara S, Maeda A. Co-administration of l-cystine and l-theanine enhances efficacy of influenza vaccination in elderly persons: nutritional status-dependent immunogenicity. *Geriatr Gerontol Int*. 2008 Dec;8(4):243-50.
20. Kurihara S, Shibahara S, Arisaka H, Akiyama Y. Enhancement of antigen-specific immunoglobulin G production in mice by co-administration of l-cystine and l-theanine. *J Vet Med Sci*. 2007 Dec;69(12):1263-70.
21. Available at: http://www.nhs.uk/Conditions/Cold-common/Pages/Commoncoldinchildren.aspx. Accessed September 24, 2013.
22. Rothberg MB, Haessler SD, Brown RB. Complications of viral influenza. *Am J Med*. 2008 Apr;121(4):258-64.
23. Thompson WW, Shay DK, Weintraub E, et al. Mortality associated with influenza and respiratory syncytial virus in the United States. *JAMA*. 2003 Jan 8;289(2):179-86.
24. Peiris JS, de Jong MD, Guan Y. Avian influenza virus (H5N1): a threat to human health. *Clin Microbiol Rev.* 2007;20:243-67.
25. Studahl M. Influenza virus and CNS manifestations. *J Clin Virol*. 2003;28:225-32.
26. Barr CE, Mednick SA, Munk-Jorgensen P. Exposure to influenza epidemics during gestation and adult schizophrenia. A 40-year study. *Arch Gen Psychiatry*. 1990;47:869-74.
27. Ison MG, Campbell V, Rembold C, et al. Cardiac findings during uncomplicated acute influenza in ambulatory adults. *Clin Infect Dis*. 2005;40:415-22.
28. Fukagawa NK. Protein and amino acid supplementation in older humans. *Amino Acids*. 2013 Jun;44(6):1493-509.
29. Brüssow H, Sidoti J, Dirren H, Freire WB. Effect of malnutrition in Ecuadorian children on titers of serum antibodies to various microbial antigens. *Clin Diag Lab Immunol*. 1995;(2):62-8.
30. Calder PC. Feeding the immune system. *Proc Nutr Soc.* 2013 Aug;72(3):299-309.
31. Available at: http://www.who.int/mediacentre/factsheets/fs194/en/. Accessed September 24, 2013.
32. McElhaney JE, Beattie BL, Devine R *et al.* Age-related decline in interleukin 2 production in response to influenza vaccine. *J Am Geriatr Soc.* 1990;38:652-8.
33. Samiec PS, Drews-Botsch C, Flagg EW et al. Glutathione in human plasma: decline in association with aging, age related macular degeneration, and diabetes. *Free Radic Biol Med*. 1998;24:699-704.
34. De Paoli P. Immunological effects of interleukin-2 therapy in human immunodeficiency virus-positive subjects. *Clin Diagn Lab Immunol.* 2001 Jul;8(4):671-7.
35. Available at; http://www.med.nyu.edu/content?ChunkIID=653856. Accessed September 24, 2013.
36. Bukowski JF, Percival SS. L-theanine intervention enhances human gammadeltaT lymphocyte function. *Nutr Rev*. 2008 Feb;66(2):96-102.
37. Bukowski JF, Morita CT, Brenner MB. Human gamma delta T-cells recognize alkylamines derived from microbes, edible plants, and tea: Implications for innate immunity. *Immunity*. 1999;11:57-65.

VASCULAR BENEFITS OF A Mediterranean Diet

VALIDATED IN HUGE NEW STUDY

A large, rigorous study published in the ***New England Journal of Medicine*** confirmed the health benefits of those who switch to a **Mediterranean diet** rich in **omega-3 fish oil** as well as protective nutrients called polyphenols found in **olive oil**, fruits, vegetables, nuts like walnuts, and wine.[1] The study ended early because the benefits were so overwhelming, with startling benefits for vascular health, that it was considered unethical to continue to deprive the control group.[1]

In addition to the health-promoting benefits of vegetables and fruits with their abundance of polyphenol nutrients, the Mediterranean Diet group took at least **4 tablespoons** of polyphenol-rich extra-virgin **olive oil** a day.[1]

LIFE EXTENSION® MEMBERS LONG AGO BENEFITED

Starting in **2005**, Life Extension members began taking a supplement (***Super Omega-3***) that provided potent concentrations of **fish oil** and **olive polyphenols** like hydroxytyrosol and oleuropein. This supplement also provided standardized **sesame lignans** to support the beneficial effect of omega-3 fatty acids in the body.[2]

Olive oil contains polyphenol nutrients that have demonstrated wide-ranging health benefits.[3-5] The recommended twice daily dose of **Super Omega-3** supplies a similar polyphenol content to that found in **4 to 6 tablespoons of olive oil.**

References

1. *N Engl J Med.* 2013 Feb 25.
2. *Crit Rev Food Sci Nutr.* 2007;47(7):651-73.
3. *Altern Med Rev.* 2007 Dec;12(4):331-42.
4. *Curr Top Med Chem.* 2011;11(14):1767-79.
5. *Med Glas (Zenica).* 2012 Feb;9(1):1-9.
6. Available at: http://www.ifosprogram.com/consumer-reports.aspx. Accessed March 18, 2013.
7. *J Nutr Sci Vitaminol (Tokyo).* 2003 Aug;49(4):270-6.

CAUTION: If you are taking anti-coagulant or anti-platelet medications, or have a bleeding disorder, consult your healthcare provider before taking this product.

Supportive but not conclusive evidence shows that consumption of EPA and DHA omega-3 fatty acids may reduce the risk of coronary heart disease. IFOS™ certification mark is a registered trademark of Nutrasource Diagnostics, Inc. These products have been tested to the quality and purity standards of the IFOS™ program conducted at Nutrasource Diagnostics, Inc.

SUPER OMEGA-3 WITH SESAME LIGNANS AND OLIVE FRUIT EXTRACT

To ensure the purest, most stable, and easy-to-tolerate fish oil, **Super Omega-3 EPA-DHA** is *molecularly distilled*. It enjoys the highest **5-star rating** for **purity**, **quality,** and **concentration** from the renowned ***International Fish Oil Standards*** program.[6] The **sesame lignans** not only direct the omega-3s toward more effective pathways in the body, but guard the delicate fish oil from oxidation.[2,7]

A bottle containing 120 softgels of **Super Omega-3 EPA/DHA with Sesame Lignans and Olive Fruit Extract** retails for $32. If a member buys four bottles, the price is reduced to **$21** per bottle. If **10 bottles** are purchased, the cost is **$18.68** per bottle. **(Item #01482)**

The daily dose (four regular size softgels) of Super Omega-3 EPA /DHA with Sesame Lignans & Olive Fruit Extract provides:

EPA (eicosapentaenoic acid)	**1,400 mg**
DHA (docosahexaenoic acid)	**1,000 mg**
Olive (fruit and leaf) **Extract** [std. to 6.5% polyphenols (39 mg), 1.73% hydroxytyrosol/tyrosol (10.4 mg), 0.5% verbascoside/oleuropein (3 mg)]	**600 mg**
Sesame Seed Lignan Extract	**20 mg**

Item #01482

To order the most advanced fish oil supplement, Super Omega-3 EPA/DHA with Sesame Lignans and Olive Fruit Extract (with or without enteric coating), call 1-800-544-4440 or visit www.LifeExtension.com

Magnesium and Brain Health

Profound loss of connections between nerve cells in the brain is one of the major hallmarks associated with ***neurodegeneration*** and memory impairment. Previous research has shown that **magnesium** is a critical factor in controlling **synaptic density.**[1]

To combat this, an innovative form of magnesium called **Neuro-Mag™** has been developed. The *magnesium-L-threonate* contained in **Neuro-Mag™** has been shown to specifically target multiple areas of the aging brain. In fact, pre-clinical models show that the *magnesium-L-threonate* contained in **Neuro-Mag™** boosted levels of magnesium in spinal fluid by **15%** versus no increase from conventional magnesium.[2]

New Cognitive Benefits Revealed!

Although research into the role of magnesium in the brain dates back 70 years, scientists continue to uncover its comprehensive benefits for cognitive function.[1,3] Studies using ***magnesium-L-threonate*** show this unique form of magnesium maintains the quantity of synaptic connections between brain cells and inhibits the dysregulation of signaling pathways.[1]

Capsules or Powder…Value Priced

The suggested daily dose of three **Neuro-Mag™ Magnesium-L-Threonate Capsules** provides **2,000 mg** of **Magnesium-L-Threonate**. While supplying a modest **144 mg** of elemental magnesium, its superior absorption into the bloodstream and nervous system make it a preferred choice for maturing individuals to supplement with.

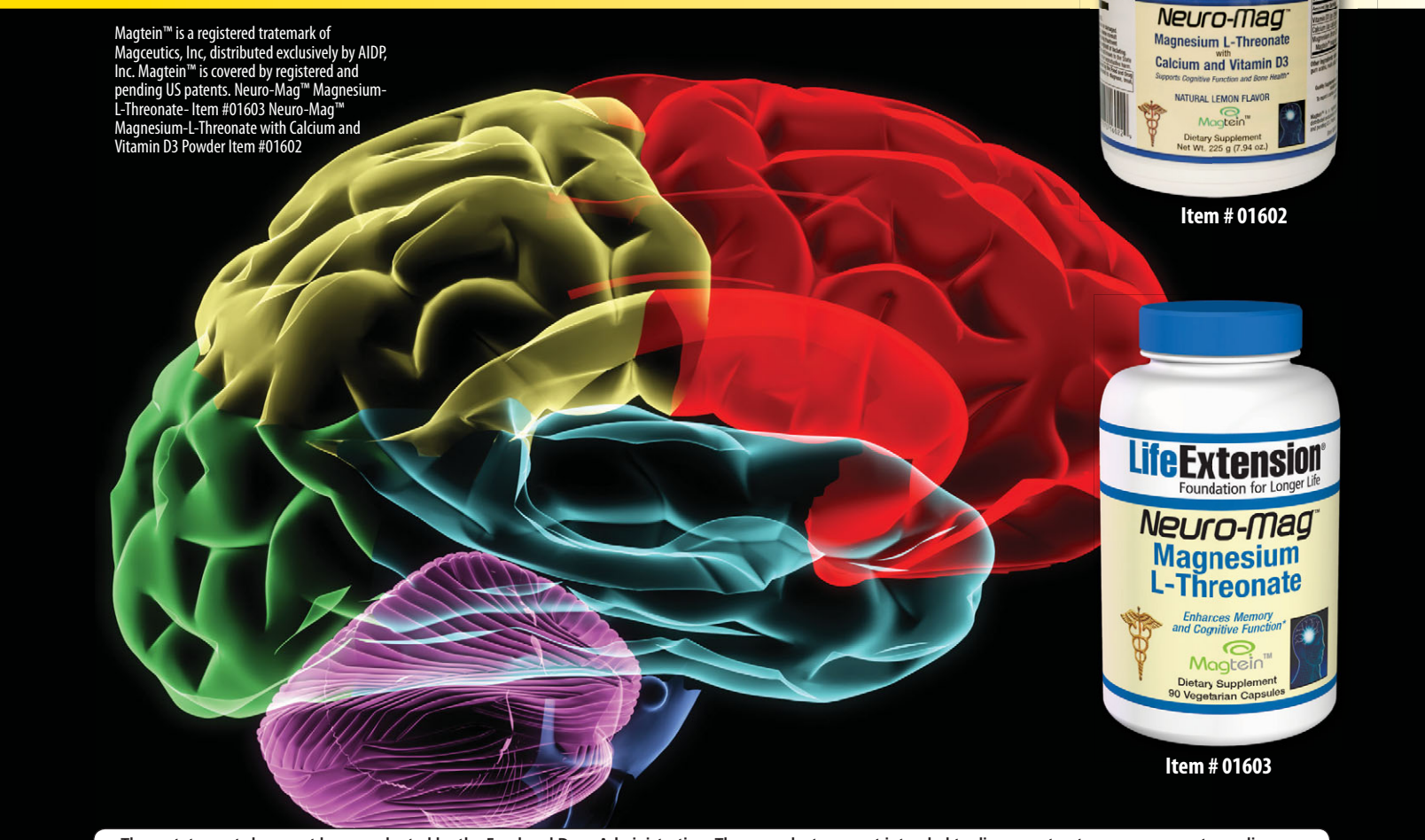
This same brain-health supporting magnesium is also available in a natural lemon flavor called **Neuro-Mag™ Magnesium-L-Threonate with Calcium and Vitamin D3 Powder**. In addition to its fresh lemon flavor, the one-scoop per day serving supplies the same amount of magnesium as the capsules plus **500 mg** of highly soluble calcium and **1,000 IU** of vitamin D3.

A bottle containing 90 vegetarian capsules of **Neuro-Mag™ Magnesium-L-Threonate** or a jar containing **30** scoops of **Neuro-Mag™ Magnesium-L-Threonate with Calcium and Vitamin D3 Powder** retails for $40. If a member buys 4 units, the price is reduced to **$27** per unit.

References

1. *J Neurosci.* 2013 May 8;33(19):8423-41.
2. *Neuron.* 2010 Jan 28;65(2):165-77.
3. *Yale J Biol Med.* 1933 Jul;5(6):545-53.

To order Neuro-Mag™ Magnesium L-Threonate Capsules or Powder call 1-800-544-4440 or visit www.LifeExtension.com



NEW Winter Wellness™

Primes Immune Response at Super LOW Cost

Every **winter**, human immune systems are overworked as they provide essential defense against **seasonal** challenges—*especially the immune systems of the elderly and very young*.[1-4]

A crucial part of this protection comes from the immune system's production of new antibodies when the ***new*** winter season's pathogens are first introduced, which boosts the body's preparedness for upcoming challenges during peak winter outbreaks.[5]

In a remarkable discovery, the amino acids in **Winter Wellness™** have been shown to *work together* to **prime** the immune system to optimize immune responsiveness.[4,6-8]

Taken daily, they support the host immune system's primary defenders by enhancing the function of key immune cells to generate antibodies and naturally *prime* readiness—especially when taken at least **two weeks prior** to the first pre-season exposure to the winter's new antigen challenges.[4,6,7]

Optimized Immune Responsiveness to New Winter Challenges

L-theanine is a distinctive amino acid found almost exclusively in tea leaves.[8] **L-cystine** is an amino acid synthesized by the body from the cysteine molecules found in many plant and animal food sources.[9] Scientists have found that L-theanine and L-cystine have potent, complementary effects on immune responsiveness.[6,7]

Now combined in the next-generation, immune-supporting product **Winter Wellness™**, L-theanine and L-cystine promote the natural enhancement in responsiveness that follows pre-season **antigen-exposure** by:

- Helping to enhance *gamma delta T cells*, ensuring an optimum state of readiness to respond through secretion of *interleukin-2*—a powerful immune regulator.[6]
- Supporting the release of immune system proteins that coordinate interactions between *T cells* and *antibodies*—further promoting immune responsiveness.[10]
- Contributing to the synthesis of *glutathione*—a potent endogenous antioxidant—that has a marked effect on immune function.[4,11]

Scientific data supports that when these potent amino acids are used **together**, they support an enhanced post-exposure immune response.[4,6-8]

Clinically Validated Antibody Support

A double-blind, placebo-controlled clinical trial on humans found that the two amino acids in **Winter Wellness™** significantly promoted antigen responsiveness.[6]

A group of nursing home residents over age 65 were co-administered **280 milligrams** of *L-theanine* and **700 milligrams** of *L-cystine* once daily for 14 days. After controlled exposure to several new winter antigens on the 15th day, the scientists found that for certain groups, supplementation resulted in an increased rate of ***seroconversion***—the point at which the immune system first develops **antibody protection** against a microorganism as a *result* of new antigen exposure.[6]

Winter Wellness™ powerfully *primes* the immune system against seasonal winter challenges.

The suggested daily dosage of two capsules of **Life Extension® Winter Wellness™**, or as recommended by a healthcare practitioner, provides:

L-Cystine	**700 mg**
L-Theanine	**280 mg**

Item# 01739

Low-Cost Ingredients

A bottle of 60 capsules of **Life Extension® Winter Wellness™** retails for $15. If a member buys four bottles, the price is reduced to **$9.75** per bottle.

References

1. *Q Rev Biol.* 1996 Dec;71(4):511-48.
2. *Cell Immunol.* 2000 Mar 15;200(2):105-15.
3. Available at: http://www.cdc.gov/flu/protect/infantcare.htm. Accessed September 12, 2013.
4. *J Vet Med Sci.* 2010 Feb;72(2):157-65.
5. Available at: http://www.garlandscience.com/res/pdf/9780815342434_ch02.pdf. Accessed September 16, 2013.
6. *Geriatr Gerontol Int.* 2008 Dec;8(4):243-50.
7. *J Amino Acids.* 2010;2010:307475.
8. *Nutr Rev.* 2008 Feb;66(2):96-102.
9. *Int J Angiol.* 2010 Spring; 19(1):e7–e20.
10. *Immunity.* 1999;11:57-65.
11. *J Vet Med Sci.* 2007 Dec;69(12):1263-70.

To order Life Extension® Winter Wellness™, call 1-800-544-4440 or visit www.LifeExtension.com

BY JON FINKEL

From Quarterback to *GIVING BACK*

Whether it's in the broadcast booth or a booth at his restaurant, football star ***Joe Theismann*** *projects a healthy lifestyle wherever he goes.*

He's donned the famous golden dome football helmet for Notre Dame and the storied jersey of the Washington Redskins, but these days, a simple pair of orange suspenders suits NFL icon Joe Theismann just fine. No, the suspenders don't provide any protection from blitzing linebackers or inspire Skins fans to do the wave, but they do bring attention to a cause near and dear to his heart: raising awareness for AAA screening.

"AAA stands for Abdominal Aortic Aneurysm," Theismann explains. "My dad is an AAA survivor, and because of this, I'm working with the 'Find the AAAnswers' campaign to help raise awareness about this silent killer and encourage at-risk individuals to go get screened."

Theismann, a former Pro Bowl NFL quarterback accustomed to studying film for hours to prepare for a defense, has taken the same approach to learn about the dangers of AAA.

"AAA is a very serious health problem" he says. "And the risk factors are fairly common. If you've smoked more than 100 cigarettes in your life, have a history of heart problems, are over 60 and male – you could be at risk for AAA. Getting screened is important."

As Theismann talks, his voice takes on a commanding, yet congenial tone; clearly, leading a cause comes to him just as easily as leading an offense, which is why we can now add AAA Advocate to the seemingly endless list of titles he has accumulated over the years, including Notre Dame All-American, NFL MVP, Super Bowl Champion, Pro Bowler, Restaurateur, and Sportscaster.

Although this isn't the first time Joe has been involved with a cause; in 1982, he was selected the NFL's Man of the Year for his community service and dedication to the health and welfare of children. >

MUSCLE MAINTENANCE

"My experience with the NFL has given me the opportunity to lend my voice to help raise awareness about important public issues," Theismann says. "When I am asked to do a presentation I am representing what I believe to be a healthy lifestyle. I pride myself on my appearance."

At age 64, Theismann's appearance is still strikingly similar to how he looked during his playing days, where he filled out his six-foot frame with around 190 pounds of muscle.

"When I was younger, working out was about getting stronger," he says. "Now it's all about maintenance. As I've gotten older, I try to maintain muscle density."

In addition to the health benefits of maintaining a strong physique, he cites another, more practical reason for his maintenance routine. "As you get older, you invest in suits, pants, and shirts. As far as I'm concerned, if I were to commit myself to a full lifting program, I'd need to buy a whole new wardrobe!"

He says the last line with the trademark laugh that we've heard countless times from the broadcast booth. But sartorial concerns aside, he happens to stick to a very impressive workout routine, including weight training two or three times a week in addition to cardio four times a week.

"There are three elements of exercise that are very important," he says. "Cardio, flexibility, and strength. People tend to confuse flexibility with stretching, but it's different. Flexibility involves having the full strength of the muscle throughout an entire range of movement. I want to be flexible."

He also advocates listening to your body, particularly in the area of needing rest. Where once he would workout for days on end without a break, he acknowledges that his body takes a little longer to recuperate, and that if you don't give your body adequate time to recover, you defeat the purpose of exercise. Of course, finding the time is also a challenge when you travel to football games for a living.

THEISMANN'S GREATEST HITS

1971

Led Notre Dame to a Cotton Bowl win Against Texas

1971

Drafted by the Miami Dolphins of the NFL and the Minnesota Twins of Major League Baseball

1978

Theismann wins starting job as Washington Redskins quarterback

1982

Led the Washington Redskins to a Super Bowl victory

1983

Won the NFL MVP Award

1985

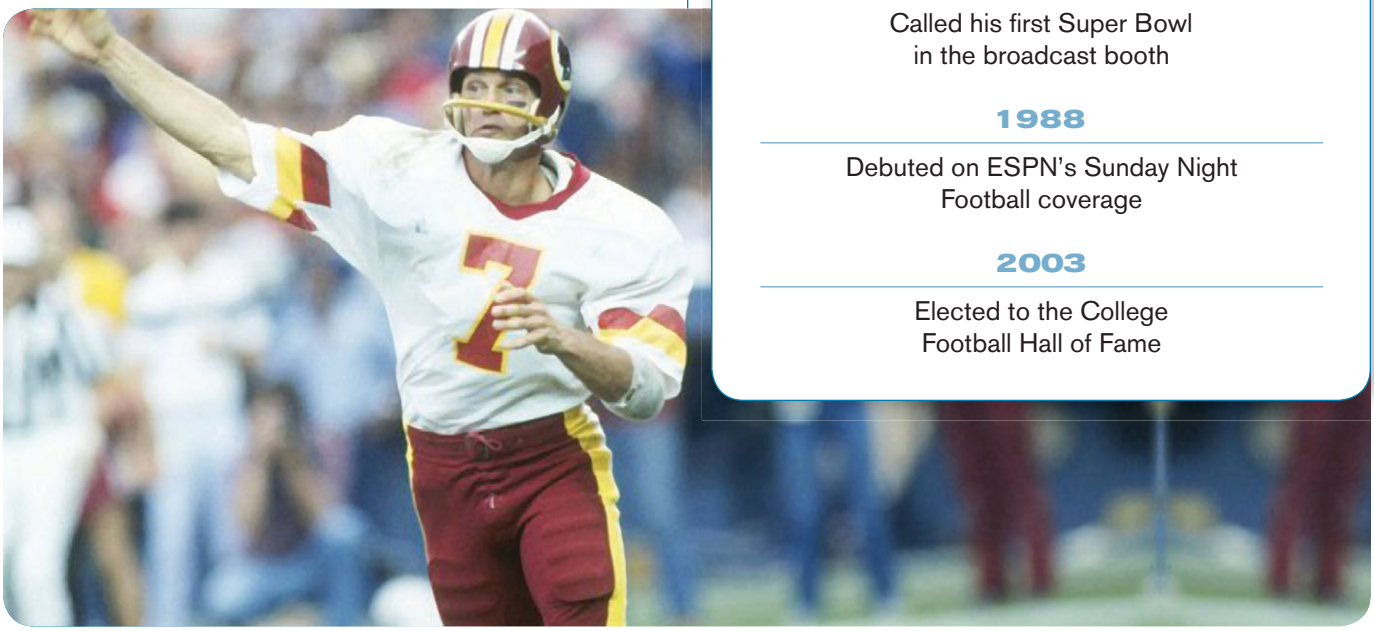
Called his first Super Bowl in the broadcast booth

1988

Debuted on ESPN's Sunday Night Football coverage

2003

Elected to the College Football Hall of Fame



STAYING HEALTHY ON THE GO

"I feel that I'm disciplined enough to find time for it," he says. "I'll work out early in the morning or late at night, but I'm comfortable with the fact that I'll find time for it somewhere in the day, even if I have to be creative."

By creative, he goes on to explain that if he's at a hotel that doesn't have a great workout facility, he'll create an entire workout in his room. These on-the-fly exercise routines include doing curls and triceps kickbacks with his briefcase, dips on the edge of the bathtub, angled pushups on a bed or desk, abdominal work on the floor, and a series of stretches that he can do anywhere.

"There can be fifty excuses for why you can't workout," he says. "But once you get going, you feel like you can go on forever. You just feel great."

Traveling also poses a problem when it comes to eating correctly. In general, Theismann sticks to what he calls a "king, prince, pauper" diet, where he eats like a king for breakfast, a prince for lunch, and a pauper for dinner.

"I usually eat a big breakfast," he says. "I'll have some raisin bran with fruit, some toast, and eggs. For lunch I'll have maybe half a sandwich with soup and a salad. And for dinner I'll have a small portion of pasta and some roasted chicken. Then I'll have an orange or apple before bed. If I'm traveling and I haven't had a chance to eat before I go to sleep, I probably won't eat and I'll just give my stomach a rest. I think it's hard to sleep when you have a ton of food in your stomach."

Supplements are an important part of his diet as well. Because of his family's history of heart problems, Theismann takes CoQ10 in addition to his daily multivitamin. He also takes a vitamin B supplement and lysine.

But the supplements, the exercise, and the eating plan are all part of a bigger overall strategy for healthier living.

"When I get up in the morning, my hip is sore, my back is sore, things are sore," he says. "I used to be able to get up and go. Now I get up, I walk around, I get all the parts going. You think you can do the same things you did 5 or 10 years ago, but it just takes a little longer. The body doesn't take very long to get going. You just have to work your way up. You'll eventually get back there." ●

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If you have any questions on the scientific content of this article, please call a Life Extension® Health Advisor at 1-866-864-3027.

Novel, Long-Lasting

GASTRO-ESOPHAGEAL SUPPORT

Many individuals have tried a host of remedies in an attempt to soothe their digestive tracts, but some *still* have an issue with gastric distress[1-4]—with resulting discomfort along the delicate lining of the **esophagus**.

A novel solution is now available in the form of what scientists call **raft-forming alginate**.

This blend of ingredients in **Esophageal Guardian** provides a totally unique approach to protecting esophageal tissue against harsh stomach acids.

RAFT-FORMING ALGINATE

The mechanism behind **Esophageal Guardian** involves the formation of a temporary physical barrier—or **raft**—between the stomach and the esophagus.[5]

The secret to this technology is what happens when ***alginic acid*** and ***potassium bicarbonate*** come into contact with gastric acids. Alginic acid forms a gel and potassium bicarbonate produces bubbles that get trapped in that gel—producing a **floating foam** layer that sits above the contents of the stomach.[5]

Immediately, two other ingredients in this formulation—***calcium carbonate*** and ***magnesium carbonate***—react with the stomach acid to create lift in the foam and make it firmer.[5]

Clinical studies show that this temporary foam barrier provides maximum support for delicate **esophageal tissues**.[5,6]

Also, the carbonate and bicarbonate in these ingredients help neutralize stomach acid.[5]

This protective foam barrier develops ***less than a minute*** after two **natural berry flavor** tablets of **Esophageal Guardian** are chewed and swallowed. Yet the relief it provides ***lasts up to 4 hours!***[5]

Quite simply, **Esophageal Guardian Natural Berry Flavor** delivers the fastest-acting, longest-lasting, and advanced technology to support delicate esophageal and stomach tissues against gastric distress.

The suggested dosage of two (2) chewable tablets of **Life Extension® Esophageal Guardian Natural Berry Flavor** chewed after the heaviest meal of the day with 4 to 8 ounces of water, or as recommended by a healthcare practitioner, provides:

Alginic acid	**1,000 mg**
Calcium (as calcium carbonate)	**80 mg**
Magnesium (as magnesium carbonate)	**40 mg**
Potassium (as potassium bicarbonate)	**40 mg**
Strawberry extract (fruit)	**416 mg**
Ellagic acid [from pomegranate extract (hull) and strawberry extract (fruit)]	**35 mg**

A bottle of 60 chewable tablets of **Life Extension® Esophageal Guardian Natural Berry Flavor** retails for **$36**. If a member buys four bottles, the price is reduced to **$24** per bottle.

Item # 01737

References

1. Available at: http://www.webmd.com/news/20110420/the-10-most-prescribed-drugs.
2. *Am J Gastroenterol.* 1983 May;78(5):257-60.
3. *J Gastroenterol Hepatol.* 2008 Sep;23(9):1368-72.
4. *Thorac Surg Clin.* 2005 Aug;15(3):369-75.
5. *Aliment Pharmacol Ther.* 2000 Jun;14(6):669-90.
6. *Aliment Pharmacol Ther.* 1992 Oct;6(5):579-88.

To order **Life Extension® Esophageal Guardian Natural Berry Flavor**, call 1-800-544-4440 or visit www.LifeExtension.com

SUPPORT ENDOTHELIAL HEALTH FOR MAXIMUM SEXUAL PERFORMANCE

Overlooked in the effort to support ***sexual function*** in aging men is the health of the ***vascular system***. Blood flow through the delicate lining of the arteries (the *endothelium*) is essential to sexual arousal, so it should come as no surprise that **endothelial *function*** is closely associated with male sexual capacity.[1]

Life Extension® has discovered supportive clinical research for a scientifically validated, nutrient formula to promote **endothelial function** *and* **blood flow** to the place men need it most—for maximum performance.

The ingredients found in **Prelox® Natural Sex for Men®** have yielded compelling and highly satisfactory results in ***five independent clinical studies.***[2-6]

Our analysis also confirms that unlike some performance enhancement supplements marketed as "natural," **Prelox® Natural Sex for Men®** is not adulterated with trace amounts of prescription drugs.

A Powerful *Synergy* to Support Sexual Health

The patented blend of the following ingredients positively affects the male physiology in three ways, to provide optimal support:

1. **PYCNOGENOL®** (standardized French maritime pine bark extract) activates ***endothelial nitric oxide synthase*** (eNO-S),[7] the enzyme required to make ***nitric oxide***. Nitric oxide (NO) *relaxes* the vessels that enable efficient blood flow—the key to healthy male sexual activity and overall vascular health. Pycnogenol® further amplifies this relaxing effect by extending the amount of time nitric oxide remains in the bloodstream.
2. **L-ARGININE** is the biological precursor to nitric oxide synthesis in the endothelium.[7] It interacts ***synergistically*** with Pycnogenol® to sustain nitric oxide levels sufficient for healthy sexual function.
3. **ICARIIN**—from a natural botanical extract used in traditional Chinese medicine—has been shown to ***deactivate*** the enzyme normally responsible for winding down male sexual response, further promoting sustained activity.[8] Prelox® Natural Sex for Men® contains a standardized extract providing a proprietary form of high-quality icariin.

The suggested dose of two Prelox® Natural Sex for Men® tablets each day provides:

Prelox® Proprietary Blend L-Arginine HCl, Aspartic Acid, Pycnogenol® Dried French Maritime Pine *(Pinus pinaster)* Extract (bark)	**1440 mg**
Icariin [Natural Sex® *Epimedium sagittatum* Extract (aerial parts)]	**60 mg**

A 60-tablet bottle of **Life Extension® Prelox® Natural Sex for Men®** retails for $52. If a member buys four bottles, the price is reduced to just **$36 per bottle**.

Item # 01373

References

1. *Int J Impot Res* 2008 Dec; Suppl 2:S9-14.
2. *Int J Impot Res*. 2008 Mar;20(2):173-80.
3. *Phytother Res*. 2009 Mar;23(3):297-302.
4. *J Sex Marital Ther*. 2003 May;29(3):207-13.
5. *European Bulletin of Drug Research*. 2005;13(1): 7–13.
6. *Akush Ginekol (Sofiia)*. 2007;46(5):7-12.
7. Rohdewald P. Pycnogenol, French maritime pine bark extract. In: Coates P, ed. *Encyclopedia of Dietary Supplements*. New York; Marcel Dekker; 2004.
8. *Urology*. 2006 Dec;68(6):1350-4.

To order Prelox® Natural Sex For Men®, call 1-800-544-4440 or visit www.LifeExtension.com

BY MICHAEL DOWNEY

A *Natural* Arsenal for Prostate Cancer Prevention

A remarkable new study has validated a method to slow **prostate cancer** progression that was long ago recommended to ***Life Extension*** members.

What made this study even more noteworthy is where it was presented.

The annual gathering of the **American Society of Clinical Oncology** (ASCO) is considered the world's most prestigious cancer forum. More than 25,000 oncology experts attend this meeting, and the media eagerly reports on meaningful advances in cancer prevention and treatment.

At the **2013 ASCO** meeting, findings from a study were released that underscored how ***effective*** certain **natural compounds** can be as a prostate cancer therapy.

In this placebo-controlled, double-blind trial of treatment-refractory prostate cancer patients, a four-nutrient supplement resulted in a **63.8%** median reduction in the increase of **PSA** levels.[1] The PSA marker is used by oncologists to determine progression or regression of prostate cancer, and to evaluate whether treatments are working or failing.

In the study presented at **ASCO**, patients with a PSA relapse after radiotherapy or surgery for localized prostate cancer took two daily capsules containing **pomegranate seed**, **broccoli**, **green tea**, and **turmeric**. Over a six-month period, median PSA levels increased only **14.7%** in the supplement group–compared to **78.5%** in the placebo group![1] PSA levels remained stable, or below, baseline values for a compelling **46%** of the supplement patients–but for only **14%** of the placebo patients.

Prostate cancer is the most common malignancy in US men (excluding non-melanoma skin cancer),[2] affecting one male in every six.[3] Autopsy findings show a significant percentage of men have underlying prostate cancer without even knowing it.[4-6]

This article will present evidence about the prostate cancer preventing effects of a wide range of nutrients. What makes this topic so compelling are the recent findings presented at **ASCO** showing that **pomegranate seed**, **green tea**, **broccoli**, and **turmeric** (source of **curcumin**) were so effective in prostate cancer patients.[1] The implication is that these nutrients may also afford considerable protection against prostate cancer progression . >

A comprehensive defense against prostate cancer involves healthy diet, supplemental nutrients, hormone balance, and annual PSA screening. The foods and nutrients described herein have been documented in published studies to target prostate cancer and help prevent or attenuate its development. As a bonus, they also confer huge protection against other age-related disorders.

Since there are overlapping mechanisms of action amongst many of these foods/nutrients, it may not be necessary to take every one of them. Most impressive, however, is the voluminous amount of scientific evidence that substantiates the anti-cancer properties of these nutrients. Yet mainstream medicine remains largely in the dark.

NUTRIENTS for PROSTATE CANCER PREVENTION

1. Flaxseed

Flaxseeds provide a rich supply of ***lignans*** and essential fatty acids that promote prostate health. The lignans in flaxseed are believed to offer protection against chronic disease and cancer, including hormone-dependent malignancies.[7-9]

A large study demonstrated that men with higher ***enterolactone*** levels were up to **72%** less likely to have prostate cancer than those with the lowest levels.[10] Studies have confirmed that flaxseed supplementation lowers PSA levels, and significantly reduces the proliferation of normal prostate cells and prostate cancer cells.[9,11] A pilot study on men who were scheduled to have a repeat prostate biopsy found that supplementation with flaxseeds, as part of a low-fat diet, lowered levels of PSA and prostate cell proliferation.[9]

2. Boron

Research has shown that boron can reduce the risk of prostate cancer.[12] In one study, men with the highest boron intake showed a **54% lower** risk of prostate cancer compared to those with the least intake.[13]

In a validated animal model of prostate cancer, researchers found that oral administration of various concentrations of a boron-containing solution led to **25-38% decreases** in tumor size, and **86-89% reductions** in PSA levels.[14] The suggestion that supplemental boron may help to shrink prostate tumors while also decreasing levels of PSA is exciting. That's because PSA—in addition to being an important prostate cancer marker—may itself be a contributor to prostate cancer promotion.[15]

Boron compounds inhibit the activity of prostate-specific antigen (PSA).[14] Higher boron levels in the blood lower the risk of prostate cancer by reducing intracellular calcium signals and storage.[16] At normal concentrations, boron operates selectively—inhibiting prostate cancer cell proliferation while allowing normal prostate cells to grow.[17]

The typical daily intake range for boron is **1-8 milligrams daily**, however individuals living in boron rich environments may consume far greater than this amount.[18] If lab studies can be replicated in human patients, higher daily dosages may become an effective and low-cost adjuvant therapy. ***Life Extension***® members already obtain boron (**3-6 mg**) in their supplements.

3. Cruciferous Vegetables

In recently released studies, three phytochemicals derived from ***cruciferous vegetables*** (such as **broccoli)** have shown promise in inhibiting prostate cancer in experimental models.[19,20] Because their chemical names are challenging—**indole-3-carbinol**, **3,3'-diindolylmethane**, and **phenethyl isothiocyanate**—they are better known as I3C, DIM, and PEITC, respectively.

I3C has several different actions that help prevent and inhibit prostate cancer. It helps activate detoxification pathways, prevents cancer cell growth, induces apoptosis, regulates gene expression, protects DNA from damage, and modulates a variety of cell signaling pathways.[20-23]

DIM has been shown to protect against prostate cancer by inhibiting the phosphorus-transferring enzyme ***Akt***, inhibiting the master DNA-transcription regulator ***nuclear factor-kappaB*** (***NF-kB***)—and blocking the crosstalk between them.[24] This is a novel mechanism through which DIM inhibits cell growth and induces apoptosis in prostate cancer cells, but not in non-tumorigenic prostate epithelial cells.[24] The ability of DIM to target aberrant epigenetic changes coupled with its ability to promote the detoxification of carcinogens, make it an effective chemopreventive agent as it is able to target multiple stages of prostate carcinogenesis.[18]

In a study released in May 2013, PEITC was found to suppress a compound known as ***PCAF*** (***P300/CBP-associated factor***)—which in turn inhibits androgen receptor-regulated transcriptional activity in prostate cancer cells.[19] Daily suggested dosages are **14 milligrams** for **DIM**, and **80-160 milligrams** for **I3C**. An I3C dosage of **200-600 milligrams daily** is suggested as an adjuvant for prostate cancer therapy. Dosages for PEITC are not well-established.

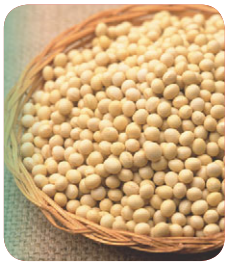
4. Vitamin D

As the *New England Journal of Medicine* clarified, "Cancer results from the accumulation of mutations in genes that regulate cellular proliferation."[25] In other words, cancer is essentially caused by the genetic mutations that occur over the lifespan. The fascinating impact of vitamin D is that it protects against cancer by enabling us to regain control over the genes that regulate cell proliferation. Vitamin D affects at least 200 human genes.[26] These genes are responsible for regulating crucially important aspects of cells: their proliferation, differentiation, and apoptosis.

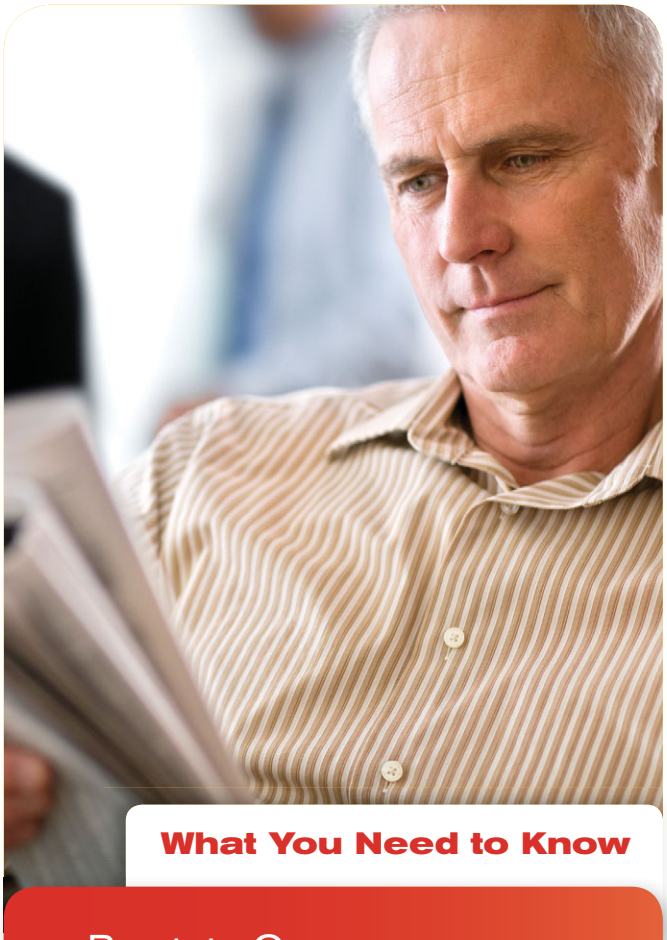
In recent years, a multitude of studies have shown cancer risk reductions of **50%** and greater based on higher vitamin D status.[27-30] People with higher vitamin D levels have lower risks of lethal prostate cancer, as well as reduced risks of other cancers.[26,27,31-34] Individual blood testing is needed to determine individual-appropriate dosages, which typically range from **2,000 to 10,000 international units (IU) daily** for prevention. Life Extension suggests an optimal vitamin D blood level of **50-80 nanograms per milliliter (ng/mL)**.

5. Soy Isoflavones

Some studies show that the highest intake of soy-based foods correlates with a **42-75% lower** risk of prostate cancer.[35-38] Early animal studies found that this difference is most likely attributable to soy isoflavones inhibiting prostate tumor growth by acting directly against tumor cells and indirectly against tumor neovasculature (growth of new blood cells).[37] Human studies support this evidence.



Japanese scientists took blood samples from over 14,000 men during 1988-1990. Their analysis clearly established that elevated serum levels of all three isoflavones assessed—***genistein***, ***daidzein***, and ***equol***—imparted strong protective effects against prostate cancer.[39] Men with the highest circulating levels of genistein, daidzein, and equol reduced prostate cancer risk by **62%**, **59%**, and **66%**, respectively. Genistein and daidzein are found in soy, and equol is derived from daidzein by bacterial flora in the intestines.[39-41] Also, genistein was shown to have "potent anti-proliferative effects" against human prostate cells[42] and inhibit metastatic potential of sex gland cancers such as prostate cancer.[43] Genistein also



What You Need to Know

Prostate Cancer Prevention

- **Prostate cancer afflicts *one male in every six*, and a significant percentage of men have underlying prostate cancer without even knowing it.**
- **New research reveals the effectiveness of a number of compounds in preventing and inhibiting this disease. We present here a comprehensive arsenal of tools available to prevent, monitor, and attenuate this disease.**
- **Aging men seeking to live a long and healthy life must be serious about avoiding the development of prostate cancer and serious about reversing its progression.**
- **These men—and their support network—now have, in one place, the latest scientific information they need to start a broadly effective, multi-action defense program today.**

blocks an enzyme that destroys an anticancer vitamin D metabolite in cancer cells.[44] A suggested dosage of soy isoflavones is **135-270 milligrams daily** with food.

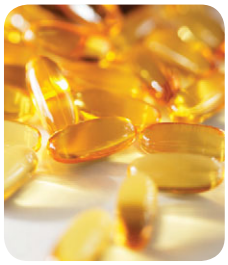
6. Green Tea Extract

Laboratory research with cultures has long suggested that green tea catechins, including ***epigallocatechin-3 gallate (EGCG)***, may inhibit the growth of cancer cells. Evidence from human studies now demonstrates that green tea compounds can help prevent prostate cancer. A clinical trial demonstrated that green tea catechins were **90%** effective in preventing prostate cancer in men with pre-malignant lesions.[45] Researchers recruited 60 men, aged 45-75. Thirty participants received **200 milligrams** of green tea catechins (**50%** EGCG) **three times daily**, while the other 30 subjects received a placebo. Biopsies were conducted at six and 12 months. Remarkably, only **one** man in the treatment group was diagnosed with prostate cancer, compared to **nine** men in the control group who developed the disease. No significant side effects or adverse reactions were reported.[45] The lead researcher concluded that "**90%** of chemoprevention efficacy could be obtained by [green tea catechin] administration in men prone to developing prostate cancer."[45]

Green tea polyphenols have also shown efficacy as an adjunctive therapy. Prostate cancer patients were given **1,300 milligrams** of green tea polyphenols, mostly EGCG, prior to the time of radical prostatectomy. They showed significant reductions in PSA and other tumor promoters such as ***vascular endothelial growth factor***.[46] Suggested dosages of EGCG are **300-350 milligrams daily**, and adjuvant cancer therapy dosages of EGCG range up to **3,000 milligrams daily**. The FDA, however, does not believe there is sufficient evidence to say that green tea reduces prostate cancer risk. A federal judge ruled against the FDA's attempt to suppress claims that green tea may reduce prostate cancer risk. [47]

7. Omega-3 Fatty Acids

In scientific studies, high blood levels of the omega-3 fatty acids DHA and EPA (***docosahexaenoic acid*** and ***eicosapentaenoic acid***, respectively) have been demonstrated to correspond to a lower risk of developing prostate cancer.[48] EPA has been shown to suppress the formation of the omega-6 fatty acid ***arachidonic acid*** (AA) by inhibiting the enzyme ***delta-5-desaturase***.[49] EPA has also been found to contribute to the inhibition of ***uPA***—a substance known as ***urokinase-type plasminogen activator*** believed to play a role in prostate cancer invasion and metastasis.[50]



Although cold water fish such as tuna, sardines, herring, and salmon provide a rich omega-3 source, commercially available pharmaceutical-grade fish oils also deliver large amounts of EPA and DHA.[51] Suggested dosages are **2-4 grams** of fish oil concentrate supplying **700-1,400 milligrams** of EPA and **500-1,000 milligrams** of DHA, **daily** with food. For adjuvant cancer therapy, recommended dosages are **4-8 grams** of fish oil concentrate supplying up to **2,800 milligrams** of EPA and up to **2,000 milligrams** of DHA, **daily** with food.

8. Curcumin

Curcumin strikes at multiple targets in prostate cancer.[52,53] It induces apoptosis, interferes with the spread of cancer cells, and regulates inflammatory responses through the master regulator ***nuclear factor-kappaB*** (***NF-kB***), a protein complex that controls the transcription of DNA.[54-57] Natural molecules that inhibit NF-kB can limit inflammatory changes.[58] Prostate cancer is often dependent on sex hormones for its growth; curcumin reduces expression of sex-hormone receptors (***androgen receptors*** and androgen receptor-related cofactors) in the prostate.[59,60] This speeds androgen receptor breakdown and impairs cancer cells' ability to respond to the effects of testosterone.[61,62]

Both *in vitro* and *in vivo* models demonstrate that curcumin inhibits prostate cancer promotion by blocking metastases of cancer cells in the prostate, and

by regulating enzymes required for tissue invasiveness.[63,64] In certain human prostate cancer cell lines, curcumin completely inhibited a type of phosphorus-transferring enzyme known as ***Akt*** (also known as ***protein kinase B*** or ***PKB***), suggesting that curcumin inhibits prostate cancer cell growth through this Akt-inhibiting mechanism.[65] Curcumin has been shown to inhibit angiogenesis in prostate cancer cells *in vivo*.[66] A novel manufacturing technology has produced a patented curcumin formulation that absorbs up to **seven times better** than conventional curcumin.[67] If supplementing with this highly absorbed curcumin formulation (BCM-95®), suggested preventive dosage is **400 milligrams daily** with food. A suggested dosage of this formulation for adjuvant cancer therapy may be **800-1,200 milligrams daily** with food.

9. Coenzyme Q10

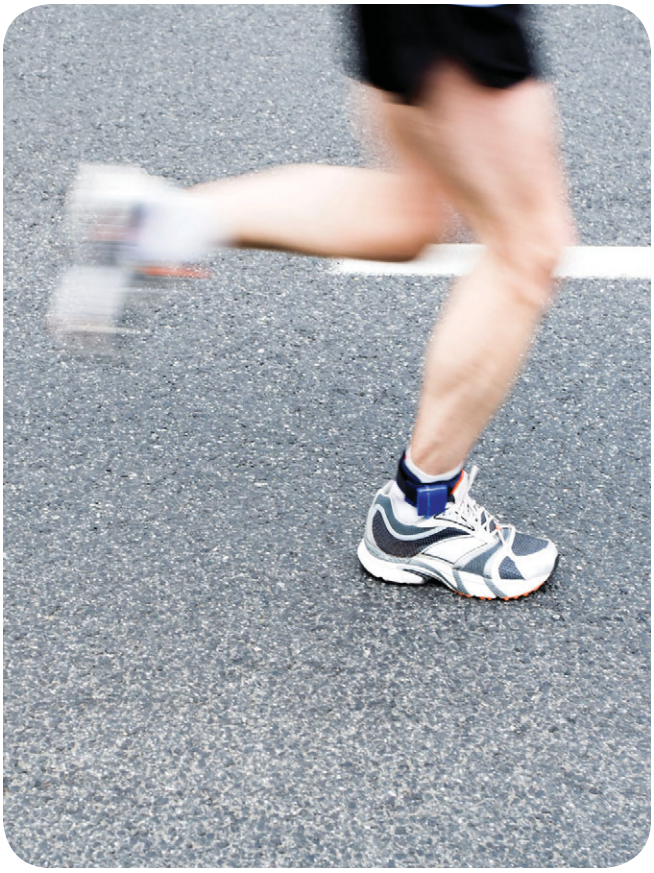
Low blood levels of coenzyme Q10 (CoQ10 or Q10) have been found in patients with a variety of cancer types.[68,69] Several published animal and human studies have demonstrated CoQ10's remarkable effects against some cancers,[70-77] but research into its potentially protective effects against prostate cancer has been very limited. In 2005, after reviewing anecdotal reports appearing in the peer-reviewed scientific literature, the National Cancer Institute (NCI) reported that coenzyme Q10 has been anecdotally reported to lengthen the survival of patients with cancer of the prostate, as well as several other cancers.[78] Despite these findings, the NCI pointed out that the absence of a control group in the human studies and other scientific weaknesses made it impossible to determine whether these beneficial results were directly related to CoQ10 therapy.[78]

Later that same year, University of Miami researchers reported research showing that adding coenzyme Q10 *in vitro* to the most common prostate cancer cell line, PC3, inhibited cell growth by **70%** over 48 hours.[79] Evidence suggested that there had been a reduction in the expression of a key, anti-apoptotic gene protein, bcl-2, and through this mechanism, CoQ10 had restored the ability for apoptosis, allowing the cancer cells to kill themselves. "The most amazing part," said UM research associate Niven Narain, "is that we've been able to restore a cancer cell's ability to kill itself, while not impacting normal cells."[79] The suggested preventive dosage of coenzyme Q10 is **100 milligrams daily**, and a suggested adjuvant dosage is **200-500 milligrams daily**, both taken after a meal.

10. Gamma-Tocopherol Vitamin E

A large study showed that the risk of prostate cancer declines with increasing concentrations of the ***alpha***-tocopherol form of vitamin E, with the highest level corresponding to a **35% lower** risk; however, these protective effects were ***only*** observed when levels of ***gamma***-tocopherol and levels of selenium were also high.[80]

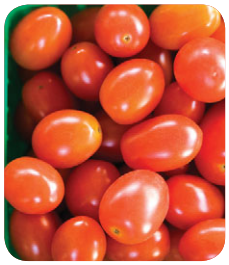
Men with the highest ***gamma***-tocopherol levels, those in the highest fifth of the distribution, were found to have a **5-fold greater reduction** in the risk of developing prostate cancer than men in the lowest fifth.[80] Other research has shown that vitamin E reduces the growth rate of *existing* prostate cancers that are specifically exacerbated by a high-fat diet—reducing tumor growth rate within a high-fat diet to the same tumor growth rate as in a lower-fat (ideal) diet.[81]



While both alpha- and gamma-tocopherols are potent antioxidants, ***gamma-tocopherol*** has a unique function. Because of its different chemical structure, gamma-tocopherol scavenges ***reactive nitrogen species***, which can damage proteins, lipids, and DNA, and promote carcinogenesis.[82-85] The suggested dosage of ***gamma-tocopherol*** is **200-250 milligrams daily**, and the suggested adjuvant therapy dosage is **400-1,000 milligrams daily**, taken with food.

11. Lycopene

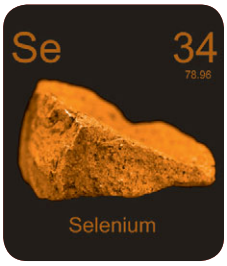
Lycopene is a carotenoid occurring abundantly in tomatoes. The relationship between its ingestion and prostate health is well established.[86-94] One laboratory experiment found that lycopene inhibited the growth of normal human prostate cells.[92] Then, a clinical trial conducted on prostate cancer patients demonstrated that lycopene supplementation decreases the growth of prostate cancer.[93] In another compelling study, healthy men with the highest lycopene levels in their blood were shown to have a **60%** reduced risk of developing prostate cancer.[94]



Scientists found that lycopene works by reducing oxidative stress in prostate tissue; lowering inflammatory signaling; preventing DNA damage; modulating expression of endocrine growth factors; and may block cancer cells from growing out of control through enhanced communication between cancer cells at "gap junctions."[89,91] Lycopene also may slow the new blood vessel growth that prostate cancers need for development.[91] Suggested dosages of **15-30 milligrams daily** are for prevention and up to **45 milligrams daily** with food for adjuvant support in existing prostate cancer.

12. Selenium

The body only needs small quantities of selenium.[95] But blood levels of this mineral decrease with age, placing middle-aged to older men at high risk for inadequate selenium levels. Lower levels of selenium in the blood can correspond to an increased risk of an enlarged prostate, the condition known as benign prostatic hyperplasia (BPH).[96] Low selenium levels were also found to parallel a **four- to five-fold higher** risk of prostate cancer.[97] Remarkably, supplementation with selenium has been demonstrated to produce an up to **63% reduced** risk of prostate cancer.[98,99] The mechanism behind this protection appears to be related to an antiproliferative effect, resulting from selenium's upregulation of cell-cycle regulators.[100]



However, confusion arose in 2009 due to publication of a single negative study that substantially contributed to misinformation about the value of selenium against prostate cancer. Known as SELECT—for Selenium and Vitamin E Cancer Prevention Trial—the study appeared to show that selenium, alone or in combination with vitamin E, had no detectable effect on preventing cancers.[101,102] Many experts have since condemned the trial's methodology and conclusions[103]—and for a number of reasons.

One problem with the 2009 study was that it used only a single form of selenium.[101,104] This selenium compound is just one of several different forms in which selenium is available for nutritional supplementation. Data indicate that three forms of selenium—the two organic forms called ***L-selenomethionine*** and ***selenium-methyl L-selenocysteine***, plus the inorganic form known as ***sodium selenite***—have different degrees of action with regard to the effect on any incipient cancer cells that might be developing.[105-107] Using one form weakened the potential protective benefits in the study.

More importantly, the highly flawed 2009 SELECT study used only one form of vitamin E, a synthetic form known as dl-alpha tocopheryl acetate. We have known for about 15 years that when alpha tocopherol is taken by itself, it displaces critically important gamma tocopherol—the form of vitamin E that is the most protective against prostate cancer.[84,108-112] By supplementing aging men with only one form of vitamin E, ***synthetic dl-alpha tocopheryl acetate***, scientists in the 2009 SELECT study may have unwittingly increased subjects' prostate cancer risk by depriving prostate cells of critical gamma tocopherol. Then, a 2011 meta-analysis of nine randomized, controlled clinical trials including 152,538 participants established that selenium supplementation cut risk for **all** cancers by **24%**. The cancer-preventive effect rose to **36%** in people with low baseline selenium levels.[113]

Based on research involving non-melanoma skin cancer patients—in which patients received either **200 micrograms daily** of selenium or a placebo—researchers concluded that selenium supplementation can slash the risk of dying from any type of cancer by **50%**.[114] Also, selenium's efficacy could potentially be enhanced: one study observed the protective effects of high selenium levels against prostate cancer **only** when the concentrations of ***gamma-tocopherol***, an isomer of vitamin E, were also high—suggesting that these two nutrients may work best together.[80] It is suggested that selenium be taken at dosages of **200 micrograms daily** with food.

13. Zinc

Evidence suggests that zinc may play an important and direct role in the prostate. For example, studies found that total zinc levels in the prostate are much higher than in other soft tissues in the body, and those with prostate cancer have been shown to have exceedingly low levels of zinc in the prostate.[115,116] Also, in normal prostate cells, zinc is highly concentrated intracellularly in the glandular epithelium—but adenocarcinoma cells taken from prostate tumors have lost their ability to amass zinc.[117-119] Supplementation with **15 milligrams of zinc daily** showed a trend toward modestly reduced risk of all invasive prostate cancers, but there was a significant **66%** reduction in risk of advanced prostate cancer.[120] This indicates that zinc supplements may be beneficial in some subgroups of men for the most advanced forms of the disease. There was also a greater reduction in prostate cancer risk from zinc supplementation among men whose vegetable intake was high.[120] Suggested preventive and adjuvant zinc dosages range between **15** and **50 milligrams a day**.

14. Milk Thistle

Evidence demonstrates that the compounds in milk thistle—isosilybin, silibinin, and silymarin—offer protection against prostate cancer. Both silibinin and silymarin and are strong antioxidants and inhibit human carcinoma cell growth and DNA synthesis.[121] *Silibinin* was found in animal research to exert cancer-fighting effects against an advanced form of human prostate tumor cells, resulting in a decrease in proliferation and an increase in programmed cancer-cell death.[122,123] *Silymarin* may block cancer cell development and growth; it was found to contain one or more constituents that induce cancer cell apoptosis and inhibit mitogenic (cell-division promoting) and survival signaling by prostate cancer cells, showing silymarin's ability to tackle cancer from a number of different angles.[124] Both silymarin and silibinin inhibit the secretion of pro-angiogenic factors from tumor cells, which are necessary for these cells to recruit the blood supply required for their continued growth.[122]

In animal research, silibinin was found to exert cancer-fighting effects against an advanced form of human prostate tumor cells, resulting in decreased proliferation and increased cancer-cell apoptosis.[123] Silibinin has high bioavailability in the prostate after oral administration, and scientists concluded that it has strong potential to be developed as an intervention for hormone-refractory (castration-resistant) human prostate cancer.[121] Silibinin may also work synergistically with the chemotherapy drug ***doxorubicin*** to help kill cancer cells, making it a potential candidate for adjuvant therapy.[122]

However, isosilybin B—a lesser known constituent that comprises no more than **5%** of silymarin and is absent from silibinin—appears to be more potent against prostate cancer cells than the other milk thistle substances.[125] Scientists reported that other compounds may require much higher concentrations to achieve the same anti-cancer effect elicited by a relatively small dose of isosilybin B.[125] It is important to note that some preparations sold as milk thistle extract, silymarin, or silibinin may contain little, or even no, isosilybin B. A typical suggested dosage of a quality standardized milk thistle extract is **750 milligrams daily**, taken with or without food.

15. Gamma-Linolenic Acid (GLA)

Gamma-linolenic acid (GLA) is an omega-6 essential fatty acid found mostly in plant-based oils. Not all omega-6 fatty acids behave the same: for example, the omega-6s called linoleic acid and arachidonic acid tend to be unhealthy because they promote inflammation; GLA, on the other hand, may serve to reduce inflammation.[126] Much of the GLA taken as a supplement is converted to a substance called ***DGLA*** (***dihomo-gamma-linolenic acid***), an omega-6 fatty acid with demonstrated anti-inflammatory effect.[126] Similar to the effect of the omega-3 fatty acid eicosapentaenoic acid (EPA), GLA has been found to inhibit the production of ***urokinase-type plasminogen activator (uPA)***, a substance believed to play a role in the invasiveness and metastasis of cancer cells.[49]

Scientists have also found that GLA metabolites suppress the activity of ***5alpha-reductase***, an enzyme that converts testosterone to a more potent androgen (***5alpha-dihydrotestosterone or DHT***) and that is involved in the pathway of prostate cancer.[127] It is believed that GLA may also increase the effectiveness of some anticancer drug treatments.[126] The suggested GLA dosage for prevention is **300 milligrams daily**, or for adjuvant therapy, **700-900 milligrams daily**, both with food.

16. Zeaxanthin

Limited evidence suggests that higher zeaxanthin levels may be protective against prostate cancer.[128] In a 2001 study, a scientific team analyzed the plasma levels of various substances in a group of participants that included 65 patients with prostate cancer and 132 cancer-free controls. They found that, relative to those in the lowest quartile, those in the highest quartile of plasma zeaxanthin had a **78%** reduced risk of prostate cancer.[128] More study is needed to explore this potential benefit. Appropriate zeaxanthin supplementation amounts for prostate cancer defense have not been determined, but **3.75 milligrams daily** is a current suggested dosage.

17. Pomegranate

Use of pomegranate (*Punica granatum* L. var. *spinosa*) juice, peel, and oil has been shown to possess anticancer activities, including interference with tumor cell proliferation, cell cycle, invasiveness, and angiogenesis.[129] Apoptosis was implicated as a mechanism for this interference with prostate cancer cell proliferation in a laboratory study in which researchers found that pomegranate extract increases expression of a protein that promotes cancer cell death, while decreasing expression of a protein that inhibits cancer cell death.[130] Later, in a 2012 study, scientists found that the in vitro cytotoxic activity of an extract of pomegranate against prostate cancer cells was dose-dependent—and they also suggested that this antiproliferative effect followed an apoptosis-dependent pathway.[131]

Further clarifying pomegranate's effects against prostate cancer cells, scientists found evidence of induced beneficial gene expression—inhibiting pro-inflammatory, DNA-related protein ***nuclear factor kappa B*** (***NF-kB***)[132] and downregulating production of cancer-stimulating androgen receptors in prostate cells.[133] The suggested dosage for prostate cancer prevention is **80-120 milligrams daily** (of punicalagins), and for adjuvant cancer therapy, **280-375 milligrams daily** (of punicalagins), with or without food.

18. Saw Palmetto

Saw palmetto (*Serenoa repens* or *Sabal serrulata*) is now one of the most widely used phytotherapies for BPH (benign prostatic hyperplasia) in the US,[134,135] a condition characterized by an enlarged prostate gland.

However, evidence has been emerging that saw palmetto also has biological activity in prostate cancer cells and may defend against prostate cancer.[136] For instance, a saw palmetto extract was shown to inhibit the activity of ***5alpha-reductase***,[137] an enzyme that converts testosterone to the most potent androgen and that is involved in the pathway of prostate cancer. Saw palmetto also appears to have anti-inflammatory properties and—crucially—a tendency to promote apoptosis in prostate cancer cells.[138,139]

In one study, researchers described how they used saw palmetto extract to slow the growth of prostate cancer cells *in vitro*. This growth-inhibitory effect was **more potent** on prostate cancer cells than on other cancer cell lines on which they tested saw palmetto.[140] One new mechanism identified by this group of scientists was the saw palmetto-induced reduction in the expression of ***cyclooxygenase-2 (COX-2)*** in prostate cancer cells. Cancer cells often use COX-2 as biological fuel to hyperproliferate, and as the researchers presenting this report concluded, "We hypothesize that COX-2 inhibition induced by saw palmetto berry extract may provide an important basis for potential chemopreventative action."[140] A typical suggested dose of saw palmetto is **320 milligrams daily**.

19. Resveratrol

By working through over a dozen anticancer mechanisms and selectively targeting cancer cells, resveratrol inhibits prostate cancer at multiple stages of development.[141] This potent compound, found in grapes and other plants, was first isolated in 1940 and is now viewed as a potential defense against this disease.[141-143] In a study that examined the effect of various polyphenols on different types of prostate cancer cells, scientists concluded that resveratrol was the most potent against advanced prostate cancer cells.[144]

Resveratrol has the ability to modulate the activity of estrogen and testosterone at both the cellular (receptor) and molecular (genetic) levels.[145-147] In fact, after examining its effects on hormone-responsive genes in prostate cancer cells, researchers concluded that, "Resveratrol may be a useful chemopreventive/chemotherapeutic agent for prostate cancer."[147] Also, resveratrol reverses increases in PSA in cancer cells.[147,148] For example, in one study, four days of resveratrol treatment resulted in an **80% reduction** in PSA levels in prostate cancer cells.[148] Resveratrol also modulates growth factors, protects DNA, blocks cancer-causing chemicals and radiation, and fights free radicals and inflammation.[149,150] The same anticancer gene activated by non-steroidal anti-inflammatory drugs (NSAIDs) demonstrates enhanced expression by resveratrol.[151]

Using a DNA microarray—a scientific research tool that simultaneously examines how particular phytocompounds affect thousands of genes—scientists found that resveratrol exerts a striking effect on cancer-related genes. Among other things, resveratrol activates tumor suppressor genes, other genes that destroy cancer cells, and genes that control the cell cycle—while suppressing genes that allow cancer cells to communicate with one another.[152] This ability to get inside cancer cells and activate or deactivate genes is a powerful weapon against cancer growth—especially since resveratrol exerts its effects without toxicity.[145] Many resveratrol supplements on the market are diluted. For pure resveratrol, the suggested dosage is **20-250 milligrams** a day, taken with or without food.

20. Supplemental Lignans

Many different plant sources provide rich sources of lignans—and this may partially explain why men who eat healthier diets enjoy sharply reduced rates of prostate cancer.[153,154] Lignan molecules are involved in plant defense mechanisms.[154] But experimental evidence suggests that dietary lignans also offer humans significant protection against tumors in a variety of organs—including tumors of the prostate.[155-158] In fact, researchers found that men with higher blood levels of lignans have the lowest incidence of prostate cancer.[10] Bacteria in the intestines convert dietary and supplemental lignans into mammalian lignan compounds called ***enterolactones***, which enter the bloodstream.[159]

Findings from human, animal, and *in vitro* studies indicate that enterolactones protect against hormone-dependent cancers.[160-162] Tyrosine kinases are activated in metastatic prostate cancer cells, and enterolactones help to inhibit the tyrosine kinase enzyme.[163] Enterolactones have been shown to inhibit ***5-alpha-reductase***, an enzyme that converts testosterone to a

more potent androgen.[164] Anti-angiogenesis effects and cancer-cell apoptosis were found to be enhanced by enterolactones in animal models of hormone-related cancers, including prostate cancer.[165,166] Enterolactone also functions via several mechanisms to reduce estrogen input to cells and has been shown in a number of studies to be a factor in the development of benign prostate enlargement and prostate cancer.[162,167-170]

A dosage of **20-50 milligrams daily** of lignans is suggested to defend against prostate cancer. For adjuvant prostate cancer support, **75-125 milligrams daily** is suggested.

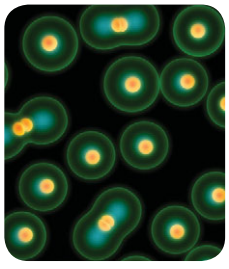
21. Vitamin K

The anti-tumor potential of vitamin K has been a part of scientific research since 1947.[171] Researchers have observed tumor cell destruction in prostate cancer patients following supplementation with a combination of vitamin C and vitamin K3, the synthetic form of vitamin K.[172] (This same combination was later developed into the prostate cancer drug Apatone®, which has shown similar results.[173])

Subsequently, a study that followed 11,319 men for an average of 8.6 years found that those with the highest intake of **vitamin K2** were **63% less** likely to develop advanced prostate cancer.[174] The same research team found no effect on prostate cancer from vitamin K1 supplementation. Optimum prostate cancer prevention dosages for vitamin K2 are not known, but typically suggested **daily** dosages are **1,000 micrograms** for the menaquinone-4 form of K2 (MK-4) and **200 micrograms** for the menaquinone-7 (MK-7) form.

22. Beta-Sitosterol

A plant fat and phytosterol known as beta-sitosterol, used in several European prostate drugs, has been found to block the growth of prostate cancer cells. A study on an androgen-dependent line of prostate cancer cells showed that beta-sitosterol decreased cancer cell growth by **24%** and increased apoptosis **four-fold**.[175] These findings correlated with a **50%** increase in production of ceramide,[175] an important cell membrane component believed to induce apopotosis.[176]



In another study, an androgen-dependent line of human prostate cancer cells (PC-3 cell line) was implanted in mice, and scientists compared both the *in vivo* and *in vitro* effects of a **2%** mixture of beta-sitosterol with those of a **2%** mixture of cholesterol on these cells. Compared to controls, beta-sitosterol, as well as another phytosterol known as campesterol, inhibited growth of the prostate cancer cells by **70%** and **14%**, respectively.[177] By contrast, the cholesterol mixture increased cell growth by **18%**. Various other parameters were also measured.

For example, the phytosterol mixtures inhibited the invasion of the prostate cancer cells into ***Matrigel-coated membranes***—a measure of cancer invasiveness—by **78%**, compared to controls, while the cholesterol mixture increased invasiveness by **43%**.[177] Also, migration of the prostate tumor cells through ***8-micron pore membranes***—a measure of tumor motility—was reduced by **60-93%** when they were in the phytosterol mixtures, but it was increased by **67%** when in the cholesterol.[177] In a measure of adhesiveness and ability to form tumor clumps, phytosterol supplementation reduced the binding of these cancer cells to laminin by **15-38%** and to fibronectin by **23%**, while cholesterol increased cell-binding to type IV collagen by **36%**.[177] The research team concluded that—indirectly *in vivo* as a dietary supplement, and directly *in vitro* in tissue culture media—phytosterols inhibited the growth and metastasis of these (PC-3) prostate cancer cells. Beta-sitosterol, however, was determined to be much more effective than campesterol in offering this protection in most parameters assessed.[177]

In later research on the mechanism involved, scientists determined that phytosterols such as beta-sitosterol may induce the inhibition of tumor growth by stimulating apoptosis and arresting cells at different locations in the cell cycle, and that this may involve alterations in reactive oxygen species and production of prostaglandin.[178] A suggested phytosterol dosage is **169 milligrams twice daily** with or without food.

23. Apigenin

In studies on human cancer cells, scientists observed that the vegetable extract apigenin inhibits angiogenesis and cell proliferation.[179-181] These effects were confirmed in an animal experiment in which scientists transplanted an androgen-dependent line of human prostate cancer cells into mice bred to serve as a model for tumor growth conditions.[182] A liquid suspension containing either apigenin or placebo was given to the mice daily, via a gastric tube, for eight or ten weeks. Administering apigenin to mice—beginning either two weeks before, or two weeks after, inoculation with the cells—inhibited the volume of prostate cancer cells in a dose-dependent manner by as much as **59%** and **53%**, respectively.[182] Induction of apoptosis in the tumor xenografts was observed. In the same study, exposure of prostate cancer cells to apigenin in a culture for as little as 24 hours appeared to inhibit cell cycle progression by nearly **69%**.[182]

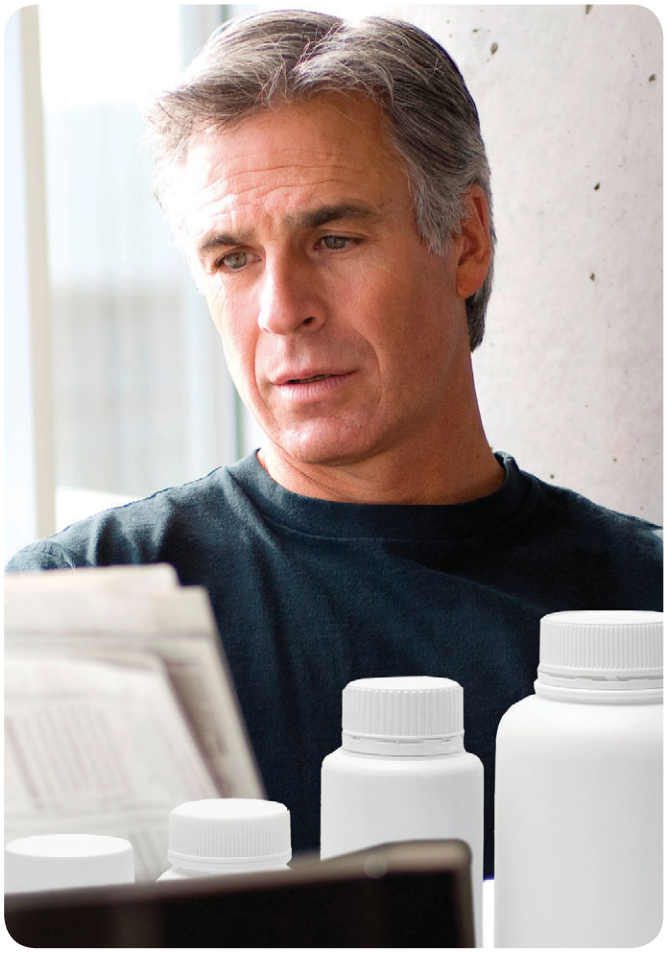
Scientists believe these effects may result from apigenin's modulation of the IGF (***insulin-like growth factors***) axis, which plays signaling roles in cell proliferation and cell death.[183] Later research demonstrated that apigenin also inhibits motility and invasiveness of prostate carcinoma cells.[184] The importance of supplementation for prostate protection is reflected in the fact that Americans typically consume only **13 milligrams** of flavonoids (including flavones like apigenin) daily,[183] however a suggested apigenin preventive dosage is **25-50 milligrams daily**, and adjuvant dosage for prostate cancer patients may exceed **100 milligrams** daily.

24. Ginger (*Zingiber officinale*)

A study reported in 2013 demonstrated that ginger phytochemicals work synergistically to inhibit the proliferation of human prostate cancer cells (PC-3 cell line).[185] In past research, ginger showed anti-inflammatory, antioxidant, and antiproliferative activities, suggesting a promising role as a chemopreventive agent.[186,187] Then, a 2012 study became the first report to clearly demonstrate the anticancer activity of orally taken, whole ginger extract for the therapeutic management of prostate cancer.[187] This breakthrough research found that ginger resulted in growth inhibition, cell-cycle arrest, and induced caspase-dependent intrinsic apoptosis in prostate cancer cells.[187] In vivo studies by this team showed that—without any detectable toxicity—ginger significantly inhibited tumor growth in xenografts of a line of prostate cancer cells (PC3) subcutaneously implanted in nude mice.[187]

Specifically, the scientific team orally fed a solution containing ginger extract to the tumor-implanted mice for eight weeks. Daily measurements of tumor volume were performed. Tumors in control mice that received a placebo solution showed unrestricted growth. But tumors in mice that received the ginger extract solution showed a time-dependent inhibition of growth over the eight-week period. Remarkably, the tumor burden in the ginger group was **reduced** by about **56%** after just eight weeks of feeding.[187] Tumor tissue from ginger extract-treated mice showed a reduced proliferation index and "widespread apoptosis" compared with controls.[187] Ginger treatment was well tolerated, and the test mice maintained normal weight gain and showed no signs of discomfort during the treatment regimen. Most importantly, orally taken ginger extract did not exert any detectable toxicity in normal, rapidly dividing tissues such as the gut and bone marrow.

Although further research is urgently needed, this study suggests that ginger extract has anticancer effects against human prostate cancer cells. No dosage for this purpose has been determined, but the study team performed allometric scaling calculations to extrapolate the mice dosage to humans. The human equivalent dose of ginger extract was found to be approximately **567 milligrams daily** for a 154-pound (**70 kilogram**) human adult.[187,188] This may be viewed as an adjuvant therapy dosage, and an appropriate preventive dosage would be significantly less.



25. Inositol Hexaphosphate (IP6)

Inositol hexaphosphate, or IP6, is a phytochemical found in cereals, soy, legumes, and other fiber-rich foods.[189] Building on earlier *in vitro* research showing that IP6 strongly inhibits growth and induces differentiation of human prostate cancer cells (PC-3 cells),[190] scientists designed an animal study. They injected mice with a line of human prostate cancer cells (DU145 cells) and then gave them either normal drinking water or water that included **1%** or **2%** IP6 for 12 weeks. The hormone-refractory (castration-resistant) prostate cancer growth was **reduced 47%** in the **1%** IP6-solution mice and **reduced 66%** in the **2%** IP6-solution mice, compared to littermates without the IP6-enriched drinking water diet.[191]

Then, in 2013, scientists designed an IP6 experiment on TRAMP mice, which are genetically modified to develop metastatic prostate cancer.[192] For 24 weeks, mice with prostate cancer were given drinking water that was **0%, 1%**, **2%**, or **4%** IP6. The study team periodically conducted magnetic resonance imaging (MRI) tests on each mouse prostate to assess prostate volume and tumor vascularity. The animals that received higher concentrations of IP6 showed a "**profound**" **reduction** in prostate tumor size, due in part to the compound's antiangiogenic effect (the ability of the compound to reduce new blood vessel formation).[192] The researchers discovered a decrease in a glucose transporter protein, known as GLUT-4, in the prostates of IP6-treated mice, and observed that IP6 decreased glucose metabolism and membrane phospholipid synthesis—meaning there was substantial energy deprivation with the tumor itself. This demonstrates "a practical and translational potential of IP6 treatment in suppressing growth and progression of prostate cancer in humans."[192]

26. N-Acetylcysteine (NAC)

N-acetylcysteine, or NAC, is a metabolite of the amino acid cysteine, which is found in many protein-containing foods.[193] It is used both as a prescription drug and a dietary supplement. As a drug, it is given orally to treat acetaminophen overdose; as a supplement, it is used as an antioxidant and to promote metabolism of glutathione, a potent endogenous antioxidant.[194] Research now indicates it can inhibit growth and block the metastasis of prostate cancer. In an *in vitro* study, researchers found that NAC significantly inhibited androgen-independent prostate carcinoma cells (PC-3 cells) in a dose- and time-dependent manner—suggesting a potent antiproliferative effect and the promise that NAC may be of benefit in the management of prostate cancer.[195]

Scientists then conducted another lab study to assess the effect of NAC on the metastasis of human prostate cancer cells. They found that NAC inhibited the growth, migration, and invasion of two cell lines (DU145 and PC3 cells).[196] Also, NAC significantly reduced the ability of the prostate cancer cells to attach themselves (to collagen IV-coated surfaces).[196] Inhibition occurred in both cell lines. The team concluded that NAC has high potential to attenuate migration of human prostate cancer cells and to suppress the growth of primary and secondary tumors—and they suggested NAC may represent an affordable and low-toxicity, adjuvant-therapy option for prostate cancer.[196] Dosages of **600 milligrams daily** are typical, but higher dosages may be needed for adjuvant cancer therapy.

27. Quercetin

Quercetin is a flavonoid found in a broad range of fruits and vegetables.[197] Lab research has suggested that quercetin inhibits prostate cancer development. Scientists found that quercetin produces a **69% reduction** in the growth of highly aggressive prostate cancer cells, a greater than **50% upregulation** of tumor-suppressor genes, and a **61-100% downregulation** of cancer-promoting oncogenes.[197] A study suggested that quercetin works partially by blocking the androgen receptors used to sustain growth by prostate cancer cells—potentially preventing these cells from forming tumors.[198] Another quercetin anticancer mechanism was revealed in a study on human prostate cancer (PC-3) cells. Quercetin induced the mitochondrial apoptotic signaling pathway and endoplasmic reticulum stress, triggering DNA damage and apoptotic death in these cells.[199] Other research confirmed that quercetin inhibits the migration and invasiveness of prostate cancer cells.[200] A suggested preventive dosage is **500 milligrams daily** and an adjuvant prostate cancer dosage is **1,000-3,000 milligrams daily**. (The lower dosage of **500 milligrams daily** is currently being tested in a double-blind, human clinical trial on the effect of quercetin on the rate of increase in PSA and on the incidence of prostate cancer, but these results are not expected to be available until 2014.[201])

28. Reishi

Constituents called triterpenes in the fungus *Ganoderma lucidum*, better known as reishi mushroom, provide important anti-inflammatory and antiproliferative effects that play a role in cancer.[202] These mechanisms, combined with the polysaccharides and other components in reishi, can inhibit cancer—including prostate cancer cells.[203,204] While reishi has been heavily studied for its ability to enhance immunity, some scientists adopted a novel approach to researching potential effects of fungi against prostate cancer. They evaluated the ability of various fungus extracts to act from within the cell to interfere with the androgen receptor and thus, inhibit prostate cancer growth.[203,204]

These researchers investigated over 200 fungus extracts for their anti-androgenic activity—and of these, *G. lucidum* (reishi) was one of two mushrooms selected for further investigation.[204] This extract also blocked cell proliferation and decreased cancer cell viability.[204] Reishi inhibited androgen-sensitive, human prostate adenocarcinoma cells (LNCaP cells).[203] The published report concluded that, "*G. lucidum* extracts have profound activity against LNCaP cells that merits further investigation as a potential therapeutic agent for the treatment of prostate cancer."[203] A suggested preventive dosage of reishi extract is **980 milligrams daily** (standardized to contain **13.5%** polysaccharides and **6%** triterpenes). For adjuvant support in prostate cancer, dosages range from **980 up to 3,000 milligrams daily** (standardized to contain **13.5%** polysaccharides and **6%** triterpenes).

29. 5-Loxin®

Aging humans are at increased risk of health complications and mortality via the upregulation of a proinflammatory enzyme called ***5-lipoxygenase***, or ***5-LOX***.[205] The 5-LOX enzyme generates a cascade of dangerous inflammatory effects throughout the body—which results in increased vulnerability of the organs to disease and functional deficits, particularly as the aging process progresses.[205,206] This enzyme stimulates the manufacture of pro-inflammatory molecules called ***leukotrienes***, which are linked in abundant research to numerous age-related diseases—including cancer.[205,207-210] Compounds in the flowering plant genus *Boswellia*—***beta-boswellic acid***, ***keto-beta-boswellic acid***, and ***acetyl-keto-beta-boswellic acid (AKBA)***—were shown to induce apoptosis in cancer cells.[211] But a purified extract of *Boswellia* has been specifically shown to selectively inhibit the 5-LOX enzyme.[212-214]

This purified extract—5-Loxin®—is standardized for AKBA content and protects against inflammatory diseases, including prostate cancer, through several mechanisms. For example, virtually all human cancer cell lines, including prostate cancer cells, induce production of a protein-degrading enzyme called ***matrix metalloproteinase (MMP)***, which cancer cells employ to tear apart containment structures within the prostate gland that would normally encase them. This allows the prostate cancer cells to break through healthy prostate tissue and metastasize.[215] However, 5-Loxin® has been shown to prevent expression of MMP—inhibiting the spread of prostate cancer cells.

Prostate cancer cells also use adhesion molecules called ***VCAM-1*** and ***ICAM-1***—which are directly involved in inflammatory processes—to facilitate their spread throughout the body. 5-Loxin® was shown to prevent the upregulation of these adhesion

molecules.[214] Also, the process of angiogenesis that feeds blood to developing cancer tumors is tightly linked to chronic inflammation.[216] A typical suggested dosage of 5-Loxin® is **70-100 milligrams daily** with or without food. Individuals with prostate cancer may consider dosages of **170** to **270 milligrams** a day of 5-Loxin®.

30. Watercress Extract

Epidemiological evidence suggests that increased intake of cruciferous vegetables reduces the risk of prostate cancer, prompting scientists to identify the specific compounds responsible for this cancer-preventive effect. They found that a metabolite of ***phenethyl isothiocyanate*** (PEITC) that is abundant in watercress inhibits the proliferation of prostate cancer cells and their ability to form tumors.[217] And watercress is the richest source of a glucosinolate known as ***nasturtiin***—which is transformed into PEITC in the digestive tract.[218]

A delicate balance of estrogens is crucially important for men's health as well as women's. In a study that examined the ratio of estrogen metabolites relative to prostate cancer risk, elevated levels of the more active metabolite, 16-hydroxyestrone, were linked with an increased risk of prostate cancer.[219]

Cruciferous vegetables such as watercress are very rich in the compounds ***indole-3-carbinol*** (I3C) and ***3,3'-diindolylmethane*** (DIM), which beneficially modulate estrogen metabolism—correlating with a reduced risk of prostate[220-222] cancer.

The constituents in watercress were also found to induce phase I and phase II liver enzymes, providing detoxification support that could explain their ability to inhibit the cancer-provoking effects of a variety of chemical compounds.[223] The suggested dosage for watercress extract is **50-100 milligrams daily**, taken with or without food.

31. Grapeseed

Grapeseed extract contains a mixture of phenolic compounds including flavonoids, anthocyanins, and stilbene compounds such as resveratrol.[224] Emerging research suggests it may be a chemopreventive agent.[225,226] Several investigators reported a reduction or delay of prostate tumor incidence when male animals were fed grapeseed extract.[227] Also, grapeseed proanthocyanidins inhibited human prostate carcinoma cells in lab culture.[228] However, it wasn't until 2011 that scientists investigated the association of long-term grapeseed supplementation with prostate cancer risk in human males.[226]

In a 2011 prostate cancer study of more than 35,000 men aged 50 to 76, researchers found that, compared to non-users, men who supplemented with any amount of grapeseed extract reduced their risk of prostate cancer by **41%**.[226] However, men with a high 10-year average use of grapeseed supplements experienced a remarkable **62%** reduction in prostate cancer risk.[226]

Studies on consumption of wine—which contains grapeseed phenols—found no association with prostate cancer risk.[229-231] Also, two large studies on food-based intake of flavonoids, flavonols, and flavones found no association with prostate cancer risk.[232,233] Scientists reporting the compelling beneficial results of grapeseed extract supplementation on prostate cancer risk in the 2011 study (above) suggested that, "One explanation for the discrepancy…is that users of grapeseed supplements may be exposed to higher

doses of these phenolic compounds than they would from their regular diet."[226] The suggested preventive dosage is **50-100 milligrams daily**, and the suggested adjuvant therapeutic dosage is **300 milligrams daily**.

32. Glycyrrhizin

Glycyrrhizin, a triterpene compound isolated from the roots of licorice has been found to exhibit potent *in vitro* cytotoxic activity against both hormone-dependent (LNCaP), and hormone-independent (DU-145), lines of human prostate cancer.[234] In one study, glycyrrhizin inhibited cell proliferation in these cell lines in a time- and dose-dependent manner.[234] The decreased viability was found to be due to apoptosis. Glycyrrhizin also caused DNA damage in these cell lines in a time-dependent manner.[234] This suggests that this licorice compound has therapeutic potential against prostate cancer, although a recommended dosage has not been determined.

33. Modified Citrus Pectin

Pectin is a highly complex, branched polysaccharide fiber that is present in most plants and is particularly abundant in citrus fruits like oranges, lemons, and grapefruit.[235] Citrus pectin, in its original form, has a limited solubility in water and therefore limited bioavailability to humans.[235] But in its modified form after hydrolysis, a special formulation of modified citrus pectin becomes a unique water-soluble fiber.[235,236] This modified form has been shown to bind to the important ***galectin*** molecules on the surface of cells.[236] Scientists believe that this ability of the modified citrus pectin to adhere to molecules—specifically to the ***galectin-3 molecule***—is responsible for its demonstrated ability to inhibit cancer cells.[237-239] This preventive effect was shown in animal research. For example, oral administration of modified citrus pectin inhibited the ***spontaneous*** extraprostatic ***colonization*** of injected cells from a prostate cancer cell line and in a dose-dependent fashion.[240]

Cancer cells must communicate with one another to invade, colonize, and proliferate in healthy tissue; but this proprietary citrus pectin appears to disrupt this inter-cellular communication, slowing metastasis. The American Cancer Society suggests that modified citrus pectin may "be useful for preventing or slowing the growth of metastatic tumors in very early stages of development."[241] For instance, **70%** of prostate cancer patients treated orally for 12 months with a modified citrus pectin preparation experienced a slow-down in the rise of ***prostate-specific antigen***, or ***PSA***, concentrations in the blood—without side effects.[239] A suggested dosage is **5-15 grams daily**, taken without food.

34. Four-Nutrient Supplement – Pomegranate, Broccoli, Green Tea, and Turmeric

As discussed, inhibiting effects against prostate cancer have been reported in published studies for a number of individual nutrients, including pomegranate extract,[130,131] broccoli compounds (I3C, DIM, and PEITC)[18-20] green tea extract,[45,46] and curcumin (a key compound in turmeric).[52,63,64] A recent, double-blind study documented the potency—and possible synergism—of a supplement that combines powders from all four of these food sources.[1]

Patients with a PSA relapse after radiotherapy or surgery for localized prostate cancer were randomized to receive capsules of either placebo or the four-nutrient supplement, three times daily. After six months, the median increase in PSA levels in the supplemented group was only **14.7%**, while the median PSA increase in the placebo group was **78.5%**.[1] A striking **46%** of the supplemented subjects showed PSA levels that were at or below baseline values, compared to only **14%** of the placebo subjects. Among supplemented patients, **92.6%** were able to continue on active surveillance, compared to just **74%** of the placebo patients.[1] There were no statistically significant side effects.[1] This identical formula is now commercially available, though it's likely that many Life Extension® members have already been taking comparable potencies in supplements that contain these specific nutrients.

Summary

This article described a huge number of nutrients that have been shown in published scientific studies to help reduce prostate cancer risk.

These nutrients function via multiple mechanisms to inhibit the development and progression of prostate cancer and/or induce cancer cell apoptosis (cell destruction).

The latest research—including a remarkable, controlled clinical trial[1]—reveals the dramatic effectiveness of combining some of these nutrients in men who failed initial treatment for prostate cancer. This is the kind of controlled study that mainstream doctors look to when assessing the efficacy of a particular therapy.

Aging men have an incredible opportunity to reduce their risk of prostate cancer, and while doing so, protect against most other degenerative diseases as well.

Long-time members of the ***Life Extension Foundation***® should appreciate this voluminous data as they have been taking many of these nutrients over a multi-decade time period. ●

If you have any questions on the scientific content of this article, please call a Life Extension® Health Advisor at 1-866-864-3027.

References

1. Thomas RJ, Williams MMA, Sharma H, et al. A double-blind, placebo RCT evaluating the effect of a polyphenol-rich whole food supplement on PSA progression in men with prostate cancer: The U.K. National Cancer Research Network (NCRN) Pomi-T study. *J Clin Oncol*. 2013;31(suppl):abstract 5008.
2. Siegel R, Naishadham D, Jemal A. Cancer statistics 2012. *CA Cancer J Clin*. 2012;62:10-29.
3. Available at: http://www.pcf.org/site/c.leJRIROrEpH/b.5802027/k.D271/Prostate_Cancer_Risk_Factors.htm. Accessed September 9, 2013.
4. Harvei S. Epidemiology of prostatic cancer. *Tidsskr Nor Laegeforen* 1999 Oct 10;119(24):3589-94.
5. Billis A. Latent carcinoma and atypical lesions of prostate. An autopsy study. *Urology*. 1986 Oct;28(4):324-9.
6. Sakr WA, Grignon DJ, Haas GP, et al. Epidemiology of high grade prostatic intraepithelial neoplasia. *Pathol Res Pract*. 1995 Sep;191(9):838-41.
7. Donaldson MS. Nutrition and cancer: a review of the evidence for an anti-cancer diet. *Nutr J.* 2004 Oct 20;3:19.
8. Stark A, Madar Z. Phytoestrogens: a review of recent findings. *J Pediatr Endocrinol Metab*. 2002 May;15(5):561-72.
9. Demark-Wahnefried W, Robertson CN, Walther PJ, Polascik TJ, Paulson DF, Vollmer RT. Pilot study to explore effects of low-fat, flaxseed-supplemented diet on proliferation of benign prostatic epithelium and prostate-specific antigen. *Urology*. 2004 May;63(5):900-4.
10. Hedelin M, Klint A, Chang ET, et al. Dietary phytoestrogen, serum enterolactone and risk of prostate cancer: the cancer prostate Sweden study (Sweden). *Cancer Causes Control*. 2006 Mar;17(2):169-80.
11. Demark-Wahnefried W, Polascik TJ, et al. Flaxseed supplementation (not dietary fat restriction) reduces prostate cancer proliferation rates in men presurgery. *Cancer Epidemiol Biomarkers Prev*. 2008 Dec;17(12):3577-87.
12. Zhang Z-F, Winton MI, Rainey C, et al. Boron is associated with decreased risk of human prostate cancer. *FASEB J*. 2001;15:A1089.
13. Cui Y, Winton MI, Zhang ZF, et al. Dietary boron intake and prostate cancer risk. *Oncol Rep*. 2004 Apr;11(4):887-92.
14. Gallardo-Williams MT, Chapin RE, King PE, et al. Boron supplementation inhibits the growth and local expression of IGF-1 in human prostate adenocarcinoma(LNCaP) tumors in nude mice. *Toxicol Pathol*. 2004 Jan-Feb;32(1):73-8.
15. Webber MM, Waghray A, Bello D. Prostate-specific antigen, a serine protease, facilitates human prostate cancer cell invasion. *Clin Cancer Res.* 1995 Oct;1(10):1089-94.
16. Henderson K, Stella SL, Kobylewski S, Eckhert CD. Receptor activated Ca(2+) release is inhibited by boric acid in prostate cancer cells. *PLoS One*. 2009;4(6):e6009.
17. Barranco WT, Eckhert CD. Boric acid inhibits human prostate cancer cell proliferation. *Cancer Lett*. 2004 Dec 8;216(1):21-9.
18. Available at: http://www.benthamscience.com/open/tompj/articles/V003/SI0001TOMPJ/36TOMPJ.pdf. Accessed September 9, 2013.
19. Beaver LM, Yu TW, Sokolowski EI, Williams DE, Dashwood RH, Ho E. 3,3'-Diindolylmethane, but not indole-3-carbinol, inhibits histone deacetylase activity in prostate cancer cells. *Toxicol Appl Pharmacol*. 2012 Sep 15;263(3):345-51.
20. Yu C, Gong AY, Chen D, Solelo Leon D, Young CY, Chen XM. Phenethyl isothiocyanate inhibits androgen receptor-regulated transcriptional activity in prostate cancer cells through suppressing PCAF. *Mol Nutr Food Res*. 2013.
21. Sarkar FH, Li Y. Indole-3-carbinol and prostate cancer. *J Nutr*. 2004 Dec;134(12 Suppl):3493S-3498S.
22. Fong AT, Swanson HI, Dashwood RH, Williams DE, Hendricks JD, Bailey GS. Mechanisms of anti-carcinogenesis by indole-3-carbinol. Studies of enzyme induction, eletrophile-scavenging, and inhibition of aflatoxin B1 activation. *Biochem Pharmacol*. 1990 Jan 1;39(1):19-26.
23. Chinni SR, Li Y, Upadhyay S, Koppolu PK, Sarkar FH. Indole-3-carbinol (I3C) induced cell growth inhibition, G1 cell cycle arrest and apoptosis in prostate cancer cells. *Oncogene*. 2001 May 24;20(23):2927-36.
24. Li Y, Chinni SR, Sarkar FH. Selective growth regulatory and pro-apoptotic effects of DIM is mediated by AKT and NF-kappaB pathways in prostate cancer cells. *Front Biosci*. 2005 Jan 1;10:236-43.
25. Haber D. Roads leading to breast cancer. *N Engl J Med*. 2000 Nov 23;343(21):1566-8.
26. Holick MF. Vitamin D deficiency. *N Engl J Med*. 2007 Jul 19;357(3):266-81.
27. Garland CF, Comstock GW, Garland FC, et al. Serum 25-hydroxyvitamin D and colon cancer: eight-year prospective study. *Lancet*. 1989 Nov 18;2(8673):1176-8.
28. Garland CF, Garland FC, Gorham ED. Can colon cancer incidence and death rates be reduced with calcium and vitamin D? *Am J Clin Nutr*. 1991 Jul;54(1 Suppl):193S-201S.
29. Garland CF, Gorham ED, Mohr SB, et al. Vitamin D and prevention of breast cancer: pooled analysis. *J Steroid Biochem Mol Biol*. 2007 Mar;103(3-5):708-11.
30. Gorham ED, Garland CF, Garland FC, et al. Vitamin D and prevention of colorectal cancer. *J Steroid Biochem Mol Biol*. 2005 Oct;97(1-2):179-94.
31. Yousef FM, Jacobs ET, Kang PT, et al. Vitamin D status and breast cancer in Saudi Arabian women: case-control study. *Am J Clin Nutr*. 2013 Jul;98(1):105-10.
32. Skinner HG, Michaud DS, Giovannucci E, et al. Vitamin D intake and the risk for pancreatic cancer in two cohort studies. *Cancer Epidemiol Biomarkers Prev*. 2006 Sep;15(9):1688-95.
33. Polesel J, Talamini R, Montella M, et al. Linoleic acid, vitamin D and other nutrient intakes in the risk of non-Hodgkin lymphoma: an Italian case-control study. *Ann Oncol*. 2006 Apr;17(4):713-8.
34. Shui IM, Mucci LA, Kraft P, et al. Vitamin D-related genetic variation, plasma vitamin D, and risk of lethal prostate cancer: a prospective nested case-control study. *J Natl Cancer Inst.* 2012 May 2;104(9):690-9.
35. Lee MM, Gomez SL, Chang JS, Wey M, Wang RT, Hsing AW. Soy and isoflavone consumption in relation to prostate cancer risk in China. *Cancer Epidemiol Biomarkers Prev.* 2003 Jul;12(7):665-8.

36. Sonoda T, Nagata Y, Mori M, et al. A case-control study of diet and prostate cancer in Japan: possible protective effect of traditional Japanese diet. *Cancer Sci*. 2004 Mar;95(3):238-42.
37. Zhou JR, Gugger ET, Tanaka T, Guo Y, Blackburn GL, Clinton SK. Soybean phyto- chemicals inhibit the growth of trans-plantable human prostate carcinoma and tumor angiogenesis in mice. *J Nutr*. 1999 Sep;129(9):1628-35.
38. Jacobsen BK, Knutsen SF, Fraser GE. Does high soy milk intake reduce prostate cancer incidence? The Adventist Health Study (United States). *Cancer Causes Controls*. 1998 Dec;9(6):553-7.
39. Ozasa K, Nakao M, Watanabe Y, et al. Serum phytoestrogens and prostate cancer risk in a nested case-control study among Japanese men. *Cancer Sci*. 2004 Jan;95(1):65-71.
40. USDA. Available at: http://www.isoflavones.info/isoflavones-content.php. Accessed September 9, 2013.
41. Wang XL, Hur HG, Lee JH, Kim KT, Kim SI. Enantioselective synthesis of S-equol from dihydrodaidzein by a newly isolated anaerobic human intestinal bacterium. *Appl Environ Microbiol.* Jan 2005;71(1):214-9.
42. Shen JC, Klein RD, Wei Q, et al. Low-dose genistein induces cyclin-dependent kinase inhibitors and G(1) cell-cycle arrest in human prostate cancer cells. *Mol Carcinog*. 2000 Oct;29(2):92-102.
43. Schleicher RL, Lamartiniere CA, Zheng M, et al. The inhibitory effect of genistein on the growth and metastasis of a transplantable rat accessory sex gland carcinoma. *Cancer Lett*. 1999 Mar 1;136(2):195-201.
44. Farhan H, Wahala K, Adlercreutz H, et al. Isoflavonoids inhibit catabolism of vitamin D in prostate cancer cells. *J Chromatogr B Analyt Technol Biomed Life Sci*. 2002 Sep 25;777(1-2):261-8.
45. Bettuzzi S, Brausi M, Rizzi F, Castagnetti G, Peracchia G, Corti A. Chemoprevention of human prostate cancer by oral administration of green tea catechins in volunteers with high-grade prostate intraepithelial neoplasia: a preliminary report from a one-year proof-of-principle study. *Cancer Res.* 2006 Jan 15;66(2):1234-40.
46. McLarty J, Bigelow RL, Smith M, Elmajian D, Ankem M, Cardelli JA. Tea polyphenols decrease serum levels of prostate-specific antigen, hepatocyte growth factor, and vascular endothelial growth factor in prostate cancer patients and inhibit production of hepatocyte growth factor and vascular endothelial growth factor in vitro. *Cancer Prev Res*. (Phila). 2009 Jul;2(7):673-82.
47. Available at: http://www.lef.org/magazine/mag2012/jul2012_Another-Victory-Against-FDA-Censorship_01.htm. Accessed October 7, 2013.
48. Norrish AE, Skeaff CM, Arribas GL, Sharpe SJ, Jackson RT. Prostate cancer risk and consumption of fish oils: a dietary biomarker-based case-control study. *Br J Cancer.* 1999 Dec;81(7):1238-42.
49. Dias VC, Parsons HG. Modulation in delta 9, delta 6, and delta 5 fatty acid desaturase activity in the human intestinal CaCo-2 cell line. *J Lipid Res*. 1995 Mar;36(3):552-63.
50. du Toit PJ, van Aswegen CH, du Plessis DJ. The effect of essential fatty acids on growth and urokinase-type plasminogen activator production in human prostate DU-145 cells. *Prostaglandins Leukot Essent Fatty Acids*. 1996;55:173-7.
51. Available at: http://my.clevelandclinic.org/heart/prevention/nutrition/omega3.aspx. Accessed September 10, 2013.
52. Shishodia S, Chaturvedi MM, Aggarwal BB. Role of curcumin in cancer therapy. *Curr Probl Cancer*. 2007 Jul-Aug;31(4):243-305.
53. Kunnumakkara AB, Anand P, Aggarwal BB. Curcumin inhibits proliferation, invasion, angiogenesis and metastasis of different cancers through interaction with multiple cell signaling proteins. *Cancer Lett.* 2008 Oct 8;269(2):199-225.
54. Plummer SM, Holloway KA, Manson MM, et al. Inhibition of cyclo-oxygenase 2 expression in colon cells by the chemopreventive agent curcumin involves inhibition of NF-kappaB activation via the NIK/IKK signalling complex. *Oncogene*. 1999 Oct 28;18(44):6013-20.
55. Teiten MH, Gaascht F, Eifes S, Dicato M, Diederich M. Chemopreventive potential of curcumin in prostate cancer. *Genes Nutr*. 2010 Mar;5(1):61-74.
56. Khan N, Adhami VM, Mukhtar H. Apoptosis by dietary agents for prevention and treatment of prostate cancer. *Endocr Relat Cancer*. 2010 Mar;17(1):R39-52.
57. Aggarwal BB, Sundaram C, Malani N, Ichikawa H. Curcumin: the Indian solid gold. *Adv Exp Med Biol.* 2007;595:1-75.
58. Gukovsky I, Reyes CN, Vaquero EC, Gukovskaya AS, Pandol SJ. Curcumin ameliorates ethanol and nonethanol experimental pancreatitis. *Am J Physiol Gastrointest Liver Physiol*. 2003 Jan;284(1):G85-95.
59. Nakamura K, Yasunaga Y, Segawa T, et al. Curcumin down-regulates AR gene expression and activation in prostate cancer cell lines. *Int J Oncol*. 2002;21(4):825-30.
60. Choi HY, Lim JE, Hong JH. Curcumin interrupts the interaction between the androgen receptor and Wnt/beta-catenin signaling pathway in LNCaP prostate cancer cells. *Prostate Cancer Prostatic Dis*. 2010 Dec;13(4):343-9.
61. Tsui KH, Feng TH, Lin CM, Chang PL, Juang HH. Curcumin blocks the activation of androgen and interlukin-6 on prostate-specific antigen expression in human prostatic carcinoma cells. *J Androl*. 2008 Nov-Dec;29(6):661-8.
62. Shi Q, Shih CC, Lee KH. Novel anti-prostate cancer curcumin analogues that enhance androgen receptor degradation activity. *Anticancer Agents Med Chem*. 2009 Oct;9(8):904-12.
63. Hong JH, Ahn KS, Bae E, Jeon SS, Choi HY. The effects of curcumin on the invasiveness of prostate cancer in vitro and in vivo. *Prostate Cancer Prostatic Dis*. 2006;9(2):147-52.
64. Herman JG, Stadelman HL, Roselli CE. Curcumin blocks CCL2-induced adhesion, motility and invasion, in part, through down-regulation of CCL2 expression and proteolytic activity. *Int J Oncol*. 2009 May;34(5):1319-27.
65. Chaudhary LR, Hruska KA. Inhibition of cell survival signal protein kinase B/Akt by curcumin in human prostate cancer cells. *J Cell Biochem*. 2003;89(1):1-5.
66. Dorai T, Cao YC, Dorai B, Buttyan R, Katz AE. Therapeutic potential of curcumin in human prostate cancer. III. Curcumin inhibits proliferation, induces apoptosis, and inhibits angiogenesis of LNCaP prostate cancer cells in vivo. *Prostate*. 2001;47(4):293-303.
67. Antony B, Merina B, Iyer VS, Judy N, Lennertz K, Joyal S. A pilot cross-over study to evaluate human oral bioavailability of BCM-95CG (Biocurcumax); A novel bioenhanced preparation of curcumin. *Indian J Pharm Sci.* 2008 Jul-Aug;70(4):445-9.
68. Rusciani L, Proietti I, Rusciani A, et al. Low plasma coenzyme Q10 levels as an independent prognostic factor for melanoma progression. *J Am Acad Dermatol*. 2006 Feb;54(2):234-41.
69. Folkers K, Osterborg A, Nylander M, Morita M, Mellstedt H. Activities of vitamin Q10 in animal models and a serious deficiency in patients with cancer. *Biochem Biophys Res Commun*. 1997 May 19;234(2):296-9.
70. Hodges S, Hertz N, Lockwood K, Lister R. CoQ10: could it have a role in cancer management? *Biofactors*. 1999;9(2-4):365-70.
71. Folkers K, Brown R, Judy WV, Morita M. Survival of cancer patients on therapy with coenzyme Q10. *Biochem Biophys Res Commun*. 1993 Apr 15;192(1):241-5.
72. Lockwood K, Moesgaard S, Hanioka T, Folkers K. Apparent partial remission of breast cancer in 'high risk' patients supplemented with nutritional antioxidants, essential fatty acids and coenzyme Q10. *Mol Aspects Med*. 1994;15 Suppls231-s40.
73. Perumal SS, Shanthi P, Sachdanandam P. Energy-modulating vitamins—a new combinatorial therapy prevents cancer cachexia in rat mammary carcinoma. *Br J Nutr*. 2005 Jun;93(6):901-9.
74. Folkers K. Relevance of the biosynthesis of coenzyme Q10 and of the four bases of DNA as a rationale for the molecular causes of cancer and a therapy. *Biochem Biophys Res Commun*. 1996 Jul 16;224(2):358-61.
75. Portakal O, Ozkaya O, Erden IM, et al. Coenzyme Q10 concentrations and antioxidant status in tissues of breast cancer patients. *Clin Biochem*. 2000 Jun;33(4): 279-84.
76. Ren S, Lien EJ. Natural products and their derivatives as cancer chemopreventive agents. *Prog Drug Res*. 1997;48:147-71.
77. Jolliet P, Simon N, Barre J, et al. Plasma coenzyme Q10 concentrations in breast cancer: prognosis and therapeutic consequences. *Int J Clin Pharmacol Ther*. 1998 Sep;36(9):506-9.
78. Available at: http://www.cancer.gov/cancertopics/pdq/cam/coenzymeQ10/patient/Page2#Section_23. Accessed September 9, 2013.

79. Available at: http://www.med.miami.edu/news/view.asp?id=403. Accessed September 10, 2013.
80. Helzlsouer KJ, Huang, HY, Alberg AJ, et al. Association between alpha-tocopherol, gamma-tocopherol, selenium, and subsequent prostate cancer. *J Natl Cancer Inst*. 2000;92:2018-23.
81. Fleshner N, Fair WR, Huryk R. et al. Vitamin E inhibits the high-fat diet promoted growth of established human prostate LNCaP tumors in nude mice. *J Urol*. 1999;161:1651-4.
82. Prins GS, Tang WY, Belmonte J, Ho SM. Perinatal exposure to oestradiol and bisphenol A alters the prostate epigenome and increases susceptibility to carcinogenesis. *Basic Clin Pharmacol Toxicol*. 2008 Feb;102(2):134-8.
83. Stone WL, Papas AM. Tocopherols and the etiology of colon cancer. *J Natl Cancer Inst*. 1997 Jul 16;89(14):1006-14.
84. Christen S, Woodall AA, Shigenaga MK, Southwell-Keely PT, Duncan MW, Ames BN. Gamma-tocopherol traps mutagenic electrophiles such as NO(X) and complements alpha-tocopherol: physiological implications. *Proc Natl Acad Sci U S A*. 1997 Apr 1;94(7):3217-22.
85. Cooney RV, Franke AA, Harwood PJ, Hatch-Pigott V, Custer LJ, Mordan LJ. a-Tocopherol detoxification of nitrogen dioxide: Superiority to a-tocopherol. *Proc Natl Acad Sci USA*. 1993;90(5):1771–1775.
86. Soares ND, Teodoro AJ, Oliveira FL, et al. Influence of lycopene on cell viability, cell cycle, and apoptosis of human prostate cancer and benign hyperplastic cells. Nutr Cancer. 2013 Sep 20.
87. Rafi MM, Kanakasabai S, Reyes MD, Bright JJ. Lycopene modulates growth and survival associated genes in prostate cancer. J Nutr Biochem. 2013 Oct;24(10):1724-34.
88. Giovannucci E, Ascherio A, Rimm EB, et al. Intake of carotenoids and retinol in relation to risk of prostate cancer. *J Natl Cancer Inst*. 1995;87:1767-76.
89. Wertz K. Lycopene effects contributing to prostate health. *Nutr Cancer.* 2009;61(6):775-83.
90. Lowe JF, Frazee LA. Update on prostate cancer chemoprevention. *Pharmacotherapy.* 2006 Mar;26(3):353-9.
91. Trejo-Solís C, Pedraza-Chaverrí J, Torres-Ramos M, et al. Multiple molecular and cellular mechanisms of action of lycopene in cancer inhibition. *Evid Based Complement Alternat Med.* 2013;2013:705121.
92. Obermuller-Jevic UC, Olano-Martin E, Corbacho AM, et al. Lycopene inhibits the growth of normal human prostate epithelial cells in vitro. *J Nutr*. 2003;133:3356-60.
93. Kucuk O, Sarkar FH, Sakr W, et al. Phase II randomized clinical trial of lycopene supplementation before radical prostatectomy. *Cancer Epidemiol Biomarkers Prev*. 2001;10:861-8.
94. Gann PH, Ma J, Giovannucci E, et al. Lower prostate cancer risk in men with elevated plasma lycopene levels: results of a prospective analysis. *Cancer Res*. 1999;59:1225-30.
95. Available at: http://ods.od.nih.gov/factsheets/Selenium-HealthProfessional/. Accessed September 11, 2013.
96. Eichholzer M, Steinbrecher A, Kaaks R, et al. Effects of selenium status, dietary glucosinolate intake and serum glutathione s-transferase a activity on the risk of benign prostatic hyperplasia. *BJU Int*. 2012 Dec;110(11 Pt C):E879-85.
97. Brooks JD, Metter EJ, Chan DW, et al. Plasma selenium level before diagnosis and the risk of prostate cancer development. *J Urol*. 2001 Dec;166(6):2034-8.
98. Duffield-Lillico, AJ, Reid, ME, Turnbull, BW, et al. Baseline characteristics and the effect of selenium supplementation on cancer incidence in a randomized clinical trial: a summary report of the Nutritional Prevention of Cancer Trial. *Cancer Epidemiol. Biomarkers Prev*. 2002;11:630-9.
99. Clark LC, Dalkin B, Krongrad A, et al. Decreased incidence of prostate cancer with selenium supplementation: results of a double-blind cancer prevention trial. *Br J Urol*. 1998 May;81(5):730-4.
100. Venkateswaran, V, Klotz, LH, Fleshner, NE. Selenium modulation of cell proliferation and cell cycle biomarkers in human prostate carcinoma cell lines. *Cancer Res*. 2002;62:2540-5.
101. Klein EA, Thompson IM, Jr., Tangen CM, et al. Vitamin E and the risk of prostate cancer: the Selenium and Vitamin E Cancer Prevention Trial (SELECT). *JAMA.* 2011 Oct 12;306(14):1549-56.
102. Lippman SM, Klein EA, Goodman PJ, et al. Effect of selenium and vitamin E on risk of prostate cancer and other cancers: the Selenium and Vitamin E Cancer Prevention Trial (SELECT). *JAMA.* 2009 Jan 7;301(1):39-51.
103. El-Bayoumy K. The negative results of the SELECT study do not necessarily discredit the selenium-cancer prevention hypothesis. *Nutr Cancer.* 2009;61(3):285-6.
104. Marshall JR, Ip C, Romano K, et al. Methyl Selenocysteine: single-dose pharmacokinetics in men. *Cancer Prev Res (Phila)*. 2011 Nov;4(11):1938-44.
105. El-Sayed WM, Aboul-Fadl T, Lamb JG, Roberts JC, Franklin MR. Effect of selenium-containing compounds on hepatic chemoprotective enzymes in mice. *Toxicology.* 2006 Mar 15;220(2-3):179-88.
106. Suzuki M, Endo M, Shinohara F, Echigo S, Rikiishi H. Differential apoptotic response of human cancer cells to organoselenium compounds. *Cancer Chemother Pharmacol.* 2010 Aug;66(3):475-84.
107. Lunoe K, Gabel-Jensen C, Sturup S, Andresen L, Skov S, Gammelgaard B. Investigation of the selenium metabolism in cancer cell lines. *Metallomics.* 2011 Feb;3(2):162-8.
108. Galli F, Stabile AM, Betti M, et al. The effect of alpha- and gamma-tocopherol and their carboxyethyl hydroxychroman metabolites on prostate cancer cell proliferation. *Arch Biochem Biophys*. 2004 Mar 1;423(1):97-102.
109. Jiang Q, Wong J, Ames BN. Gamma-tocopherol induces apoptosis in androgen-responsive LNCaP prostate cancer cells via caspase-dependent and independent mechanisms. *Ann NY Acad Sci*. 2004 Dec;1031:399-400.
110. Gysin R, Azzi A, Visarius T. Gamma-tocopherol inhibits human cancer cell cycle progression and cell proliferation by down-regulation of cyclins. *FASEB J*. 2002 Dec;16(14):1952-4.
111. Helzlsouer KJ, Huang HY, Alberg AJ, et al. Association between alpha-tocopherol, gamma-tocopherol, selenium, and subsequent prostate cancer. *J Natl Cancer Inst*. 2000 Dec 20;92(24):2018-23.
112. Moyad MA, Brumfield SK, Pienta KJ. Vitamin E, alpha- and gamma-tocopherol, and prostate cancer. *Semin Urol Oncol*. 1999 May;17(2):85-90.
113. Lee EH, Myung SK, Jeon YJ, et al. Effects of selenium supplements on cancer prevention: Meta-analysis of randomized controlled trials. *Nutr Cancer.* 2011 Nov;63(8):1185-95.
114. Clark LC, Combs GF, Jr., Turnbull BW. et al. Effects of selenium supplementation for cancer prevention in patients with carcinoma of the skin. A randomized controlled trial. Nutritional Prevention of Cancer Study Group. *JAMA*. 1996;276:1957-63.
115. Gómez Y, Arocha F, Espinoza F, Fernández D, Vásquez A, Granadillo V. Zinc levels in prostatic fluid of patients with prostate pathologies. *Invest Clin*. 2007 Sep;48(3):287-94.
116. Zaichick V, Sviridova TV, Zaichick SV. Zinc in the human prostate gland: normal, hyperplastic and cancerous. *Int Urol Nephrol*. 1997;29(5):565-74.
117. Bataineh ZM, Hani IH Bani, Al-Alami JR. Zinc in normal and pathological human prostate gland. *Saudi Med Jour*. 2002;23(2):218-20.
118. Huang L, Kirschke CP, Zhang Y. Decreased intracellular zinc in human tumorigenic prostate epithelial cells: a possible role in prostate cancer progression. *Cancer Cell Int*. 2006;6:10.
119. Liang JY, Liu YY, Zou J, Franklin RB, Costello LC, Feng P. Inhibitory effect of zinc on human prostatic carcinoma cell growth. *Prostate*. 1999;40(3):200-7.
120. Gonzalez A, Peters U, Lampe JW, White E. Zinc intake from supplements and diet and prostate cancer. *Nutr Cancer*. 2009;61(2):206-15.
121. Zi X, Agarwal R. Silibinin decreases prostate-specific antigen with cell growth inhibition via G1 arrest, leading to differentiation of prostate carcinoma cells: implications for prostate cancer intervention. *Proc Natl Acad Sci USA*. 1999 Jun 22;96(13):7490-5.
122. Singh RP, Agarwal R. Prostate cancer prevention by silibinin. *Curr Cancer Drug Targets*. 2004 Feb;4(1):1-11.
123. Singh RP, Sharma G, Dhanalakshmi S, Agarwal C, Agarwal R. Suppression of advanced human prostate tumor growth in athymic mice by silibinin feeding is associated with reduced cell proliferation, increased apoptosis, and inhibition of angiogenesis. *Cancer Epidemiol Biomarkers Prev*. 2003 Sept;12(9):933-9.

124. Singh RP, Agarwal R. A cancer chemopreventive agent silibinin, targets mitogenic and survival signaling in prostate cancer. *Mutat Res*. 2004 Nov 2;555(1-2):21-32.
125. Davis-Searles PR, Nakanishi Y, Kim NC, et al. Milk thistle and prostate cancer: differential effects of pure flavonolignans from Silybum marianum on antiproliferative end points in human prostate carcinoma cells. *Cancer Res*. 2005 May 15;65(10):4448-57.
126. Available at: http://www.umm.edu/altmed/articles/gamma-linolenic-000305.htm. Accessed September 11, 2013.
127. Pham H, Ziboh VA. 5a-Reductase-catalyzed conversion of testosterone to dihydrotestosterone is increased in prostatic adenocarcinoma cells: suppression by 15-lipoxygenase metabolites of gamma-linolenic and eicosapentaenoic acids. *Steroid Biochem Mol Biol.* 2002;82:393-400.
128. Lu QY, Hung JC, Heber D, et al. Inverse associations between plasma lycopene and other carotenoids and prostate cancer. *Cancer Epidemiol Biomarkers Prev*. 2001 Jul;10(7):749-56.
129. Lansky EP, Newman RA. Punica granatum (pomegranate) and its potential for prevention and treatment of inflammation and cancer. *J Ethnopharmacol*. 2007;109(2):177-206.
130. Malik A, Afaq F, Sarfaraz S, Adhami VM, Syed DN, Mukhtar H. Pomegranate fruit juice for chemoprevention and chemotherapy of prostate cancer. *Proc Natl Acad Sci USA*. 2005 Oct 11;102(41):14813-8.
131. Sineh Sepehr K, Baradaran B, Mazandarani M, Khori V, Shahneh FZ. Studies on the cytotoxic activities of Punica granatum L. var. spinosa (Apple Punice) extract on prostate cell line by induction of apoptosis. *ISRN Pharm*. 2012;2012:547942.
132. Heber D. Multitargeted therapy of cancer by ellagitannins. *Cancer Lett*. 2008 Oct 8;269(2):262-8.
133. Hong MY, Seeram NP, Heber D. Pomegranate polyphenols down-regulate expression of androgen-synthesizing genes in human prostate cancer cells overexpressing the androgen receptor. *J Nutr Biochem*. 2008 Dec;19(12):848-55.
134. Gerber GS. Phytotherapy for benign prostatic hyperplasia. *Curr Urol Rep*. 2002 Aug;3(4):285-91.
135. Wilt TJ, Ishani A, Rutks I, MacDonald R. Phytotherapy for benign prostatic hyperplasia. *Public Health Nutr*. 2000 Dec;3(4A):459-72.
136. Yang Y, Ikezoe T, Zheng Z, Taguchi H, Koeffler HP, Zhu WG. Saw palmetto induces growth arrest and apoptosis of androgen-dependent prostate cancer LNCaP cells via inactivation of STAT 3 and androgen receptor signaling. *Int J Oncol*. 2007 Sep;31(3): 593-600.
137. Pais P. Potency of a novel saw palmetto ethanol extract, SPET-085, for inhibition of 5alpha-reductase II. *Adv Ther*. 2010 Aug;27(8):555-63.
138. Sirab N, Robert G, Fasolo V, et al. Lipidosterolic extract of serenoa repens modulates the expression of inflammation related-genes in benign prostatic hyperplasia epithelial and stromal cells. *Int J Mol Sci*. 2013 Jul 10;14(7):14301-20.
139. Hostanska K, Suter A, Melzer J, Saller R. Evaluation of cell death caused by an ethanolic extract of Serenoae repentis fructus (Prostasan) on human carcinoma cell lines. *Anticancer Res*. 2007 Mar-Apr;27(2):873-81.
140. Goldmann WH, Sharma AL, Currier SJ, Johnston PD, Rana A, Sharma CP. Saw palmetto berry extract inhibits cell growth and Cox-2 expression in prostatic cancer cells. *Cell Biol Int*. 2001;25(11):1117-24.
141. Jang M, Pezzuto JM. Cancer chemopreventive activity of resveratrol. *Drugs Exp Clin Res.* 1999;25(2-3):65-77.
142. Jang M, Cai L, Udeani GO, et al. Cancer chemopreventive activity of resveratrol, a natural product derived from grapes. *Science*. 1997 Jan 10;275(5297):218-20.
143. Aggarwal BB, Bhardwaj A, Aggarwal RS, Seeram NP, Shishodia S, Takada Y. Role of resveratrol in prevention and therapy of cancer: preclinical and clinical studies. *Anticancer Res*. 2004 Sep-Oct;24(5A):2783-840.
Kampa M, Hatzoglou A, Notas G, et al. Wine antioxidant polyphenols inhibit the proliferation of human prostate cancer cell lines. *Nutr Cancer*. 2000;37(2):223-33.
144. Lu R, Serrero G. Resveratrol, a natural product derived from grape, exhibits anti-estrogenic activity and inhibits the growth of human breast cancer cells. *J Cell Physiol*. 1999 Jun;179(3):297-304.
145. Seeni A, Takahashi S, Takeshita K, et al. Suppression of prostate cancer growth by resveratrol in the transgenic rat for adenocarcinoma of prostate (TRAP) model. *Asian Pac J Cancer Prev*. 2008 Jan-Mar;9(1):7-14.
146. Mitchell SH, Zhu W, Young CY. Resveratrol inhibits the expression and function of the androgen receptor in LNCaP prostate cancer cells. *Cancer Res*. 1999 Dec 1;59(23):5892-5.
147. Hsieh TC, Wu JM. Grape-derived chemo preventive agent resveratrol decreases prostate-specific antigen (PSA) expression in LNCaP cells by an androgen receptor (AR)-independent mechanism. *Anticancer Res*. 2000 Jan-Feb;20(1A):225-8.
148. Available at: http://www.mskcc.org/cancer-care/herb/resveratrol. Accessed September 11, 2013.
149. Dubuisson JG, Dyess DL, Gaubatz JW. Resveratrol modulates human mammary epithelial cell O-acetyltransferase, sulfo transferase, and kinase activation of the het- erocyclic amine carcinogen N-hydroxy-PhIP. *Cancer Lett*. 2002 Aug 8;182(1):27-32.
150. Baek SJ, Wilson LC, Eling TE. Resveratrol enhances the expression of nonsteroidal anti-inflammatory drug-activated gene (NAG-1) by increasing the expression of p53. *Carcinogenesis*. 2002 Mar;23(3):425-34.
151. Narayanan BA, Narayanan NK, Re GG, Nixon DW. Differential expression of genes induced by resveratrol in LNCaP cells: P53-mediated molecular targets. *Int J Cancer*. 2003 Mar 20;104(2):204-12.
152. Miano L. Mediterranean diet, micronutrients and prostate carcinoma: a rationale approach to primary prevention of prostate cancer. *Arch Ital Urol Androl*. 2003 Sep;75(3):166-78.
153. Lamblin F, Hano C, Fliniaux O, Mesnard F, Fliniaux MA, Lainé E. Interest of lignans in prevention and treatment of cancers. *Med Sci (Paris)*. 2008 May;24(5):511-9.
154. Yokota T, Matsuzaki Y, Koyama M, et al. Sesamin, a lignan of sesame, down-regulates cyclin D1 protein expression in human tumor cells. *Cancer Sci*. 2007 Sep;98(9):1447-53.
155. Bergman Jungeström M, Thompson LU, Dabrosin C. Flaxseed and its lignans inhibit estradiol-induced growth, angiogenesis, and secretion of vascular endothelial growth factor in human breast cancer xenografts in vivo. *Clin Cancer Res*. 2007 Feb 1;13(3):1061-7.
156. Suzuki R, Rylander-Rudqvist T, Saji S, Bergkvist L, Adlercreutz H, Wolk A. Dietary lignans and postmenopausal breast cancer risk by oestrogen receptor status: a prospective cohort study of Swedish women. *Br J Cancer*. 2008 Feb 12;98(3):636-40.
157. McCann MJ, Gill CI, Linton T, Berrar D, McGlynn H, Rowland IR. Enterolactone restricts the proliferation of the LNCaP human prostate cancer cell line in vitro. *Mol Nutr Food Res*. 2008 May;52(5):567-80.
158. Heald CL, Bolton-Smith C, Ritchie MR, Morton MS, Alexander FE. Phyto-oestrogen intake in Scottish men: use of serum to validate a self-administered food-frequency questionnaire in older men. *Eur J Clin Nutr*. 2006 Jan;60(1):129-35.
159. Pietinen P, Stumpf K, Männistö S, Kataja V, Uusitupa M, Adlercreutz H. Serum enterolactone and risk of breast cancer: a case-control study in eastern Finland. *Cancer Epidemiol Biomarkers Prev.* 2001 Apr;10(4):339-44.
160. Piller R, Chang-Claude J, Linseisen J. Plasma enterolactone and genistein and the risk of premenopausal breast cancer. *Eur J Cancer Prev*. 2006 Jun;15(3):225-32.
161. Wang LQ. Mammalian phytoestrogens: enterodiol and enterolactone. *J Chromatogr B Analyt Technol Biomed Life Sci*. 2002 Sep 25;777(1-2):289-309.
162. Chen LH, Fang J, Sun Z, Li H, Wu Y, Demark-Wahnefried W, Lin X. Enterolactone inhibits insulin-like growth factor-1 receptor signaling in human prostatic carcinoma PC-3 cells. *J Nutr.* 2009 Apr;139(4):653-9.
163. Evans BA, Griffiths K, Morton MS. Inhibition of 5 alpha-reductase in genital skin fibroblasts and prostate tissue by dietary lignans and isoflavonoids. *J Endocrinol*. 1995 Nov;147(2):295-302.
164. Bergman JM, Thompson LU, Dabrosin C. Flaxseed and its lignans inhibit estradiol-induced growth, angiogenesis, and secretion of vascular endothelial growth factor in human breast cancer xenografts in vivo. *Clin Cancer Res*. 2007 Feb 1;13(3):1061-7.

165. Chen LH, Fang J, Li H, Demark-Wahnefried W, Lin X. Enterolactone induces apoptosis in human prostate carcinoma LNCaP cells via a mitochondrial-mediated, caspase-dependent pathway. *Mol Cancer Ther*. 2007 Sep;6(9):2581-90.
166. Takase Y, Levesque MH, Luu-The V, et al. Expression of enzymes involved in estrogen metabolism in human prostate. *J Histochem Cytochem*. 2006 Aug;54(8):911-21.
167. Bonkhoff H, Fixemer T. Implications of estrogens and their receptors for the development and progression of prostate cancer. *Pathologe*. 2005 Nov;26(6):461-8.
168. Yang GS, Chen ZD. Comparative studies of the expression of estrogen receptor-alpha and estrogen receptor-beta in prostatic carcinoma. *Zhonghua Wai Ke Za Zhi*. 2004 Sep 22;42(18):1111-5.
169. Steiner MS, Raghow S. Antiestrogens and selective estrogen receptor modulators reduce prostate cancer risk. *World J Urol*. 2003 May;21(1):31-6.
170. Available at: http://www.thorne.com/altmedrev/.fulltext/8/3/303.pdf. Accessed September 11, 2013.
171. Lasalvia-Prisco E, Cucchi S, Vazquez J, Lasalvia-Galante E, Golomar W, Gordon W. Serum markers variation consistent with autoschizis induced by ascorbic acid-menadione in patients with prostate cancer. *Med Oncol*. 2003;20(1):45-52.
172. Tareen B, Summers JL, Jamison JM, et al. A 12 week, open label, phase I/IIa study using apatone for the treatment of prostate cancer patients who have failed standard therapy. *Int J Med Sci*. 2008;5(2):62-7.
173. Nimptsch K, Rohrmann S, Linseisen J. Dietary intake of vitamin K and risk of prostate cancer in the Heidelberg cohort of the European Prospective Investigation into Cancer and Nutrition (EPIC-Heidelberg). *Am J Clin Nutr*. 2008 Apr;87(4):985-92.
174. von Holtz RL, Fink CS, Awad AB. Beta-Sitosterol activates the sphingomyelin cycle and induces apoptosis in LNCaP human prostate cancer cells. *Nutr Cancer*. 1998;32(1):8-12.
175. Duan RD. Anticancer compounds and sphingolipid metabolism in the colon. *In Vivo*. 2005 Jan-Feb;19(1):293-300.
176. Awad AB, Fink CS, Williams H, Kim U. In vitro and in vivo (SCID mice) effects of phytosterols on the growth and dissemination of human prostate cancer PC-3 cells. *Eur J Cancer Prev*. 2001 Dec;10(6):507-13.
177. Awad AB, Burr AT, Fink CS. Effect of resveratrol and beta-sitosterol in combination on reactive oxygen species and prostaglandin release by PC-3 cells. *Prostaglandins Leukot Essent Fatty Acids*. 2005 Mar;72(3):219-26.
178. Fang J, Xia C, Cao Z, Zheng JZ, Reed E, Jiang BH. Apigenin inhibits VEGF and HIF-1 expression via PI3K/AKT/p70S6K1 and HDM2/p53 pathways. *FASEB J*. 2005 Mar;19(3):342-53.
179. Fang J, Zhou Q, Liu LZ, et al. Apigenin inhibits tumor angiogenesis through decreasing HIF-1alpha and VEGF expression. *Carcinogenesis*. 2007 Apr;28(4):858-64.
180. Luo H, Jiang BH, King SM, Chen YC. Inhibition of cell growth and VEGF expression in ovarian cancer cells by flavonoids. *Nutr Cancer*. 2008;60(6):800-9.
181. Shukla S, Mishra A, Fu P, Maclennan GT, Resnick MI, Gupta S. Up-regulation of insulin-like growth factor binding protein-3 by apigenin leads to growth inhibition and apoptosis of 22Rv1 xenograft in athymic nude mice. *FASEB J*. 2005 Dec;19(14):2042-44.
182. Shukla S, Gupta S. Apigenin: A promising molecule for cancer prevention. *Pharm Res*. 2010 June;27(6):962-78.
183. Franzen CA, Amargo E, TodorovićV, et al. The chemopreventive bioflavonoid apigenin inhibits prostate cancer cell motility through the focal adhesion kinase/Src signaling mechanism. *Cancer Prev Res (Phila Pa)*. 2009 Sep;2(9):830-41.
184. Brahmbhatt M, Gundala SR, Asif G, Shamsi SA, Aneja R. Ginger phytochemicals exhibit synergy to inhibit prostate cancer cell proliferation. *Nutr Cancer*. 2013 Feb;65(2):263-72.
185. Shukla Y, Singh M. Cancer preventive properties of ginger: a brief review. *Food Chem Toxicol.* 2007 May;45(5):683-90.
186. Karna P, Chagani S, Gundala SR, et al. Benefits of whole ginger extract in prostate cancer. *Br J Nutr*. 2012 February;107(4):473-84.
187. Reagan-Shaw S, Nihal M, Ahmad N. Dose translation from animal to human studies revisited. *FASEB J*. 2008;22:659-61.
188. Available at: http://www.cancer.org/treatment/treatmentsandsideeffects/complementaryandalternativemedicine/dietandnutrition/inositol-hexaphosphate. Accessed September 12, 2013.
189. Shamsuddin AM, Yang GY. Inositol hexaphosphate inhibits growth and induces differentiation of PC-3 human prostate cancer cells. *Carcinogenesis*. 1995 Aug;16(8):1975-9.
190. Singh RP, Sharma G, Mallikarjuna GU, Dhanalakshmi S, Agarwal C, Agarwal R. In vivo suppression of hormone-refractory prostate cancer growth by inositol hexaphosphate: induction of insulin-like growth factor binding protein-3 and inhibition of vascular endothelial growth factor. *Clin Cancer Res*. 2004 Jan 1;10(1 Pt 1):244-50.
191. Raina K, Ravichandran K, Rajamanickam S, Huber KM, Serkova NJ, Agarwal R. Inositol hexaphosphate inhibits tumor growth, vascularity, and metabolism in TRAMP mice: a multiparametric magnetic resonance study. *Cancer Prev Res*. January 2013;6:40-50.
192. Available at: http://www.webmd.com/vitamins-supplements/ingredientmono-1018-N-ACETYL%20CYSTEINE.aspx?activeIngredientId=1018&activeIngredientName=N-ACETYL%20CYSTEINE. Accessed September 12, 2013.
193. Available at: http://www.mskcc.org/cancer-care/herb/n-acetylcysteine. Accessed September 12, 2013.
194. Lee YJ, Lee DM, Lee CH, et al. Suppression of human prostate cancer PC-3 cell growth by N-acetylcysteine involves over-expression of Cyr61. *Toxicol In Vitro*. 2011 Feb;25(1):199-205.
195. Supabphol A, Supabphol R. Antimetastatic potential of N-acetylcysteine on human prostate cancer cells. *J Med Assoc Thai*. 2012 Dec;95 Suppl 12:S56-62.
196. Nair HK, Rao KV, Aalinkeel R, Mahajan S, Chawda R, Schwartz SA. Inhibition of prostate cancer cell colony formation by the flavonoid quercetin correlates with modulation of specific regulatory genes. *Clin Diagn Lab Immunol*. 2004 Jan;11(1):63-9.
197. Yuan H, Young CY, Tian Y, Liu Z, Zhang M, Lou H. Suppression of the androgen receptor function by quercetin through protein-protein interactions of Sp1, c-Jun, and the androgen receptor in human prostate cancer cells. *Mol Cell Biochem*. 2010 Jun;339(1-2):253-62.
198. Liu KC, Yen CY, Wu RS, et al. The roles of endoplasmic reticulum stress and mitochondrial apoptotic signaling pathway in quercetin-mediated cell death of human prostate cancer PC-3 cells. *Environ Toxicol*. 2012. doi: 10.1002/tox.21769. Epub March 20, 2012.
199. Senthilkumar K, Arunkumar R, Elumalai P, et al. Quercetin inhibits invasion, migration and signalling molecules involved in cell survival and proliferation of prostate cancer cell line (PC-3). *Cell Biochem Funct*. 2011 Mar;29(2):87-95.
200. Available at: http://clinicaltrials.gov/show/NCT01538316. Accessed September 12, 2013.
201. Dudhgaonkar S, Thyagarajan A, Sliva D. Suppression of the inflammatory response by triterpenes isolated from the mushroom Ganoderma lucidum. *Int Immunopharmacol*. 2009 Oct;9(11):1272-80.
202. Zaidman BZ, Wasser SP, Nevo E, Mahajna J. Androgen receptor-dependent and -independent mechanisms mediate Ganoderma lucidum activities in LNCaP prostate cancer cells. *Int J Oncol*. 2007 Oct;31(4):959-67.
203. Zaidman BZ, Wasser SP, Nevo E, Mahajna J. Coprinus comatus and Ganoderma lucidum interfere with androgen receptor function in LNCaP prostate cancer cells. *Mol Biol Rep*. 2008 Jun;35(2):107-17.
204. Chu J, Pratico D. The 5-lipoxygenase as a common pathway for pathological brain and vascular aging. *Cardiovasc Psychiatry Neurol*. 2009;2009:174657.
205. Chinnici CM, Yao Y, Pratico D. The 5-lipoxygenase enzymatic pathway in the mouse brain: young versus old. *Neurobiol Aging*. 2007 Sep;28(9):1457-62.
206. Sampson AP. FLAP inhibitors for the treatment of inflammatory diseases. *Curr Opin Investig Drugs*. 2009 Nov;10(11):1163-72.
207. Goodman LA, Jarrett CL, Krunkosky TM, et al. 5-Lipoxygenase expression in benign and malignant canine prostate tissues. *Vet Comp Oncol*. 2011 Jun;9(2):149-57.

208. Angelucci A, Garofalo S, Speca S, et al. Arachidonic acid modulates the crosstalk between prostate carcinoma and bone stromal cells. *Endocr Relat Cancer*. 2008 Mar;15(1):91-100.
209. Faronato M, Muzzonigro G, Milanese G, et al. Increased expression of 5-lipoxygenase is common in clear cell renal cell carcinoma. *Histol Histopathol*. 2007 Oct;22(10):1109-18.
210. Liu J-J, Nilsson A, Oredsson S, Badmaev V, Zhao W, Duan R. Boswellic acids trigger apoptosis via a pathway dependent on caspase-8 activation but independent on Fas/Fas ligand interaction in colon cancer HT-29 cells. *Carcinogenesis*. Dec 2002;23(12):2087-93.
211. Safayhi H, Rall B, Sailer ER, Ammon HP. Inhibition by boswellic acids of human leukocyte elastase. *J Pharmacol Exp T*her. 1997 Apr;281(1):460-3.
212. Safayhi H, Sailer ER, Ammon HP. Mechanism of 5-lipoxygenase inhibition by acetyl-11-keto-beta-boswellic acid. *Mol Pharmacol*. 1995 Jun;47(6):1212-6.
213. Lalithakumari K, Krishnaraju AV, Sengupta K, Subbaraju GV, Chatterjee A. Safety and toxicological evaluation of a novel, standardized 3-O-acetyl-11-keto-beta-boswellic acid (AKBA)-enriched *Boswellia serrata* extract (5-Loxin(R)). *Toxicol Mech Methods*. 2006;16(4):199-226.
214. Katiyar SK. Matrix metalloproteinases in cancer metastasis: molecular targets for prostate cancer prevention by green tea polyphenols and grape seed proanthocyanidins. *Endocr Metab Immune Disord Drug Targets*. 2006 Mar;6(1):17-24.
215. Rajashekhar G, Willuweit A, Patterson CE, et al. Continuous endothelial cell activation increases angiogenesis: evidence for the direct role of endothelium linking angiogenesis and inflammation. *J Vasc Res*. 2006;43(2):193-204.
216. Chiao JW, Wu H, Ramaswamy G, et al. Ingestion of an isothiocyanate metabolite from cruciferous vegetables inhibits growth of human prostate cancer cell xenografts by apoptosis and cell cycle arrest. *Carcinogenesis*. 2004 Aug;25(8):1403-8.
217. Palaniswamy UR, McAvoy RJ, Bible BB, Stuart JD. Ontogenic variations of ascorbic acid and phenethyl isothiocyanate concentrations in watercress (Nasturtium officinale R.Br.) leaves. *J Agric Food Chem*. 2003 Aug 27;51(18):5504-9.
218. Muti P, Westerlind K, Wu T, et al. Urinary estrogen metabolites and prostate cancer: a case-control study in the United States. *Cancer Causes Control*. 2002 Dec;13(10):947-55.
219. Li Y, Chinni SR, Sarkar FH. Selective growth regulatory and pro-apoptotic effects of DIM is mediated by AKT and NF-kappaB pathways in prostate cancer cells. *Front Biosci*. 2005 Jan 1;10: 236-43.
220. Kristal AR, Lampe JW. Brassica vegetables and prostate cancer risk: a review of the epidemiological evidence. *Nutr Cancer*. 2002;42(1):1-9.
221. Heath EI, Heilbrun LK, Li J, et al. A phase I dose-escalation study of oral BR-DIM (BioResponse 3,3'- Diindolylmethane) in castrate-resistant, non-metastatic prostate cancer. *Am J Transl Res*. 2010 Jul 23;2(4):402-11.
222. Lhoste EF, Gloux K, De W, I, et al. The activities of several detoxication enzymes are differentially induced by juices of garden cress, water cress and mustard in human HepG2 cells. *Chem Biol Interact*. 2004 Dec 7;150(3):211-9.
223. Nassiri-Asl M, Hosseinzadeh H. Review of the pharmacological effects of Vitis vinifera (Grape) and its bioactive compounds. *Phytother Res*. 2009;23:1197-1204.
224. Kaur M, Agarwal C, Agarwal R. Anticancer and cancer chemopreventive potential of grape seed extract and other grape-based products. *J Nutr*. 2009 Sep;139(9):1806S-12S
225. Brasky TM, Kristal AR, Navarro SL, et al. Specialty supplements and prostate cancer risk in the VITamins and Lifestyle (VITAL) cohort. *Nutr Cancer*. 2011;63(4):573-82.
226. Raina K, Singh RP, Agarwal R, Agarwal C. Oral grape seed extract inhibits prostate tumor growth and progression in TRAMP mice. *Cancer Res*. 2007;67:5976-82.
227. Vayalil PK, Mittal A, Katiyar SK. Proanthocyanidins from grape seeds inhibit expression of matrix metalloproteinases in human prostate carcinoma cells, which is associated with the inhibition of activation of MAPK and NF kappa B. *Carcinogenesis*. 2004;25:987-95.
228. Albertsen K, Gronbaek M. Does amount or type of alcohol influence the risk of prostate cancer? *Prostate*. 2002;52:297-304.
229. Chao C, Haque R, Van Den Eeden SK, Caan BJ, Poon KY, et al. Red wine consumption and risk of prostate cancer: the California men's health study. *Int J Cancer*. 2010;126:171-9.
230. Sutcliffe S, Giovannucci E, Leitzmann MF, Rimm EB, Stampfer MJ, et al. A prospective cohort study of red wine consumption and risk of prostate cancer. *Int J Cancer*. 2007;120:1529-35.
231. Hirvonen T, Virtamo J, Korhonen P, Albanes D, Pietinen P. Flavonol and flavone intake and the risk of cancer in male smokers (Finland). *Cancer Causes Control*. 2001;12:789-96.
232. Mursu J, Nurmi T, Tuomainen TP, Salonen JT, Pukkala E, Voutilainen S. Intake of flavonoids and risk of cancer in Finnish men: The Kuopio Ischaemic Heart Disease Risk Factor Study. *Int J Cancer*. 2008;123:660-3.
233. Thirugnanam S, Xu L, Ramaswamy K, Gnanasekar M. Glycyrrhizin induces apoptosis in prostate cancer cell lines DU-145 and LNCaP. *Oncol Rep*. 2008 Dec;20(6):1387-92.
234. Niture SK, Refai L. Plant pectin: A potential source of cancer suppression. *Amer J Pharmacol Toxicol*, 2013;8(1):9-19.
235. Glinsky VV, Raz A. Modified citrus pectin anti-metastatic properties: one bullet, multiple targets. *Carbohydr Res*. 2009 Sep 28;344(14):1788-91.
236. Inohara H, Raz A. Effects of natural complex carbohydrate (citrus pectin) on murine melanoma cell properties related to galectin-3 functions. *Glycoconj J*. 1994 Dec;11(6):527-32.
237. Nangia-Makker P, Hogan V, Honjo Y, et al. Inhibition of human cancer cell growth and metastasis in nude mice by oral intake of modified citrus pectin. *J Natl Cancer Inst*. 2002 Dec 18;94(24):1854-62.
238. Guess BW, Scholz MC, Strum SB, Lam RY, Johnson HJ, Jennrich RI. Modified citrus pectin (MCP) increases the prostate-specific antigen doubling time in men with prostate cancer: a phase II pilot study. *Prostate Cancer Prostatic Dis*. 2003;6(4):301-4.
239. Pienta KJ, Naik H, Akhtar A, et al. Inhibition of spontaneous metastasis in a rat prostate cancer model by oral administration of modified citrus pectin. *J Natl Cancer Inst*. 1995;87:348-53.
240. Available at: http://www.cancer.org/treatment/treatmentsandsideeffects/complementaryandalternativemedicine/dietandnutrition/modified-citrus-pectin. Accessed September 13, 2013.

ARE YOU GETTING Curcumin's BENEFITS?

Curcumin is the health-promoting trace compound derived from the Indian spice **turmeric**. But not all turmeric is alike.

The curcumin found in the vast majority of dietary supplements is derived from turmeric that is **nutritionally inferior**.

Why? Almost all growers harvest turmeric at the point when the turmeric root turns its signature yellow color, but *before* it has fully matured.

The turmeric root requires more time in the ground for highly beneficial phytonutrients called ***curcuminoids*** and ***sesquiterpenoids*** to attain peak concentrations.

Life Extension®'s Super Bio-Curcumin® derives from turmeric that is grown with organic practices, cultivated to maturity, then specially transported and processed to preserve and deliver the root's most complete nutritional profile.

In recent studies comparing the effects of standard curcumin against turmeric extracts comparable to **Super Bio-Curcumin®**, researchers observed:[1,2]

- Nearly twice the support for **immune** health.
- Approximately twice the support for **inflammatory** issues.
- Almost double the **antioxidant** support.

A separate study indicated that an antioxidant-rich curcumin extract[3] provided powerful support for heart health.

Unrivaled Potency and Absorbability with BCM-95®

Curcumin is neither absorbed nor *retained* well in the blood, which is another challenge facing those who wish to maximize its benefits.

The highly popular **Super Bio-Curcumin®** uses **BCM-95®**, a patented, *bioenhanced* preparation of curcumin. It has been shown to reach up to **7 times higher concentration** in the blood than standard curcumin.[4]

The graphs on this page illustrate that one **400 mg** vegetarian capsule per day of **Super Bio-Curcumin®** supplies the equivalent of **2,500 mg** of commercial curcumin supplements.

A bottle containing 60 vegetarian capsules of **Super Bio-Curcumin®** retails for $38. If a member buys four bottles, the price is reduced to only **$26.25** per bottle.

Item # 00407

References

1. *Int J Pharmacol.* 2009;5(6):333-45.
2. *J Food Nutr Res.* 2009;48(3):148-52.
3. *Arch Gerontol Geriatr.* 2002;34:37-46.
4. *Indian J Pharm Sci.* 2008 Jul-Aug;70(4):445-9.
5. Bioavailability study of BCM-95® in rats. Orcas International Inc. 2006.

CAUTION: Do not take if you have gallbladder problems or gallstones. If you are taking anti-coagulant or anti-platelet medications, or have a bleeding disorder, consult your healthcare provider before taking this product.

How Much Curcumin Are You Absorbing?

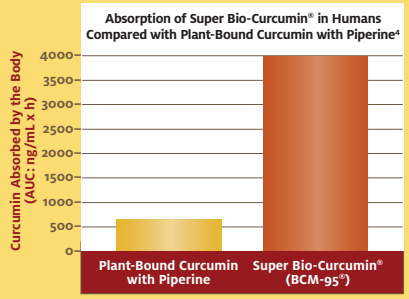


Chart 1. Super Bio-Curcumin® (BCM-95®) showed 6.3 times greater bioavailability (absorption and sustainability over 8 hours) in humans compared with plant-bound curcumin with piperine (as measured by the area under the curve [AUC] in a plot of blood levels against time, that is, the total amount of curcumin absorbed by the body over 8 hours).

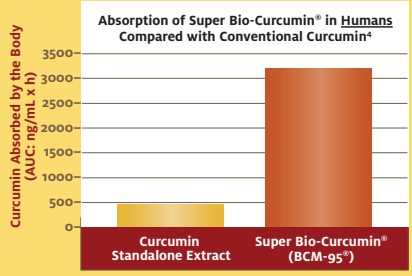


Chart 2. Super Bio-Curcumin® (BCM-95®) showed 6.9 times greater bioavailability (absorption and sustainability over 8 hours) in humans compared with conventional curcumin (as measured by the area under the curve [AUC] in a plot of blood levels against time, that is, the total amount of curcumin absorbed by the body over 8 hours).

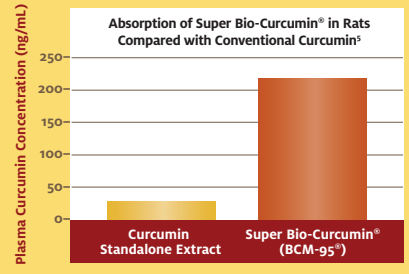
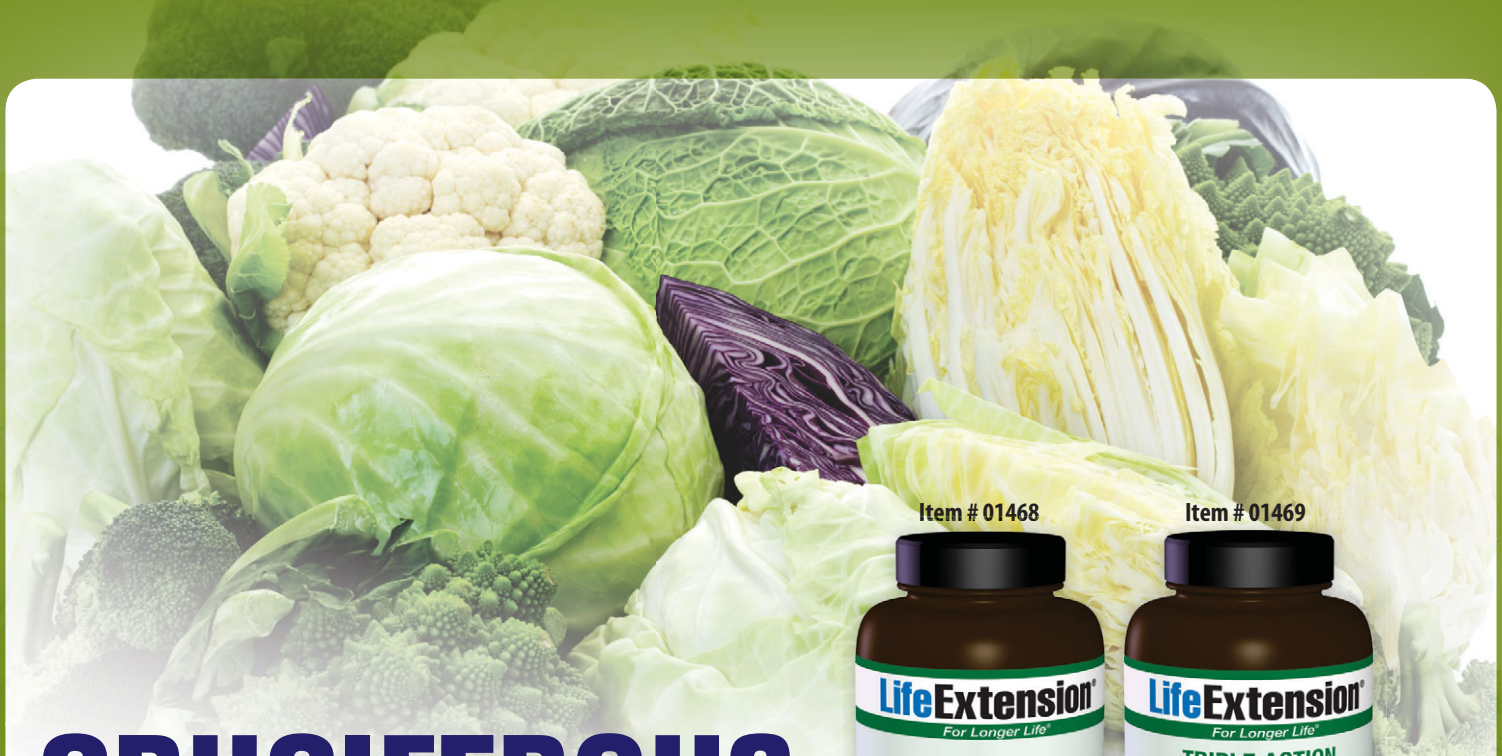


Chart 3. Bioavailability in rats fed with BCM-95® is 7.8 times higher than conventional curcumin.

To order Super Bio-Curcumin®
call 1-800-544-4440
or visit www.LifeExtension.com



CRUCIFEROUS

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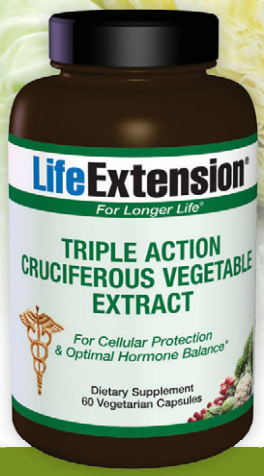

Item # 01469

Scientists have identified specific extracts from ***cruciferous vegetables***—such as broccoli, cauliflower, cabbage and Brussels sprouts—that help maintain healthy hormone metabolite balance. **Triple Action Cruciferous Vegetable Extract** combines some of these plant extracts into a comprehensive formula for optimal DNA protection.

I3C (indole-3-carbinol) and ***DIM (di-indolyl-methane)*** favorably modulate estrogen metabolism and induce liver detoxification enzymes to help neutralize potentially harmful estrogen metabolites and xenoestrogens (estrogen-like environmental chemicals).[1-4]

Extracts of ***broccoli***, ***watercress***, and ***rosemary*** provide *glucosinolates, isothiocyanates, carnosic acid,* and *carnosol*—bioactive compounds that have a multitude of favorable effects on estrogen metabolism and cell division.[5-8] **Apigenin**, a powerful plant flavonoid found in plants such as **parsley** and **celery**, is also added to the formula to boost cell protection,[9] while 25 mg of a natural source of benzyl isothiocyanate (BITC), are included to maintain cell health.[10]

Consumers should be aware that while consumption of cruciferous vegetables is highly recommended, the cooking process depletes many of the beneficial compounds such as **I3C**.

For those weighing less than 160 pounds, just one capsule a day provides optimal potencies. Those weighing over 160 pounds should consider taking two capsules a day. A bottle containing 60 vegetarian capsules of **Triple Action Cruciferous Vegetable Extract** retails for $24. If a member buys four bottles, the price is reduced to **$16.50 per bottle**.

Triple Action Cruciferous Vegetable Extract provides the following concentrates in just one vegetarian capsule:

Broccoli Extract [standardized to 4% glucosinolates (16 mg)]	**400 mg**
Watercress 4:1 extract	**50 mg**
Indole-3-Carbinol (I3C)	**80 mg**
Rosemary Extract	**50 mg**
Cat's Claw Extract	**50 mg**
Cabbage Extract	**25 mg**
DIM (di-indolyl-methane)	**14 mg**
Apigenin	**25 mg**

Those who want to obtain the benefits of ***trans*-resveratrol** can order **Triple Action Cruciferous Vegetable Extract with Resveratrol**. Each capsule provides **20 mg** of ***trans*-resveratrol** in addition to the **vegetable extracts** and retails for $32 per 60-capsule bottle. When a member buys four bottles, the price is reduced to **$22.20 per bottle**.

REFERENCES

1. *Biochem Pharm.* 2002, 64;393-404.
2. *Toxicol Appl Pharm.* 2001 Jul 15;174(2):146-52.
3. *J Natl Cancer Inst.* 1997 May 21;89(10):718-23.
4. *Cancer Detect Prevent.* 2004;28:72-9.
5. *Carcinogenesis.* 2002 Apr;23(4):581-6.
6. *Mol Cancer Ther.* 2003 Oct;2(10):1045-52.
7. *Carcinogenesis.* 1998 Oct;19(10):1821-7.
8. *Carcinogenesis.* 1995 Sep;16(9):2057-62.
9. *J Clin Biochem Nutr.* 2009 May;44(3):260-5.
10. *Food Chem Toxicol.* 2008 Jul;46(7):2358-64.

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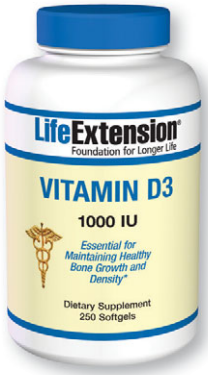
VITAMIN D3 SOFTGELS

FOR SUPERIOR ABSORPTION

Study after study confirms the vital importance of maintaining optimal levels of **vitamin D**. Research often indicates that a blood level between **50–80 ng/mL** of **25-hydroxyvitamin D** is ideal. Because people have individual requirements, Life Extension® has created a large selection of **vitamin D** supplements to ensure that you achieve your **vitamin D3** goals.

Keep in mind that you may already be getting **1,000-3,000 IU** of vitamin D in your multi-nutrient formulas.

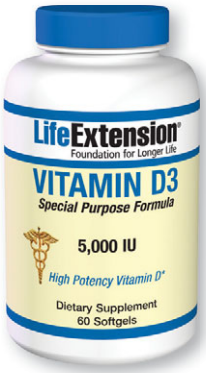
Vitamin D is now available in superior absorbing **softgels**. A recent study demonstrated that the use of one **5,000 IU** vitamin D **softgel** daily resulted in a near **30%** increase in vitamin D levels in just **60 days**.



VITAMIN D3 1,000 IU
250 softgels

Retail: $12.50
Four-bottle Member Price: $8.44 ea.

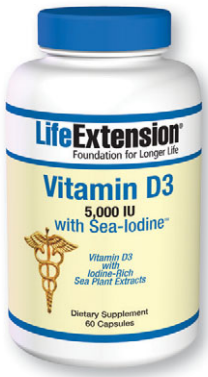
Commercial companies offered only **400 IU** vitamin D products when Life Extension long ago introduced a **1,000 IU** version. For most people, this **1,000 IU** potency is *insufficient* to attain optimal vitamin D blood levels. For smaller individuals who obtain **2,000-3,000 IU** in their multi-nutrient formulas (and children), this potency of vitamin D may be suitable. **Item # 01751**



VITAMIN D3 5,000 IU
60 softgels

Retail: $11
Four-bottle Member Price: $7.43 ea.

For those already obtaining **1,000-3,000 IU** of vitamin D in their multi-nutrient formulas, this **5,000 IU** potency is what many need to *achieve* optimal vitamin D blood levels. **Item # 01713**

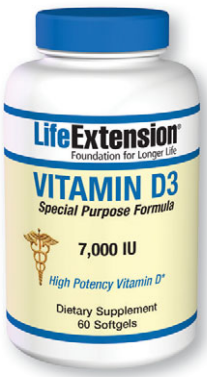


VITAMIN D3 5,000 IU WITH SEA-IODINE™*
60 capsules (non-softgel)

Retail: $14
Four-bottle Member Price: $9.38 ea.

Most people do not ingest enough vitamin D and iodine, especially those seeking to reduce their salt intake. Combining **5,000 IU** of **vitamin D3** and **1,000 mcg** of **iodine** into one capsule makes taking these two nutrients economical and convenient.

Due to the source of kelp, this product may contain fish and shellfish. **Item # 01573**



VITAMIN D3 7,000 IU
60 softgels

Retail: $14
Four-bottle Member Price: $9.45 ea.

Some individuals (such as those weighing more than 180 pounds) may require higher potencies of vitamin D. When combined with **1,000-3,000 IU** obtained from multi-nutrient formulas, this **7,000 IU vitamin D3** softgel should enable these individuals to attain **25-hydroxyvitamin D** blood levels above the desired range of **50 ng/mL**. **Item # 01718**

VITAMIN D3 LIQUID 2,000 IU (Natural mint flavor)
1 ounce

Retail: $28
Four-bottle Member Price: $18.75 ea.

For those rare individuals who have difficulty absorbing enough vitamin D3 from softgels, this liquid of vitamin D can be used.
Item # 01732

To order any of these high-potency vitamin D3 supplements, call 1-800-544-4440 or visit www.LifeExtension.com

CAUTION: Individuals consuming more than 2,000 IU/day of vitamin D (from diet and supplements) should periodically obtain a serum 25-hydroxy-vitamin D measurement. Do not exceed 10,000 IU per day unless recommended by your doctor. Vitamin D supplementation is not recommended for individuals with high blood calcium levels.

*** If you have a thyroid condition or are taking antithyroid medications, do not use without consulting your healthcare practitioner.**

INTRODUCING

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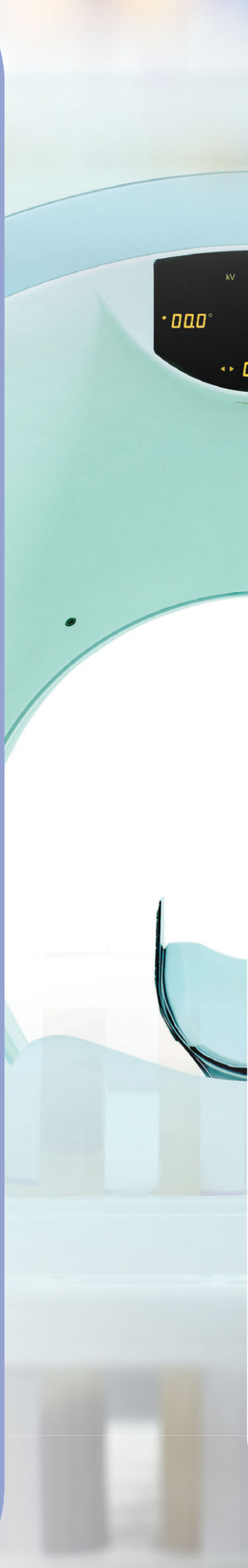
BY MICHAEL DOWNEY

PROSTATE *Diagnostic and Assessment* TESTS

There are now a number of diagnostic tests to identify early stage prostate cancer and then monitor the success or failure of a wide range of treatment options.

This article succinctly describes conventional prostate gland diagnostic tests along with those that mainstream medicine often overlooks, to the detriment of their patients. All of these tests, however, are commercially available. >



TESTS

1. PSA (Prostate-Specific Antigen)

Perhaps the greatest breakthrough in the detection and management of prostate cancer was the approval of the prostate-specific antigen (PSA) blood test in **1986**, but it was only approved for men already diagnosed with prostate cancer.[1] It wasn't until **1994** that the FDA approved the PSA test as a prostate cancer **screening** test for all men.[1] Prostate-specific antigen is a protein produced by the cells of the prostate gland, including both cancerous cells as well as cells that are benign.[1] Since very little PSA escapes into the bloodstream from a healthy prostate, an elevated PSA level in the blood indicates an abnormal condition of the prostate gland—which can be either benign or malignant. PSA test results can be used both to detect potential prostate problems and to follow the progress of prostate cancer therapy.[1]

Because tumor growth is essentially exponential, with one cell dividing into two, two to four, four to eight, and so on, a tumor cell product such as PSA can reflect such exponential growth—measuring the time it takes for PSA to double (PSA doubling time, or PSADT).[2] Also, the PSA rate of rise (PSA velocity), although not a more specific marker, may have value in prostate cancer prognosis—because men with prostate cancer whose PSA level increased by more than **2.0 ng/mL** during the year before their diagnosis showed a higher risk of death from prostate cancer.[3] Additionally, though not an absolute criteria for or against malignancy, PSA velocity can serve as a gauge regarding the likelihood of a malignant condition.[2] A rising PSA velocity in excess of **.75 ng/mL/year** relates to an increased probability of a malignant condition.[2]

The reference interval provided by most conventional laboratories for the PSA test is **0.00-4.00 nanograms per milliliter (ng/mL)**.[4] Conventional reference ranges suggest that PSA levels under **4.0 ng/mL** are normal, but any reading over **2.0 ng/mL** can indicate unhealthy activity, such as prostatitis, benign prostate hypertrophy, or prostate cancer.[2] If PSA readings begin to elevate, there are interventions that can reduce or

stabilize the production of PSA, shutting down a mechanism used by cancer cells to escape their confinement within the prostate gland.[5] PSA readings can increase immediately after ejaculation, returning slowly to baseline levels within 24-48 hours.[6,7]

Chart of PSA Ranges with Succinct Suggestions

PSA (ng/mL)	Concise Recommendation
0-1.0	Optimal
1.1-2.4	Initiate measures to support prostate health and have digital rectal exam performed
2.5-4.0	Moderate concern–assess PSA velocity–have digital rectal exam–consider other tests.
>4.0	Too high–additional diagnostics recommended

2. Free PSA

Free PSA is a newer evaluation for prostate health. Most PSA in the blood is bound to serum proteins, but a small amount is not protein-bound and is called free PSA.[2,8] In men with prostate cancer, the ratio of free (unbound) PSA to total PSA is decreased.[2] The **free PSA** test measures the percentage of free PSA relative to the total amount.[9] The lower the ratio, the greater the probability of prostate cancer. Measuring free PSA may help eliminate unnecessary biopsies.[8] Free PSA readings increase immediately after ejaculation, returning slowly to baseline levels within about 24 hours.[6] Although not used as an initial screening test, a lower percentage of free PSA might mean your doctor needs to do a further workup.

Below are the percentage of PSA ranges and what they represent as far as prostate cancer risk. Note that when the percentage of free PSA is high (over **20%**), this means the risk of prostate cancer is low, whereas a low percentage of free PSA (under **11%** indicates high risk).

	PROSTATE CANCER RISK	
Free PSA%	50-64 Years	65-75 Years
0.00-10.00%	56%	55%
10.01-15.00%	24%	35%
15.01-20.00%	17%	23%
20.01-25.00%	10%	20%
Over 25%	5%	9%

3. PCA3 Urine

PCA3 is a molecular diagnostic test performed on urine rather than blood and detects mRNA that is excreted into the urethra via the epithelial cells that line the prostatic ducts.[10] Prostate cancer cells tend to produce this compound far more than normal cells do.[10] The PCA3 urine test has to be done in a urologist's, or other doctor's, office, because it requires a digital rectal massage just prior to collection of the urine.[11]

PCA3 testing is most useful when repeated over a period of time to monitor for changes in the observed value. In general, a PCA3 score of **35** is considered the optimal cut-off. A score of greater than **35** reflects an increased probability of a positive biopsy. A score of less than **35** reflects a decreased probability of a positive biopsy.

4. 25-Hydroxy Vitamin D

Research points to a connection between vitamin D levels and cancer.[12,13] Experimental studies indicate that low levels of vitamin D increase prostate cancer risk.[14] And further evidence shows that the active form of vitamin D promotes differentiation and inhibits proliferation, invasiveness, and metastasis of human prostate cancer cells.[14,15] Detecting deficient levels allows you and your physician to implement vitamin D supplementation to help avert illnesses associated with inadequate vitamin D levels. For this nutrient, individualized dosing is of particular importance, and the only way to accomplish this is through vitamin D blood testing. Although conventional laboratory reference ranges list a reference interval of **30-100 ng/mL**, Life Extension supports maintaining vitamin D in the **50-80 ng/mL** range.[16]

5. Prolactin

Prolactin, a peptide hormone largely secreted by the anterior pituitary gland, has typically remained restricted to the fields of lactation and infertility. However, researchers discovered that prolactin plays a major role in the differentiation and development of the prostate gland.[17] Both malignant and healthy prostates produce prolactin. Prostatic fluids from patients with cancer also have higher prolactin levels than controls.[17] In vitro, prolactin induces proliferation and antagonizes apoptosis in prostate organ culture and in some tumor cell lines.[17] Increased levels of prolactin have significant stimulatory action on the prostate and on prostate ductal development and may lead to hyperplastic growth, independent of elevations in circulating androgen levels.[18]

Labcorp normal reference range - Male: **4.0-15.2 ng/mL**
Optimal for Prostate Cancer- **<5 ng/mL**

6. DRE (Digital Rectal Exam)

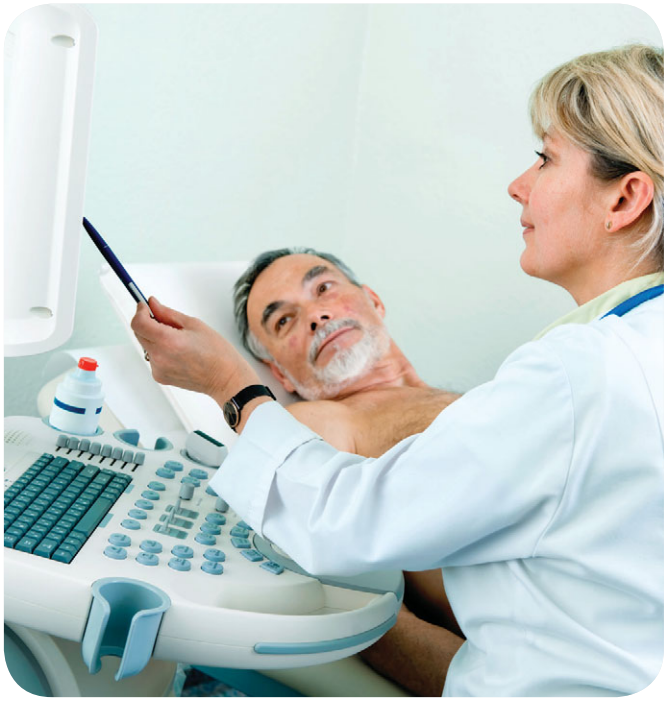
Men can easily be tested for palpable prostate abnormalities with a digital rectal exam (DRE), a simple test that provides a lot of information.[19] It gives the physician a sense of the prostate gland volume. The bigger the prostate, the more PSA the gland is entitled to make without indicating a potential problem. A basic rule is that the prostate gland volume multiplied by the amount of PSA produced per unit of volume in benign prostate tissue is **0.067 ng**.[19] This means that a 50-year-old man with a normal size prostate of **30 grams** (or cubic centimeters) would therefore be entitled to make approximately **2 ng** of PSA. If such a man has a PSA of **4.0 ng/mL**, it would indicate an excess of about **2 ng** of PSA and the need for further investigation to rule out prostate cancer.

In addition to estimating prostate gland volume and calculating the benign cellular contribution to the total PSA value, the DRE can also aid in finding hard nodules or other evidence of disease. Palpable (able to be felt) abnormalities of the prostate gland relate to tumor volume, also called tumor burden.[19] In the years before routine testing with PSA, most prostate cancers were already palpable via DRE by the time of diagnosis. Today, close to **70%** of prostate cancers newly diagnosed in the US are no longer associated with palpable disease.[19] This shows the value of PSA screening in allowing an earlier diagnosis of prostate cancer — before the cancer has had a chance to get bulkier and manifest itself as a palpable disease, known as a T2 disease. Most American men when first diagnosed with prostate cancer have non-palpable, or T1, prostate cancer.[19]

What You Need to Know

Methods of Diagnosing and Assessing Prostate Cancer

- **Prostate cancer remains unique in that there are many tests to identify early stage disease and then monitor the success or failure of a wide range of treatment options.**
- **Perhaps the greatest breakthrough in the detection and management of prostate cancer was the approval of the prostate-specific antigen (PSA) blood test.**
- **Experimental studies indicate that low levels of vitamin D increase prostate cancer risk.**
- **Men can easily be tested for palpable prostate abnormalities with a digital rectal exam (DRE), a simple test that provides a lot of information.**
- **A comprehensive blood test for specific hormone levels is useful since many hormones have been shown to play a role in the proliferation of prostate cancer.**
- **Combining imaging tests such as ultrasound, MRI, QCT, Color Doppler, and bone scan can give the most complete picture, allowing for full physical and architectural assessment of tumors, including those that have spread beyond the prostate.**



7. Blood Hormone Profile

A comprehensive blood test for specific hormone levels is useful. In addition to the free and total testosterone levels covered earlier, a complete blood test should include levels of estradiol, DHT (dihydrotestosterone), pregnenolone, DHEA-S (dehydroepiandrosterone sulfate), FSH (follicle-stimulating hormone, LH (luteinizing hormone), and possibly, IGF-1 (insulin-like growth factor 1). DHT plays a role in the development and exacerbation of benign prostatic hyperplasia, as well as prostate cancer.[20] FSH (follicle-stimulating hormone) and LH (luteinizing hormone) regulate the reproductive processes of the body, and in aging men, a rise in FSH and LH can be indicative of andropause.[21,22] Studies have shown that increased levels of IGF promote cancer growth and confer resistance to conventional treatments (chemotherapy and radiation).[23,24]

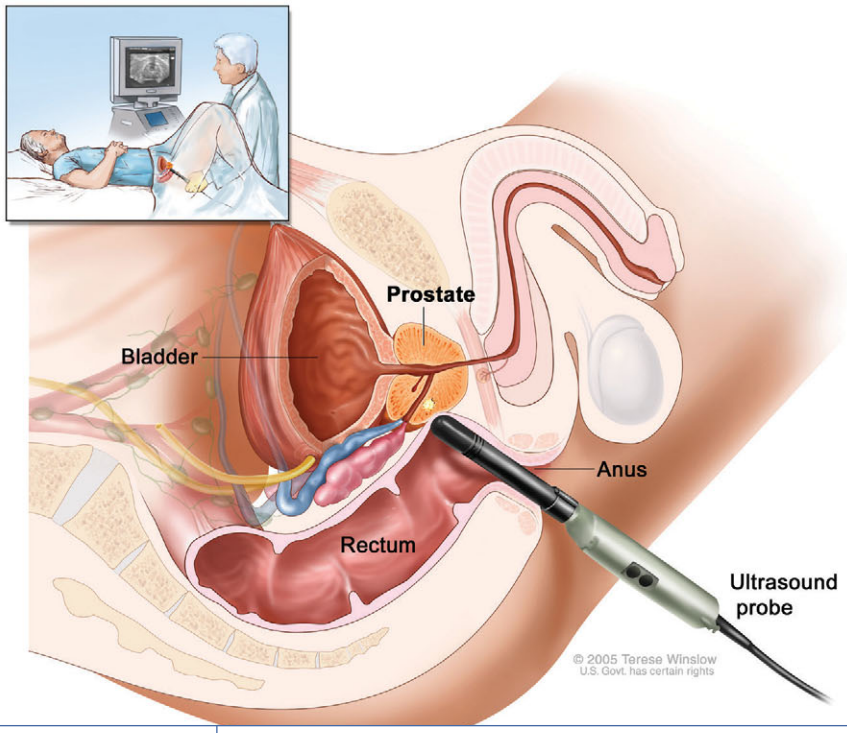
8. PAP (Prostatic Acid Phosphatase) Test

The PAP test is a simple blood test, used to measure the amount of an enzyme—called prostatic acid phosphatase (PAP)—that is produced by prostate epithelial cells and is abundant in seminal fluid.[25] Higher levels of PAP are associated with prostate cancer.[25] PAP determination, in conjunction with PSA measurements, is useful in assessing the prognosis of prostate cancer. It is an important test, because it allows identification of prostate cancer patients who have an elevation of PAP, but not of PSA. This helps monitor the course of disease and response to treatment.

Baseline PAP[2]	Freedom from prostate cancer recurrence at 5 years after prostate cancer surgery defined as psa>0.2 ng/mL
<0.4 U/liter	87%
0.4-0.5 U/liter	79%
>0.5 U/liter	63%

9. Circulating Tumor Cells Assay

This test provides a measurement of cancer cells that have separated from a solid tumor site and are circulating in the bloodstream.[26] Detecting the presence of circulating tumor cells in the blood has clinical usefulness in assessing the disease status and prognosis of metastatic prostate cancer, and is predictive of overall survival.[27] Fasting prior to the blood draw is not required.



Transrectal ultrasound. An ultrasound probe is inserted into the rectum to check the prostate. The probe bounces sound waves off body tissues to make echoes that form a sonogram (computer picture) of the prostate.

IMAGING

1. Transrectal Ultrasound

Transrectal ultrasound creates an image of the organs in the pelvis, and the most common indication is for the evaluation of the prostate gland in men with elevated PSA levels, or with prostatic nodules on a digital rectal exam.[28] Ultrasound clarifies the size of the prostate gland and aids in the distinction between benign prostate conditions and prostate cancer.[28] This type of imaging can also be used to help guide a biopsy of the prostate.[28]

2. Color Doppler Ultrasound

Color Doppler ultrasound is a medical imaging technique that is used to provide visualization of blood flow, using computer processing to add color to the image to greatly clarify what is happening inside the body.[29] An ultrasound transducer is used to beam sound into the area of interest, and it reads the returning sound. When the sound bounces off a moving target such as a blood vessel, the pitch changes as a result of the Doppler effect. The transducer can detect very subtle pitch changes, record them visually, and generate an image showing where blood is flowing, and in what direction. Because a simple grayscale image can be a bit difficult to read, the ultrasound machine assigns different color values, depending on whether blood is moving towards or away from the transducer. In addition to showing the direction of flow, the colors also vary in intensity depending on the velocity of the flow, allowing doctors to also see how quickly the blood is moving.[28]

A color Doppler ultrasound of a patient with a suspected tumor will reveal the precise areas where the velocity of blood flow is changing, mapping out the problem in full color.[30] This type of imaging can map out the tumor's blood supply to clarify exactly how far the growth has spread.[31] This can have an impact on what treatments are selected, and how surgery and other measures are approached. While color Doppler ultrasound can be done using a transducer on the outside of the body, it can also be used for transrectal procedures, in which the probe is inserted to get a better view.

3. MRI (Magnetic Resonance Imaging)

The MRI has been used for over 30 years for prostate cancer detection and evaluation.[32] In contrast to ultrasound imaging, prostate MRI has superior soft tissue resolution.[33] Magnetic fields are used to locate and characterize prostate cancer. To do so, radiologists use multi-parametric MRI, which includes four different types of MRI sequences.[32] Currently, MRI is used to identify targets for prostate biopsy, and to make a surgical plan for men undergoing robotic prostatectomy. MRI imaging also helps surgeons decide whether to resect or spare the neurovascular bundle and assess surgical difficulty.[32]

4. (Nuclear) Bone Scan

Prostate cancer can cause "hot spots" to appear on a bone scan if the cancer has metastasized to the bone.[34,35] A bone scan for cancer uses nuclear technology and involves administering a radioactive substance called a tracer to produce gamma radiation that can be picked up by a special camera.[34] The tracer consists of radionuclides that bind to the bone and show up as dark or light spots. After the technician injects the tracer, it usually takes between one and four hours for the radioactive substance to move

throughout the skeleton. During this time, patients will be asked to drink up to six glasses of water to flush any tracer material not absorbed by bone. Then, the patient must remain still on a padded table while a large camera passes over the body.

A dark spot, also called a cold spot, might indicate lack of absorption of the tracer.[34] This may also indicate that cancer has spread to the bone from the prostate gland. A normal scan shows evenly distributed tracer throughout the body. Risks associated with a bone scan are considered low, with a very small level of radiation exposure.[34] The radionuclides injected into the bloodstream are excreted through the urine and have a low risk of toxicity.[34]

5. Quantitative Computed Tomography (QCT)

Osteoporosis, or bone thinning, is associated with prostate cancer and can be a side effect of prostate cancer treatment.[36] Quantitative computed tomography (QCT) is a highly sensitive test that is better able to determine bone density changes than common methods such as DEXA testing.[37] Studies have shown that DEXA testing can often read degenerative changes involving bone and joint tissues and calcium deposits within blood vessels as bone density thus not suggesting osteoporosis when in fact bone loss is present.[38-41] Quantitative computed tomography QCT is similar to other forms of computed tomography (CT). As with any CT scan, an X-ray tube and sensor rotate around the body area in a circular or spiral pattern, and a series of pictures are transmitted to a computer.[42] The primary difference with QCT is the special analysis performed by special QCT software. While most computed tomography (CT) software produces a composite visual image to detect fractures or other symptoms in the scanned bone or soft tissue, QCT uses the data provided by the scanner to generate numerical values for the volume, mass, and density of bone.[42] This allows QCT to distinguish between cortical bone, which lines the outside of the bones, and trabecular bone, the softer tissue that makes up the center of the bone.[43] Trabecular bone is much more metabolically active than cortical bone—meaning, the two types of bone are replaced at different rates.[43] As a result, these two bone types can show different rates of change in bone mineral density.

GENETIC TESTING

About half of US men diagnosed with prostate cancer are classified as low-risk by use of conventional measures such as Gleason Score (a form of tumor grading), the prostate-specific antigen test (PSA), and a physical exam.[44] Nonetheless, nearly **90%** of these low-risk patients will choose to undergo immediate

aggressive treatment such as radical prostatectomy or radiation even though there is less than a **3%** chance of deadly progression.[44]

A new test called **Oncotype DX** is now available to physicians and their patients. It measures the level of expression of **17 genes** across four biological pathways to predict prostate cancer aggressiveness.[44]

Test results are reported as a **Genomic Prostate Score (GPS)** ranging from **0 to 100**; this score is assessed along with other clinical factors to clarify a man's risk prior to treatment intervention.[44] This multi-gene test has been validated using the prostate needle biopsy sample taken *before* the prostate is removed, thereby providing the opportunity for low risk patients to avoid invasive treatments. According to the principle investigator of the validation study, individual biological information from the Oncotype DX prostate cancer test almost **tripled** the number of patients who can more confidently consider active surveillance and avoid unnecessary treatment and its potential side effects.[44]

The advantage of this test for those who choose the ***comprehensive surveillance program*** utilized by Life Extension members (which involves the use of several drugs, targeted nutrients, and adherence to healthy dietary patterns) is to provide greater assurance the right course of action is being followed.

For information about the **Oncotype DX** test, log on to www.genomichealth.com

Prolaris® is another genomic test developed to aid physicians in predicting prostate cancer aggressiveness in conjunction with clinical parameters such as Gleason score and PSA.[45]

Prolaris® measures prostate cancer tumor biology at the molecular level. By measuring and analyzing the level of expression of genes directly involved with

cancer replication, Prolaris may be able to more accurately predict disease progression.[45]

Prolaris® is a tool designed to measure the aggressiveness of a patient's cancers to better predict and stratify an individual's relative risk of disease progression within ten years.[45] It may enable physicians to better define a treatment/monitoring strategy for their patients.

Prolaris® claims to be significantly more prognostic than currently used variables and provides unique additional information that can be combined with other clinical factors in an attempt to make a more accurate prediction of a patient's cancer aggressiveness and therefore disease progression.[45]

Prolaris® has been shown to predict clinical progression in four different clinical cohorts, in both pre and post-treatment scenarios.

In the treatment of prostate cancer, Prolaris® is prognostic at the point of diagnosis and in the post-surgery setting.[45]

At diagnosis, Prolaris® can help to identify patients with less aggressive cancer who may be candidates for active surveillance. In addition, Prolaris® can define patients who appear clinically low-risk but have a more aggressive disease that requires more aggressive treatment.

Prolaris® testing is also well suited for use in post-prostatectomy patients that have higher risk features after surgery to better estimate their risk of disease recurrence and therefore adjust the level of monitoring or add additional therapy.

For more information about Prolaris®, log on to www.myriad.com

Summary

Prostate cancer is the most common malignancy in US men (excluding non-melanoma skin cancer), afflicting one male in every six.[46,47] A significant percentage of men have underlying prostate cancer without even knowing it.[48-50]

These men have access to an arsenal of tools for their doctors to diagnose and then monitor the success or failure of various treatment modalities, including "active surveillance" or "watchful waiting."

As you've learned in this issue of ***Life Extension***, one does not have to sit back and "watch" their PSA level steadily rise. Nutritional, hormonal, and drug approaches exist to help control early-stage, low-grade prostate tumors. There is data to support the efficacy of some of them as effective adjuvants in men with high-grade tumors as well.[51-59] ●

If you have any questions on the scientific content of this article, please call a Life Extension® Health Advisor at 1-866-864-3027.

References

1. Available at: http://www.cancer.gov/cancertopics/factsheet/detection/PSA. Accessed September 13, 2013.
2. Strum SB, Pogliano D. *A Primer on Prostate Cancer: An Empowered Patient's Guide*. Hollywood, FL: The Life Extension Foundation; 2005.
3. D'Amico A, Chen M, Roehl K, Catalona W. Preoperative PSA velocity and the risk of death from prostate cancer after radical prostatectomy. *N Engl J Med*. 2004;351(2):125-35.
4. Available at: https://www.labcorp.com/wps/portal/!ut/p/c1/hY1LDoIwFADP4gFMX1uosFUB-RUrED4bQsAghj9Gg6eXC6iZ5WQyKEUrXf6sq_xR913eoBilLBMK44JwAopLdCCU7UEaBgMtvrkuwf4U_NT315RgtJdFmqSj02Vgmf4BEyfehInnDEFUIBikDL_DoPrzJ37Vr2zo8nc0SavsCcIRpjfi2qDKG3rUjbNKKIqCo_VjeJiobYudCthLV4_yc_P0MYvvBWbDxFxg-k!/dl2/d1/L0lJS2FZQSEhL3dMRUJGcUFFQWpNQy9ZSTV5bHchIS83X1VFNFMxSTkzME9HUzIwSVMzTzROMk42NjgwL3ZpZXdUZXN0/?testId=408050. Accessed September 13, 2013.
5. Webber MM, Waghray A, Bello D. Prostate-specific antigen, a serine protease, facilitates human prostate cancer cell invasion. *Clin Cancer Res*. 1995 Oct;1(10):1089-94.
6. Tchetgen MB, Song JT, Strawderman M, Jacobsen SJ, Oesterling JE. Ejaculation increases the serum prostate-specific antigen concentration. *Urology*. 1996 Apr;47(4):511-6.
7. Herschman JD, Smith DS, Catalona WJ. Effect of ejaculation on serum total and free prostate-specific antigen concentrations. *Urology*. 1997 Aug;50(2):239-43.
8. Gion M, Mione R, Barioli P, et al. Percent free prostate-specific antigen in assessing the probability of prostate cancer under optimal analytical conditions. *Clin Chem*. 1998 Dec;44(12):2462-70.
9. Abrahamsson PA, Lilja H, Oesterling JE. Molecular forms of serum prostate-specific antigen. The clinical value of percent free prostate-specific antigen. *Urol Clin North Am*. 1997 May;24(2):353-65.
10. Hessels D, Schalken JA. The use of PCA3 in the diagnosis of prostate cancer. *Nat Rev Urol*. 2009 May;6(5):255-61.
11. Day JR, Jost M, Reynolds MA, Groskopf J, Rittenhouse H. PCA3: from basic molecular science to the clinical lab. *Cancer Lett*. 2011 Feb 1;301(1):1-6.
12. Qin W, Smith C, Jensen M, Holick MF, Sauter ER. Vitamin d favorably alters the cancer promoting prostaglandin cascade. *Anticancer Res*. 2013 Sep;33(9):3861-6.

13. van den Bemd GJ, Chang GT. Vitamin D and vitamin D analogs in cancer treatment. *Curr Drug Targets*. 2002 Feb;3(1):85-94.
14. Lou YR, Qiao S, Talonpoika R, Syvala H, Tuohimaa P. The role of Vitamin D3 metabolism in prostate cancer. *J Steroid Biochem Mol Biol*. 2004 Nov;92(4):317-25.
15. John EM, Schwartz GG, Koo J, Van Den BD, Ingles SA. Sun exposure, vitamin D receptor gene polymorphisms, and risk of advanced prostate cancer. *Cancer Res*. 2005 Jun 15;65(12):5470-9.
16. Available at: https://www.labcorp.com/wps/portal/!ut/p/c1/hY1LDoIwFADP4gFMHwUrbFVAhRZqNXw2hKBBlD9EQ08v-F1Azy8lkUIxm6vRV5OlYNHVaohDFJOE6YRwzDDrFFmCVbGC-1NRWwyeyj7x7gT832TXVDEYrXycXUhHIwVPBsgeEgVE9jm-BGiAzqjELREPKCl7lBTaXi-a66Ya_Ze5vRw7mCQk-EAvzrH07U-sOx7kQejS5yAy6UvLkpBNqmPx_W68czr_op-_tgrfypIvPv02K8Q!/dl2/d1/L0lJS2FZQSEhL3dMRUJGcUFFQWpNQy9ZSTV5bH-chIS83X1VFNFMxSTkzME9HUzIwSVMzTzROMk42NjgwL3ZpZXdUZXN0/?testId=408405. Accessed September 13, 2013.
17. Sethi BK, Chanukya GV, Nagesh VS. Prolactin and cancer: Has the orphan finally found a home? *Indian J Endocrinol Metab*. 2012 Dec;16(Suppl 2):S195-8.
18. Available at: http://www.neurophys.gu.se/digitalAssets/1278/1278430_AVHANDLINGSRAM__Jon_Kindblom.pdf. Accessed September 13, 2013.
19. Available at: http://www.prostate-cancer.org/PDFs/Is4-2.pdf. Accessed September 13, 2013.
20. Available at: http://www.cancer.gov/newscenter/qa/2008/PCPTQandA. Accessed September 13, 2013.
21. Dandona P, Rosenberg MT. A practical guide to male hypogonadism in the primary care setting. *Int J Clin Pract*. 2010 May;64(6):682-96.
22. Miwa Y, Kaneda T, Yokoyama O. Correlation between the Aging Males' Symptoms Scale and sex steroids, gonadotropins, dehydroepiandrosterone sulfate, and growth hormone levels in ambulatory men. *J Sex Med*. 2006 Jul;3(4):723-6.
23. Arnaldez FI, Helman LJ. Targeting the insulin growth factor receptor 1. *Hematol Oncol Clin North Am.* 2012 Jun;26(3):527-42,vii-viii.
24. Kojima S, Inahara M, Suzuki H, Ichikawa T, Furuya Y. Implications of insulin-like growth factor-I for prostate cancer therapies. *Int J Urol.* 2009 Feb;16(2):161-7.
25. Kong HY, Byun J. Emerging roles of Human prostatic acid phosphatase. *Biomol Ther (Seoul).* 2013 Jan;21(1):10-20.
26. Ligthart ST, Coumans FA, Bidard FC, et al. Circulating tumor cells count and morphological features in breast, colorectal and prostate cancer. *PLoS One*. 2013 Jun 27;8(6):e67148.
27. Miller MC, Doyle GV, Terstappen LW. Significance of circulating tumor cells detected by the CellSearch system in patients with metastatic breast colorectal and prostate cancer. *J Oncol*. 2010;2010:617421.
28. Available at: http://www.upmccancercenter.com/cancer/prostate/biopsyultrasound.cfm. Accessed September 17, 2013.
29. Available at: http://www.webmd.com/dvt/doppler-ultrasound. Accessed September 16, 2013.
30. Fleischer AC. Sonographic depiction of tumor vascularity and flow: from in vivo models to clinical applications. *J Ultrasound Med.* 2000 Jan;19(1):55-61.
31. Available at: http://prostate-cancer.org/decision-aide/understanding-your-diagnosis/diagnostic-imaging/#sthash.np5KXLxK.dpuf. Accessed September 16, 2013.
32. Gupta RT, Kauffman CR, Polascik TJ, Taneja SS, Rosenkrantz AB. The state of prostate MRI in 2013. *Oncology (Williston Park).* 2013 Apr;27(4):262-70.
33. Available at: http://www.med.uc.edu/radiology/research/prostateimaging/mriprocedure.aspx. Accessed September 16, 2013.
34. Available at: http://www.cancer.org/treatment/understandingyourdiagnosis/examsandtestdescriptions/imagingradiologytests/imaging-radiology-tests-nuc-scan. Accessed September 16, 2013.
35. Tombal B, Lecouvet F. Modern detection of prostate cancer's bone metastasis: Is the bone scan era over? *Adv Urol.* 2012;2012:893193.
36. Tuck SP, Hanusch B, Walker J, Datta HK. Prostate cancer and osteoporosis. *Curr Osteoporos Rep.* 2013 Mar;11(1):11-20.
37. Smith, M.R., McGovern, F.J., Fallon, M.A. et al. Low bone mineral density in hormone-naive men with prostate carcinoma. *Cancer.* 2001;91:2238–45.
38. Bolotin HH Inaccuracies inherent in dual-energy X-ray absorptiometry in vivo bone mineral densitometry may flaw osteopenic/osteoporotic interpretations and mislead assessment of antiresorptive therapy effectiveness. *Bone*. 2001;28:548–55.
39. Meirelles ES, Borelli A, Camargo OP. Influence of disease activity and chronicity on ankylosing spondylitis bone mass loss. *Clin. Rheumatol.* 1999;18:364–8.
40. von der Recke P, Hansen MA, Overgaard K. et al. The impact of degenerative conditions in the spine on bone mineral density and fracture risk prediction. *Osteoporos Int.* 1996;6:43–9.
41. Available at: http://www.medscape.com/viewarticle/738733_5. Accessed October 7, 2013.
42. Available at: https://www.galileo-training.com/de-deutsch/literaturdownload.html?f=anim25.pdf. Accessed September 16, 2013.
43. Available at: http://www.idifwb.com/services/exam%20descriptions/bonedensity.htm. Accessed September 16, 2013.
44. Available at: http://files.shareholder.com/downloads/GHDX/2097290524x0x661617/85f38a0e-ccd5-47de-a348-8d0c2b5c03bd/GHDX_News_2013_5_8_General.pdf. Accessed October 1, 2013.
45. Available at: http://www.myriad.com/products/prolaris/. Accessed October 1, 2013.
46. Siegel R, Naishadham D, Jemal A. Cancer statistics 2012. *CA Cancer J Clin*. 2012;62:10-29.
47. Available at: http://www.pcf.org/site/c.leJRIROrEpH/b.5802027/k.D271/Prostate_Cancer_Risk_Factors.htm. Accessed October 1, 2013.
48. Harvei S. Epidemiology of prostatic cancer. *Tidsskr Nor Laegeforen* 1999 Oct 10;119(24):3589-94.
49. Billis A. Latent carcinoma and atypical lesions of prostate. An autopsy study. *Urology*. 1986 Oct;28(4):324-9.
50. Sakr WA, Grignon DJ, Haas GP, et al. Epidemiology of high grade prostatic intraepithelial neoplasia. *Pathol Res Pract*. 1995 Sep;191(9):838-41.
51. Gallardo-Williams MT, Chapin RE, King PE, et al. Boron supplementation inhibits the growth and local expression of IGF-1 in human prostate adenocarcinoma(LNCaP) tumors in nude mice. *Toxicol Pathol*. 2004 Jan-Feb;32(1):73-8.
52. Choi HY, Lim JE, Hong JH. Curcumin interrupts the interaction between the androgen receptor and Wnt/beta-catenin signaling pathway in LNCaP prostate cancer cells. *Prostate Cancer Prostatic Dis*. 2010 Dec;13(4):343-9.
53. Dorai T, Cao YC, Dorai B, Buttyan R, Katz AE. Therapeutic potential of curcumin in human prostate cancer. III. Curcumin inhibits proliferation, induces apoptosis, and inhibits angiogenesis of LNCaP prostate cancer cells in vivo. *Prostate*. 2001;47(4):293-303.
54. Fleshner, N., Fair, W.R., Huryk, R. et al. Vitamin E inhibits the high-fat diet promoted growth of established human prostate LNCaP tumors in nude mice. *J Urol*. 1999;161:1651-4.
55. Yang Y, Ikezoe T, Zheng Z, Taguchi H, Koeffler HP, Zhu WG. Saw Palmetto induces growth arrest and apoptosis of androgen-dependent prostate cancer LNCaP cells via inactivation of STAT 3 and androgen receptor signaling. *Int J Oncol*. 2007 Sep;31(3):593-600.
56. McCann MJ, Gill CI, Linton T, Berrar D, McGlynn H, Rowland IR. Enterolactone restricts the proliferation of the LNCaP human prostate cancer cell line in vitro. *Mol Nutr Food Res*. 2008 May;52(5):567-80.
57. von Holtz RL, Fink CS, Awad AB. Beta-Sitosterol activates the sphingomyelin cycle and induces apoptosis in LNCaP human prostate cancer cells. *Nutr Cancer*. 1998;32(1):8-12.
58. Zaidman BZ, Wasser SP, Nevo E, Mahajna J. Androgen receptor-dependent and -independent mechanisms mediate Ganoderma lucidum activities in LNCaP prostate cancer cells. *Int J Oncol*. 2007 Oct;31(4):959-67.
59. Thirugnanam S, Xu L, Ramaswamy K, Gnanasekar M. Glycyrrhizin induces apoptosis in prostate cancer cell lines DU-145 and LNCaP. *Oncol Rep*. 2008 Dec;20(6):1387-92.

KRILL HEALTHY JOINT FORMULA

TARGETED SUPPORT FOR OPTIMAL JOINT FUNCTION AND MOBILITY

Maintaining healthy, flexible joints is essential to quality of life. Joint stiffness and discomfort can stand in the way of performing even simple everyday tasks.

Most people do not obtain critical nutrients shown to support youthful joint function and mobility.

To meet this urgent need, **Life Extension**® introduced **Krill Healthy Joint Formula**, a patent-pending blend of deep-sea **whole krill oil** sourced in Antarctica, combined with **hyaluronic acid** and **astaxanthin**.

In a recent clinical trial involving over 100 maturing individuals, a **55% reduction** in joint discomfort was observed in less than three months, with **63%** of participants maintaining ease of motion.[1]

THREE SYNERGISTIC COMPOUNDS FOR SUPERIOR BENEFIT

The data reveals that the fatty acids found in krill oil are particularly effective for joint health.[2] These unique fatty acids have been shown to *specifically target joint tissue*.[2,3]

Hyaluronic acid occurs naturally in the joints,[4] where it acts to lubricate and cushion against repeated physical impacts.[5] Because it forms a major component of cartilage and soft tissue,[4] it is widely used to promote joint health.[4-8]

The difficulty has been that hyaluronic acid is a large molecule not well absorbed by the body. When combined with krill oil, it has been shown to reach significantly *higher* levels in the bloodstream than in standalone form.[8]

Krill oil is a natural source of the antioxidant carotenoid **astaxanthin**. Astaxanthin works in multiple ways, including suppression of free radical activity and enhanced mitochondrial function.[9] It also maintains krill oil's molecular stability.

Most commercially available krill oils do not contain significant amounts of astaxanthin because it is nearly eliminated during processing. **Krill Healthy Joint Formula** is *fortified* with astaxanthin, for maximum stability and superior benefit.

JUST ONE SOFTGEL DAILY

The suggested daily serving of one **Krill Healthy Joint Formula** softgel daily supplies **353 mg** of this proprietary blend.

A bottle containing **30** softgels of **Krill Healthy Joint Formula** retails for $32. If a member buys four bottles, the price is reduced to **$21.75** per bottle. Just one softgel a day of **Krill Healthy Joint Formula** duplicates a successful human clinical trial.

Item # 01600

References

1. Valensa. (Data on File.) 2011.
2. *Altern Med Rev.* 2010 Apr;15(1):84-6.
3. *J Am Coll Nutr.* 2007 Feb;26(1):39-48.
4. *Curr Med Chem.* 2009;16(14):1718-45.
5. *Curr Rheumatol Rep.* 2003 Feb;5(1):7-14.
6. *Nutr J.* 2008;7:3.
7. *Am J Phys Med Rehabil.* 2005 Apr;84(4): 278-83; quiz 84, 93.
8. *World J Gastroenterol.* 2007 Feb 14; 13(6):945-9.
9. *J Nutr Biochem.* 2010 May;21(5):381-9.

CAUTION: If you are taking anti-coagulant or anti-platelet medications, or have a bleeding disorder, consult your healthcare provider before taking this product.

Contains crustacean shellfish (krill).

To order **Krill Healthy Joint Formula** call 1-800-544-4440 or visit **www.LifeExtension.com**

BIO-COLLAGEN WITH PATENTED UC-II®

CONCENTRATED SUPPORT FOR JOINT COMFORT!

Tender, sensitive joints can limit everyday activities. As you age and continue to put stress on your joints, you can compromise joint cartilage—which exposes **small collagen fibers**.

Your body's immune system mistakenly identifies these collagen fibers as "**foreign cells**." This triggers an inflammatory response against the **collagen-containing** cartilage in *your* own joints. Inflammation and joint discomfort can soon follow.

Data shows that a patented collagen provides targeted support for the immune issues related to joint discomfort.[1]

To meet this urgent need, **Life Extension®** offers **Bio-Collagen** with **Patented UC-II®**—a novel form of ***undenatured*** type II collagen from chicken cartilage.

Taken orally, **UC-II®** travels to the intestinal tract, where it "introduces" the immune system to the **same** type of collagen molecules found in **joint cartilage**.

ADVANCED MOLECULAR STRUCTURE

Not just *any* form of collagen will do. Normally, when chicken collagen is **processed**, its molecular shape is changed. It loses bioactivity and becomes **denatured**—which researchers found has *no beneficial effect*[2] on the immune system.

Fortunately, a **unique processing technique preserves the correct molecular shape** of the collagen[3,4]—*and preserves its bioactivity*[5]—producing a form known as **undenatured collagen**.

The result of this innovative process is an *undenatured* **chicken collagen** called **Bio-Collagen** with **Patented UC-II®**.

SCIENTIFICALLY VALIDATED

Scientific studies have found that **UC-II® reduced sensitive joint discomfort** and **eased joint function**.[1,6-10] One double-blind, placebo-controlled study on patients found that **UC-II®** provided relief by **33%** and decreased joint discomfort scores by a remarkable **40%**—***in just 90 days!***[1]

CONVENIENT ONE-PER-DAY DOSE

The suggested daily serving of one capsule of **Bio-Collagen** with **Patented UC-II®** supplies **40 mg** of UC-II® standardized chicken cartilage.

The retail price of a bottle of 60 capsules of **Bio-Collagen** with **Patented UC-II®** is $36. If a member buys four bottles, the price is reduced to **$24** per bottle or just **$12 a month**.

To order Life Extension® Bio-Collagen with Patented UC-II®, call 1-800-544-4440 or visit www.LifeExtension.com

Item # 01631

REFERENCES

1. *Int J Med Sci*. 2009;6(6):312-21.
2. *Proc Natl Acad Sci U S A*. 1986 Oct;83(19):7443-6.
3. *Int Immunopharmacol*. 2011 Jan;11(1):12-8.
4. *Int J Clin Pharmacol Res*. 2002;22(3-4):101-10.
5. *Immunol Rev*. 2005;206:232-59.
6. *J Vet Pharmacol Ther*. 2005 Aug;28(4):385-90.
7. *J Vet Pharmacol Ther*. 2007 Jun;30(3):275-8.
8. *Toxicol Mech Methods*. 2007;17(4):189-96.
9. *J Anim Physiol Anim Nutr (Berl)*. Epub 2011 May 30.
10. *J Vet Pharmacol Ther*. 2009 Dec;32(6):577-84.

LIMIT THE RELEASE OF **GLUCOSE** FROM **STARCHY FOODS**

Hundreds of studies document the importance of protecting against blood **glucose** surges.[1]

What the public doesn't realize is that a huge source of **blood sugar** emanates from dietary **starch**.[2,3] This includes bread, pasta, potatoes, and rice. But even so-called healthy carbohydrates such as whole-grain bread and brown rice can induce undesirable glucose spikes.[4]

In a breakthrough development, scientists have shown that an enzyme called ***transglucosidase*** converts **starches** into prebiotic **fiber**—*within your own digestive tract!*[5,6] Taking this enzyme with starchy meals helps avoid the flood of **glucose** into the bloodstream that results from eating carbohydrates.

COMPELLING HUMAN RESEARCH DATA

Published studies show that **transglucosidase** limits the amount of **SUGAR** released from **STARCH**, especially in the critical ***after-meal*** period. It does this by converting dietary starch into a beneficial indigestible prebiotic **fiber**.[5,6]

Transglucosidase has been demonstrated in humans to reduce the level of ***rapidly digested*** starch in a carbohydrate food item by **31%**.[7] This helps maintain healthy blood glucose, cholesterol, and insulin levels for those whose levels are already in the normal range.[8-11]

SHIELD AGAINST AFTER-MEAL GLUCOSE SURGES

Each vegetarian capsule of the new **GlycemicPro™ Transglucosidase** contains a full **450,000 TG** (transglucosidase activity units) of ***trans-glucosidase***.

Just one capsule taken with starch-containing meals helps limit the release of sugar from starch. Those who consume a low-starch diet may need to take only one **GlycemicPro™ Transglucosidase** capsule daily with their starch-containing meal.

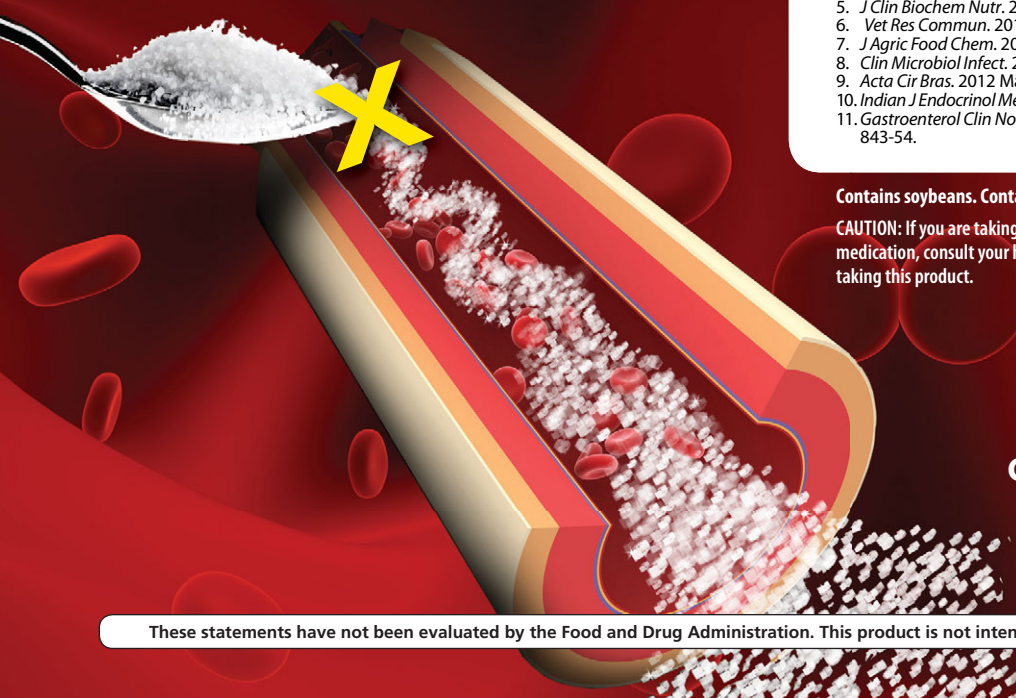
A bottle of 60 vegetarian capsules of **GlycemicPro™ Transglucosidase** retails for $48. If a member buys four bottles, the price is reduced to **$31.50** per bottle.

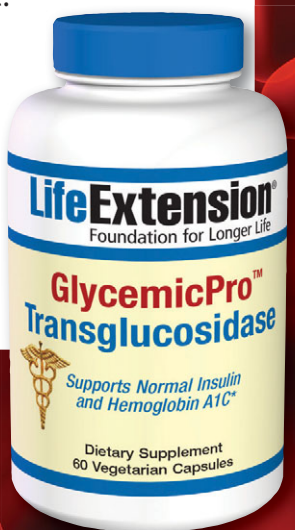
References

1. Available at: www.myhealthnewsdaily.com/3759-soda-type-2-diabetes-risk.html. Accessed April 30, 2013.
2. *Am J Clin Nutr*. 1998 Jun;67(6):1186-96.
3. *Am J Clin Nutr*. 2001 Feb;73(2):177-89.
4. *Am J Clin Nutr*. 1997 Nov;66(5):1264-76.
5. *J Clin Biochem Nutr*. 2007 Nov;41(3):191-6.
6. *Vet Res Commun*. 2010 Feb;34(2):161-72.
7. *J Agric Food Chem*. 2007 May 30;55(11):4540-7.
8. *Clin Microbiol Infect*. 2012 Jul;18 Suppl 4:50-3.
9. *Acta Cir Bras*. 2012 Mar;27(3):279-82.
10. *Indian J Endocrinol Metab*. 2012 Jan;16(1):20-7.
11. *Gastroenterol Clin North Am*. 2012 Dec;41(4):843-54.

Contains soybeans. Contains tree nuts (coconut).

CAUTION: If you are taking blood glucose lowering medication, consult your healthcare provider before taking this product.





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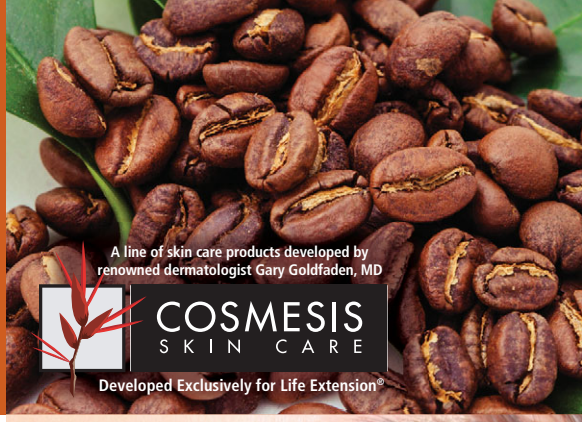
GlycemicPro™ Transglucosidase,
call **1-800-544-4440**
or visit **www.LifeExtension.com**

COFFEE EXTRACTS FOR THE SKIN



It is now possible to diminish visible signs of facial-skin **photoaging**—by harnessing the power of **coffee compounds**.

Facial skin retains its youthful, vibrant glow thanks to a resilient framework of connective tissue formed by the proteins *collagen* and *elastin* and water-binding *glycosaminoglycans*.[1] These molecules make up the skin's **extracellular matrix** that supports the suppleness of the skin.[1,2]

However, free radicals generated by the pervasive ultraviolet rays of the sun are associated with a normal decline in this extracellular matrix.[2,3] Over time, unsightly, tell-tale signs of photoaging may appear—***wrinkles***, ***redness***, *and* ***roughness***—especially in the sun-vulnerable regions such as the face.[4,5]

Concentrated **coffee extracts** can target multiple factors involved in facial skin aging.

THE POWER OF TOPICALLY APPLIED COFFEE COMPOUNDS

Scientists have shown that topical application of the highly active **coffee compounds** supports the natural capacity of the extracellular matrix to replenish connective tissue and restore water-binding molecules.[6-8]

Topically applied **caffeine**, for instance, helps support the body's normal removal of ultraviolet light-damaged *keratinocyte cells*—the process a healthy body employs to inhibit skin photoaging.[8]

This promotes the appearance of firmer, more **youthful-looking** facial skin.[9]

IMPACT ON AGING SKIN

Studies have demonstrated the effectiveness of coffee compounds—***Coffea arabica* seed oil** as well as ***Coffea robusta* seed extract,** which is known to contain both **chlorogenic acid** and **caffeine**—on aging facial skin.

When applied directly to facial skin…

- **Arabica seed oil** improved skin dryness and promoted the body's natural production of collagen and elastin.[6]
- ***Coffea arabica*** supported improvement of the appearance of wrinkles, redness, and rough texture in a clinical trial—after ***just 12 weeks*** of twice daily application.[9]
- **Chlorogenic acid** helped reduce the normal redness associated with prolonged ultraviolet exposure.[7]
- **Caffeine** enhanced the visibility of skin smoothness and promoted a reduction in wrinkle depth—with clinical results seen in ***only 4 weeks***.[10]

These **coffee extracts** have been combined into the new **Cosmesis Anti-Aging Rejuvenating Face Cream** to help provide support against the visible signs of *photoaging.* Suggested use is to apply this rejuvenating face cream to clean skin twice a day, morning and night.

A net weight **2 oz** jar of **Cosmesis Anti-Aging Rejuvenating Face Cream** retails for $65. If a member buys two jars, the price is reduced to **$42.75** per jar.

Item # 80151

To order Cosmesis Anti-Aging Rejuvenating Face Cream, call 1-800-544-4440 or visit www.LifeExtension.com

References

1. *Australas J Dermatol.* 1998 Feb;39(1):19-23.
2. *EMBO Rep.* 2008 Nov; 9(11): 1073-7.
3. *EXS.* 2006;(96):131-57.
4. *Coll Antropol.* 2008 Oct;32 Suppl 2:177-80.
5. *Arch Dermatol.* 2002 Nov;138(11):1462-70.
6. *J Cosmet Dermatol.* 2009 Mar;8(1):56-62.
7. *Chem Pharm Bull (Tokyo).* 2011;59(6):793-6.
8. *Br J Dermatol.* 2007 May;156(5): 957-64.
9. *J Drugs Dermatol.* 2010 Dec;9(12):1480-7.
10. *J Cosmet Dermatol.* 2009 Sep;8(3):228-33.

The MAGIC of Cholesterol Numbers

By Sergey A. Dzugan, MD, PhD, & Konstantine S. Dzugan

THE STAGGERING TRUTH ABOUT CHOLESTEROL

Dr. Dzugan and his foresighted colleagues have discovered a new fundamental and unifying truth about human aging. They recognize that **elevated cholesterol** may in fact simply be the result of **accumulated errors of physiology** throughout a lifetime.

ENORMOUS IMPLICATIONS

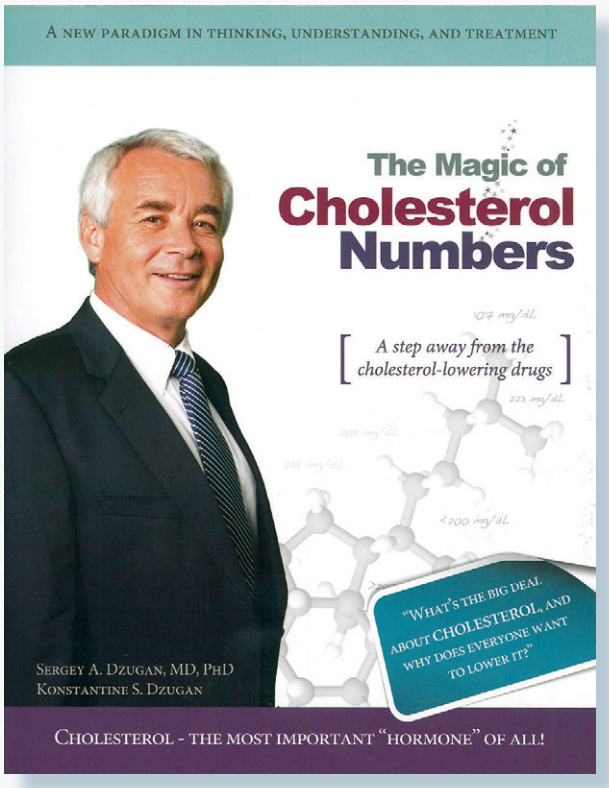
If the theories in *The Magic of Cholesterol Numbers* are true, then when humans repair a lifetime of errors of physiology using tailored, *multimodal* therapeutic approaches, they can see **truly remarkable results** in conditions that otherwise perplex mainstream medicine.

WHAT YOU'LL LEARN

In *The Magic of Cholesterol Numbers*, you'll gain knowledge about:

- Why mainstream doctors have taken a disastrous approach to cholesterol.
- What the Atherosclerosis – Cholesterol Axis is and why it's important.
- What the REAL problems created by high and low cholesterol are.
- How cholesterol and steroid hormones are linked.
- What the "Grandmother" of steroids truly is.
- Why there are so many unfavorable misconceptions about estrogen in women.
- How Dr. Dzugan's cutting edge hypothesis about high cholesterol is changing medicine.
- And much, much more!

> "This is an absolutely brilliant and very unique book."
> – Emilia Fabian, MD, PhD



Buy *The Magic of Cholesterol* TODAY and read about the incredible CLINICAL EVIDENCE that proves Dr. Dzugan is revolutionizing medicine.

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Retail price: $29.95
Member price: $22.46

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Blood Testing
The Ultimate Information

Blood testing provides the ultimate information regarding correctable risk factors that may predispose you to disorders such as cancer, diabetes, cardiovascular disease, and more. Information about general health and nutritional status can also be gained through standard blood analysis. Standing behind the belief that blood testing is an essential component of any program designed to attain optimal health and longevity, *Life Extension*® offers this innovative and convenient service at a very affordable price. Not only is comprehensive blood testing an important step in safeguarding your health, it is a simple process from virtually anywhere in the United States.

Five Easy Steps:

1. Call 1-800-208-3444 to discuss and place your order with one of our knowledgeable health advisors. (This order form can also be faxed to 1-866-728-1050 or mailed). Online orders can also be placed at www.lifeextension.com.
2. After your order is placed, you will be mailed either a requisition form to take to your local LabCorp Patient Service Center or a Blood Draw Kit; whichever is applicable (Please note: If a blood draw kit is used, an additional local draw fee may be incurred.)
3. Have your blood drawn.
4. Your blood test results will be sent directly to you by Life Extension.
5. Take the opportunity to discuss the results with one of our knowledgeable health advisors by calling 1-800-226-2370; or review the results with your personal physician.

It's that simple! Don't delay—call today!

For Our Local Members:

For those residing in the Ft. Lauderdale, Florida area, blood-draws are also performed at the Life Extension Nutrition Center from 9:00 am to 2:00 pm Monday through Saturday. Simply purchase the blood test and have it drawn with no wait! Our address is 5990 North Federal Highway, Ft. Lauderdale, FL, 33308-2633.

MOST POPULAR PANELS

Life Extension Member Pricing

COMPREHENSIVE PANELS

MALE LIFE EXTENSION PANEL (LC322582) — $269

Chemistry Profile includes glucose, cholesterol, LDL, HDL, triglycerides, liver and-kidney function tests PLUS 20 additional tests. **CBC** includes immune (white) cell count, red blood cell count and platelet count. Also includes:

DHEA-S
TSH for thyroid function
Estradiol
Vitamin D 25- hydroxy
Hemoglobib A1c
C-Reactive Protein
Homocysteine
Free Testosterone
Total Testosterone
PSA (prostate-specific antigen)

FEMALE LIFE EXTENSION PANEL (LC322535) — $269

Chemistry Profile includes glucose, cholesterol, LDL, HDL, triglycerides, liver and-kidney function tests PLUS 20 additional tests. **CBC** includes immune (white) cell count, red blood cell count and platelet count. Also includes:

DHEA-S
TSH for thyroid function
Estradiol
Progesterone
Hemoglobib A1c
C-Reactive Protein
Homocysteine
Free Testosterone
Total Testosterone
Vitamin D 25- hydroxy

MALE WEIGHT LOSS PANEL (LCWLM) — $299

Chemistry Profile includes glucose, cholesterol, LDL, HDL, triglycerides, liver and-kidney function tests PLUS 20 additional tests. **CBC** includes immune (white) cell count, red blood cell count and platelet count. Also includes:

DHEA-S
SHBG
Estradiol
Free T3
TSH for thyroid function
C-Reactive Protein
Insulin
Free Testosterone
Total Testosterone
Free T4
PSA (prostate-specific antigen)

FEMALE WEIGHT LOSS PANEL (LCWLF) — $299

Chemistry Profile includes glucose, cholesterol, LDL, HDL, triglycerides, liver and-kidney function tests PLUS 20 additional tests. **CBC** includes immune (white) cell count, red blood cell count and platelet count. Also includes:

DHEA-S
Progesterone
Estradiol
Free T3
TSH for thyroid function
C-Reactive Protein
Insulin
Free Testosterone
Total Testosterone
Free T4
SHBG

MALE HORMONE ADD-ON PANEL (LCADDM)* — $155

Pregnenolone and Dihydrotestosterone (DHT)

To provide an even more in-depth analysis of a man's hormone status, Life Extension has created this panel as an addition to the Male Life Extension Panel. This panel provides valuable information about a testosterone metabolite that can affect the prostate, and the mother hormone that acts as a precursor to all other hormones.

FEMALE HORMONE ADD-ON PANEL (LCADDF)* — $125

Pregnenolone and Total Estrogens

To provide an even more in-depth analysis of a woman's hormone status, Life Extension has created this panel as an addition to the Female Life Extension Panel. This panel provides valuable information about total estrogen status, and the mother hormone that acts as a precursor to all other hormones.

LIFE EXTENSION THYROID PANEL (LC304131) — $75

TSH, T4, Free T3, Free T4.

FEMALE COMPREHENSIVE HORMONE PANEL* (LC100011) — $299

CBC/Chemistry Profile (see description above), DHEA-S, Estradiol, Total Estrogens, Progesterone, Pregnenolone, Total and Free Testosterone, SHBG, TSH, Free T3.

MALE COMPREHENSIVE HORMONE PANEL* (LC100010) — $299

CBC/Chemistry Profile (see description above), DHEA-S, Estradiol, DHT, PSA, Pregnenolone, Total and Free Testosterone, SHBG, TSH, Free T3.

THE CBC/CHEMISTRY PROFILE (LC381822) — $35

Note: This CBC/Chemistry Profile is included in many Life Extension panels. Please check panel descriptions.

CARDIOVASCULAR RISK PROFILE

Total Cholesterol	Cholesterol/HDL Ratio
HDL Cholesterol	Estimated CHD Risk
LDL Cholesterol	Glucose
Triglycerides	Iron

LIVER FUNCTION PANEL

AST (SGOT)	Total Bilirubin
ALT (SGPT)	Alkaline Phosphatase
LDH	

KIDNEY FUNCTION PANEL

BUN	BUN/Creatinine Ratio
Creatinine	Uric Acid

BLOOD PROTEIN LEVELS

Total Protein	Globulin
Albumin	Albumin/Globulin Ratio

BLOOD COUNT/RED AND WHITE BLOOD CELL PROFILE

Red Blood Cell Count	Monocytes
White Blood Cell Count	Lymphocytes
Eosinophils	Platelet Count
Basophils	Hemoglobin
Polys (Absolute)	Hematocrit
Lymphs (Absolute)	MCV
Monocytes (Absolute)	MCH
Eos (Absolute)	MCHC
Baso (Absolute)	Polynucleated Cells
RDW	

BLOOD MINERAL PANEL

Calcium	Sodium
Potassium	Chloride
Phosphorus	Iron

COMPREHENSIVE THYROID PANEL (LC100018) — $199

TSH, T4, Free T4, Free T3, Reverse T3, TPO, ATA

FOOD SAFE ALLERGY TEST (LCM73001)** — $198

This test measures delayed (IgG) food allergies for 95 common foods.

ADRENAL FUNCTION PANEL (LC100021) — $136

DHEA-S, AM/PM Cortisol, Glucose, Insulin, Lipid Panel, RBC magnesium

OMEGA SCORE™ (LCOMEGA)** — $131.25

Provides valuable information on your risk of developing heart disease, sudden heart attack, and cardiac death. The Omega Score™ also includes your AA:EPA ratio, allowing you to determine and track a major factor in total body inflammation.

MITOCHONDRIAL FUNCTION PANEL* (LC100020) — $159

Carnitine (Free with Total), CoQ10, Glucose

VAP™ TEST* (LC804500) — $90

The VAP™ cholesterol test provides a more comprehensive coronary heart disease (CHD) risk assessment than the conventional lipid profile. Direct measurements, not estimations, are provided for total cholesterol, LDL, HDL, VLDL, and cholesterol subclasses.

* This test requires samples to be shipped to the lab on dry ice for customers using a Blood Draw Kit and will incur an additional $35 charge. If the customer is having blood drawn at a LabCorp facility, this extra charge does not apply.

** This test is packaged as a kit, requiring a finger stick performed at home.

Other Popular Tests and Panels
Life Extension Member Pricing

◯ **ENERGY PROFILE (LC100005)** — $375
CBC/Chemistry Profile (see description), Epstein –Barr Virus antibodies (IgG and IgM), Cytomegalovirus Antibodies (IgG and IgM), Ferritin, Total and Free Testosterone, DHEA-S, Free T3, Free T4, Cortisol, C-Reactive Protein (high sensitivity), Vitamin B12, Folate, Insulin.

◯ **ANEMIA PANEL* (LC100006)** — $86
CBC/Chemistry Profile (see description), Ferritin, Total Iron Binding Capacity (TIBC), Vitamin B12, Folate, Reticulocyte Count.

◯ **INFLAMMATION PANEL (LC100007)** — $135
CBC/Chemistry Profile (see description above), C-Reactive Protein (high sensitivity), Sedimentation Rate, Rheumatoid (RA) Factor, Antinuclear Antibodies (ANA) Screen.

◯ **THYROID ANTIBODY PROFILE (LC100004)** — $99
Thyroid Antithyroglobulin Antibody (ATA) and Thyroid Peroxidase Antibody (TPO).

◯ **CARDIAC PLUS* (LC100008)** — $145
CBC/Chemistry profile (see description), Vitamin D 25-hydroxy, C-Reactive Protein (high sensitivity), Fibrinogen, Homocysteine.

◯ **VAP™ PLUS* (LC100009)** — $330
VAP, C-Reactive Protein (high sensitivity), Homocysteine, Fibrinogen, PLAC® Test (Lp-PLA2), Vitamin D 25-hydroxy.

CARDIAC RISK

◯ **COQ10* (COENZYME Q10) (LC120251)** — $99
This test is used to check the blood level of CoQ10 and will enable more precise dosing for anyone seeking to achieve and maintain high levels of this critical antioxidant.

◯ **Lp-PLA2 (PLAC® TEST) (LC123240)** — $125
This test is used to aid in predicting risk for coronary heart disease, and ischemic stroke associated with atherosclerosis. Lp-PLA2 is a cardiovascular risk factor that provides unique information about the stability of the plaque inside your arteries.

◯ **C-REACTIVE PROTEIN (HIGH-SENSITIVITY) (LC120766)** — $42
Measures inflammation factors in arteries. Recent studies indicate that C-reactive protein may be the most accurate risk factor for predicting heart attack and stroke.

◯ **FIBRINOGEN* (LC001610)** — $31
High levels of this blood-clotting factor increase the risk of heart attack and stroke.

◯ **HOMOCYSTEINE (LC706994)** — $64
Can indicate if you are likely to have a heart attack or stroke. Even if you take folic acid, you still may have dangerously high levels of this artery-clotting metabolic debris that can be lowered with high doses of TMG, vitamin B6, and vitamin B12.

MALE HEALTH

◯ **PSA (PROSTATE-SPECIFIC ANTIGEN) (LC010322)** — $31
Can provide an early warning sign for prostate disorders and possible cancer.

◯ **FREE-PSA (INCLUDES TOTAL PSA)* (LC480780)** — $61
Recommended to determine if an elevated PSA is indicative of prostate cancer.

This is NOT a complete listing of LE blood test services. Call **1-800-208-3444** for additional information.

HORMONES

◯ **DHEA-SULFATE (LC004020)** — $61
This test shows if you are taking the proper amount of DHEA. This test normally costs $100 or more at commercial laboratories.

◯ **DIABESITY PANEL* (LC100019)** — $159
Glucose, Insulin, HbA1c, VAP™, Cortisol, C-Reactive Protein

◯ **MALE BASIC HORMONE PANEL (LC100012)** — $75
DHEA-S, Estradiol, Free and Total Testosterone, PSA

◯ **FEMALE BASIC HORMONE PANEL (LC100013)** — $75
DHEA-S, Estradiol, Free and Total Testosterone, Progesterone

◯ **DIHYDROTESTOSTERONE (DHT)* (LC500142)** — $99
Measures serum concentrations of DHT.

◯ **ESTRADIOL (LC004515)** — $33
For men and women. Determines the proper amount in the body.

◯ **INSULIN FASTING (LC004333)** — $25
Can predict those at risk of diabetes, obesity, and heart and other diseases.

◯ **PREGNENOLONE* (LC140707)** — $116
Used to determine ovarian failure, hirsutism, adrenal carcinoma, and Cushing's syndrome.

◯ **PROGESTERONE (LC004317)** — $55
Primarily for women. Determines the proper amount in the body.

◯ **SEX HORMONE BINDING GLOBULIN (SHBG) (LC082016)** — $33
This test is used to monitor SHBG levels which are under the positive control of estrogens and thyroid hormones, and suppressed by androgens.

BONE HEALTH

◯ **VITAMIN D (25OH) (LC081950)** — $47
This test is used to rule out vitamin D deficiency as a cause of bone disease. It can also be used to identify hypercalcemia.

◯ **OSTEOCALCIN* (LC010249)** — $91
Osteocalcin is often used as a biochemical marker, or biomarker, for the bone formation process. It has been routinely observed that higher serum osteocalcin levels are relatively well correlated with bone diseases characterized by increased bone turnover, especially osteoporosis.

◯ **DPD CROSS LINK URINE TEST (LC511105)** — $79
The deoxypyridinoline (DPD) urine test can be used to measure bone re-absorption rates in healthy individuals and in those with enhanced risk of developing metabolic bone diseases. Deoxypyridinoline can be used to monitor therapies (which may include bisphosphonate drugs) in people diagnosed with osteoporosis.

Blood tests available only in the continental United States. Not available in Maryland.

For non-member prices call 1-800-208-3444

ORDER LIFE-SAVING BLOOD TESTS FROM VIRTUALLY ANYWHERE IN THE US!

TERMS AND CONDITIONS

This blood test service is for informational purposes only and no specific medical advice will be provided. National Diagnostics, Inc., and the Life Extension Foundation contract with a physician who will order your test(s), but will not diagnose or treat you. Both the physician and the testing laboratory are independent contractors and neither National Diagnostics, Inc., nor the Life Extension Foundation® will be liable for their acts or omissions. Always seek the advice of a trained health professional for medical advice, diagnosis, or treatment. When you purchase a blood test from Life Extension/National Diagnostics, Inc., you are doing so with the understanding that you are privately paying for these tests. There will be absolutely no billing to Medicare, Medicaid, or private insurance. I have read the above Terms and Conditions and understand and agree to them.

Signature of Life Extension Member

X

Life Extension Foundation Members only

MEMBER NO.

◯ Male ◯ Female

Name

Date of Birth (required) / /

Address

City

State Zip

Phone

Credit Card No.

Expiration Date /

Mail your order form to:

LifeExtension®
NATIONAL DIAGNOSTICS, INC.

3600 West Commercial Boulevard
Fort Lauderdale, FL 33309

Phone your order to: **1-800-208-3444**
Fax your order to: **1-866-728-1050**

PRODUCTS

AMINO ACIDS
Acetyl-L-Carnitine
Acetyl-L-Carnitine-Arginate
Branched Chain Amino Acids
D, L-Phenylalanine Capsules
Glycine Capsules
L-Arginine Capsules
Arginine/L-Ornithine Capsules
L-Carnitine Capsules
L-Carnitine Powder Natural Lemon Flavor
L-Glutathione, L-Cysteine & C
L-Glutamine Capsules
L-Glutamine Powder
L-Lysine Capsules
L-Tyrosine Tablets
Mega L-Glutathione Capsules
N-Acetyl-L-Cysteine Capsules
Optimized Carnitine with GlycoCarn®
PharmaGABA
Super Carnosine Capsules
Taurine Capsules

BONE & JOINT HEALTH
ArthroMax® with Theaflavins and AprèsFlex®
ArthroMax® Advanced with UC-II® and AprèsFlex®
Bone-Up™
Bone Restore
Bone Restore w/Vitamin K2
Bone Strength Formula w/KoAct™
Dr. Strum's Intensive Bone Formula
Fast Acting Joint Formula
Glucosamine Chondroitin Capsules

BRAIN HEALTH
Acetyl-L-Carnitine
Acetyl-L-Carnitine-Arginate
Brain Shield™
CDP Choline Capsules
Cognitex® with Brain Shield™
Cognitex® with Pregnenolone & Brain Shield™
Cognitex® Basics
DMAE Bitartrate
Ginkgo Biloba Certified Extract™
Huperzine A
Lecithin Granules
Methylcobalamin Lozenges
Migra-Mag with Brain Shield™
Neuro-Mag™ Magnesium L-Threonate
Optimized Ashwagandha Extract
Phosphatidylserine Capsules
Rhodiola Extract
Super Ginkgo Extract
Vinpocetine

DIGESTIVE
Bifido GI Balance
Carnosoothe w/PicroProtect
Digest RC™
Esophageal Guardian
Enhanced Super Digestive Enzymes
Extraordinary Enzymes
LACTOSOLV™ Long Lasting Digestion
Life Flora™
Natural EsophaGuard
Pancreatin
Regimint
Theralac Probiotics

DURK AND SANDY PRODUCTS
Blast™
Inner Power™

EYE CARE
Bilberry Extract
Brite Eyes III
Eye Pressure Support with Mirtogenol®
Solarshield Sunglasses
Super Zeaxanthin with Lutein & Meso-Zeaxanthin Plus Astaxanthin and C3G
Super Zeaxanthin with Lutein & Meso-Zeaxanthin and C3G

FIBER
AppleWise Polyphenol
Fiber Food
TruFiber®
WellBetX PGX® plus Mulberry

FOOD
Rich Rewards™ Black Bean Vegetable Soup
Rich Rewards™ Spicy Cruciferous Vegetable Soup
Rich Rewards™ Cruciferous Vegetable Soup
Rich Rewards™ Lentil Soup
Rich Rewards™ Mung Bean Soup with Turmeric
Rich Rewards® Coffee
(Available in mocha, vanilla and decaffeinated)
Rich Rewards™ Dark Chocolate

HAIR CARE
Dr. Proctor's Advanced Hair Formula
Dr. Proctor's Shampoo
Super-Absorbable Tocotrienols

HEART HEALTH
AppleWise Polyphenol
Advanced Lipid Control
Aspirin (Enteric Coated)
Cardio Peak™ w/Standarized Hawthorn and Arjuna
Cho-Less™
D-Ribose Tablets
D-Ribose Powder
Endothelial Defense™ with Full-Spectrum Pomegranate™
Fibrinogen Resist
Forskolin
Homocysteine Resist
Natural BP Management
Olive Leaf Vascular Support
Peak ATP® with GlycoCarn®
PhosphOmega®
Policosanol
Pycnogenol® French Maritime Pine Bark Extract
Red Yeast Rice
Super Absorbable CoQ10™ with *d*-Limonene
Super Omega-3 EPA/DHA with Sesame Lignans & Olive Fruit Extract
Super Ubiquinol CoQ10
Super Ubiquinol CoQ10 with BioPQQ®
Super Ubiquinol CoQ10 with Enhanced Mitochondrial™ Support
Theaflavin Standardized Extract
TMG Powder
TMG Tablets

HERBAL/PHYTO PRODUCTS
Artichoke Leaf Extract
Asian Energy Boost
Astaxanthin w/Phospholipids
Berry Complete
Blueberry Extract
Blueberry Extract w/Pomegranate
Butterbur Extract w/Standardized Rosmarinic Acid
Calcium D-Glucarate
Enhanced Berry Complete with Acai
Full-Spectrum Pomegranate™
Grapeseed Extract with Resveratrol & Pterostilbene
Huperzine A
Kyolic® Garlic Formula 102 + 105
Kyolic® Reserve
Mega Green Tea Extract
Mega Green Tea Extract (Decaffeinated) (also w/CoffeeGenic® Green Coffee Extract)
Mega Lycopene Extract
Optimized Ashwagandha Extract
Optimized Garlic
Pomegranate Extract
Pomegranate Juice Concentrate
Pycnogenol
Optimized Quercetin
Resveratrol with Synergistic Grape-Berry Actives
Rhodiola Extract
Silymarin
SODzyme™ with GliSODin®
Stevia Extract
Advanced Bio-Curcumin® with Ginger & Turmerones
Super Bio-Curcumin®
Super Ginkgo Extract
Triple Action Cruciferous Vegetable Extract
Venotone
Whole Grape Extract

HORMONES
Advanced Natural Sex for Women® 50+
7-KETO® DHEA
DHEA
DHEA Complete
GH Pituitary Support Day Formula
GH Pituitary Support Night Formula
Liquid Melatonin
Melatonin
Melatonin Timed Release
Natural Estrogen with Pomegranate Extract
Pregnenolone
ProgestaCare for Women
Super Miraforte with Standarized Lignans

IMMUNE ENHANCEMENT
AHCC® (Active Hexose Correlated Compound)
Black Cumin Seed Oil
Black Cumin Seed Oil w/Bio-Curcumin®
Buffered Vitamin C Powder
Echinacea Extract
FlorAssist™ Probiotic
i26 Hyperimmune Egg
Immune Modulator w/Tinofend®
Immune Protect with PARACTIN®
Lactoferrin
Norwegian Shark Liver Oil
Optimized Fucoidan w/Maritech® 926
ProBoost™ Thymic Protein A
Reishi Extract Mushroom Complex
Vitamin C with Dihydroquercetin
Winter Wellness™
Zinc Lozenges

INFLAMMATORY REACTIONS
Arthro-Immune Joint Support
ArthroMax® with Theaflavins
Boswella
Bromelain (Specially-coated)
Cytokine Suppress™ with EGCG
DHA (Vegetarian Sourced)
Fast Acting Joint Formula
Ginger Force
Krill Healthy Joint Formula
5-LOX Inhibitor w/AprèsFlex®
Mega EPA/DHA
Mega GLA with Sesame Lignans
MSM
Omega-3 Whirl
Serraflazyme
SODzyme™ with GliSODin® and Wolfberry
Super Omega-3 EPA/DHA with Sesame Lignans & Olive Fruit Extract
Tart Cherry w/Standardized CherryPURE®
Zyflamend® Whole Body

LIVER HEALTH
Branch Chain Amino Acids
N-Acetyl Cysteine
Liver Efficiency Formula
European Milk Thistle Advanced Phospholipid Delivery
Hepatopro
SAMe
Silymarin

PRODUCTS

MINERALS
Biosil
Bone Restore
Bone Strength Formula w/KoAct®
Bone-Up™
Boron Capsules
Calcium Citrate with D3
Chromium Ultra
Copper
Iodoral
Iron Protein Plus
Magnesium
Magnesium Citrate
Only Trace Minerals
Optimized Chromium w/Crominex® 3+
OptiZinc
Sea-Iodine™
Selenium
Se-Methyl L-Selenocysteine
Strontium
Vanadyl Sulfate
Zinc Lozenges

MISCELLANEOUS
Blood Pressure Monitor Arm Cuff
CR Way Edition Advanced Dietary Software

MITOCHONDRIAL SUPPORT
Acetyl-L-Carnitine
Acetyl-L-Carnitine-Arginate
Mitochondrial Basics w/BioPQQ®
Mitochondrial Energy Optimizer w/BioPQQ®
Optimized Carnitine with GlycoCarn®
Super Absorbable CoQ10™ with *d*-Limonene
Super Alpha Lipoic Acid with Biotin
Super R-Lipoic Acid
Super Ubiquinol CoQ10 with Enhanced Mitochondrial Support™

MOOD RELIEF
Adrenal Energy Formula
Bioactive Milk Peptides
L-Theanine
5 HTP
Enhanced Natural Sleep® w/ Melatonin
Enhanced Natural Sleep® w/o Melatonin
Natural Stress Relief
SAMe
St. John's Wort Extract
L-Tryptophan
Optimized Tryptophan Plus

MOUTH CARE
Advanced Oral Hygiene
Mouthwash w/Pomegranate
Toothpaste

MULTIVITAMIN
Booster
Children's Formula Life Extension Mix™
Comprehensive Nutrient Packs Basic
Comprehensive Nutrient Packs Advanced
Life Extension Mix™ Capsules
Life Extension Mix™ Powder
Life Extension Mix™ Tablets
Life Extension Mix™ w/o Copper Capsules
Life Extension Mix™ w/o Copper Tablets
Life Extension Mix™ w/Extra Niacin
Life Extension Mix™ w/Extra Niacin w/o Copper
Life Extension Mix™ w/Stevia Powder
Life Extension Mix™ w/Stevia w/o Copper Powder
Life Extension One-Per-Day
Life Extension Two-Per-Day
Super Booster Softgels w/Advanced K2 Complex

PET CARE
Cat Mix
Dog Mix

PROSTATE & URINARY HEALTH
Optimized Cran-Max® with UTI*Rose*™
5-LOXIN®
Pomi-T®
(Water-Soluble) Pumpkin Seed Extract
Super Saw Palmetto with Beta-Sitosterol
Super Saw Palmetto/Nettle Root Formula w/Beta-Sitosterol
Ultra Natural Prostate Formula

SKIN CARE
Advanced Under Eye Serum with Stem Cells
Amber Self MicroDermAbrasion
Anti-Aging Mask
Anti-Glycation Serum
Anti-Aging Rejuvenating Face Cream with Coffee Extracts
Antioxidant Rejuvenating Foot Cream
Antioxidant Rejuvenating Foot Scrub
Antioxidant Rejuvenating Hand Cream
Antioxidant Rejuvenating Hand Scrub
Anti-Redness & Blemish Lotion
Bio-Collagen w/Patented UC-II®
Bioflavonoid Cream
Broccoli Sprout
Corrective Clearing Mask
DNA Repair Cream
Dual-Action MicroDermAbrasion
Essential Plant Lipids Reparative Serum
Face Master® Platinum
Face Rejuvenating Antioxidant Cream
Enhanced FernBlock® with Red Orange Complex
Fine Line-Less
Hair Suppress Formula
Healing Formula All-in-One Cream
Healing Mask
Hyaluronic Facial Moisturizer
Hydrating Anti-oxidant Face Mist
Hydroderm®
Lifting & Tightening Complex
Lycopene Cream
Melatonin Cream
Mild Facial Cleanser
Neck Rejuvenating Antioxidant Cream
Pigment Correcting Cream
(Ultra) Rejuvenex®
Rejuvenex® Body Lotion
RejuveneX® Factor Firming Serum
Rejuvenating Serum
Renewing Eye Cream
Resveratrol Anti-Oxidant Serum
Skin Lightening Serum
Skin Restoring Phytoceramides w/Lipowheat®
Skin Stem Cell Serum
Stem Cell Cream w/Alpine Rose
Ultra Rejuvenex®
Ultra RejuveNight® w/o Progesterone
Ultra Lip Plumper
Ultra Wrinkle Relaxer
Under Eye Refining Serum
Under Eye Rescue Cream
Vitamin C Serum
Vitamin D Lotion
Vitamin E-ssential Cream
Vitamin K Healing Cream
Youth Serum

SOY
Natural Estrogen w/Pomegranate
Super Absorbable Soy Isoflavones
Ultra Soy Extract

SPECIAL PURPOSE FORMULA
Anti-Alcohol Antioxidants w/HepatoProtection Complex
Benfotiamine w/Thiamine
Breast Health Formula
Butterbur Extract w/Standardized Rosmarinic Acid
Chlorella
Chlorophyllin
Green Coffee Extract CoffeeGenic® (also w/Glucose control)
Coriolus Super Strength
CR Mimetic Longevity Formula
Cinsulin® w/InSea$^{2®}$ and Crominex® 3+
European Leg Solution Diosmin 95
Fem Dophilus
Femmenessence MacaPause®
GlycemicPro™ Transglucosidase
Migra-eeze™
Natural Female Support
Pecta-Sol®
Potassium Iodide
PQQ Caps with BioPQQ®
PteroPure™
Prelox® Natural Sex for Men®
Pyridoxal 5' - Phosphate
Tri Sugar Shield™

SPORTS PERFORMANCE
Creatine Capsules
DMG (N, N-dimethylglycine)
L-Glutamine Capsules
L-Glutamine Powder
Whey Protein Isolate
Whey Protein Concentrate

VITAMINS
Ascorbyl Palmitate Capsules
B12
Beta-Carotene
Biotin Capsules
Buffered Vitamin C Powder
Complete B Complex
Effervescent Vitamin C
Fast-C®
Folic Acid + B12
Gamma E Tocopherol w/Sesame Lignans
Gamma E Tocopherol/Tocotrienols
Inositol Capsules
Mega Lycopene Extract
Methylcobalamin
MK-7
No-Flush Niacin
Optimized Folate
Super Ascorbate C Capsules
Super Ascorbate C Powder
Super K w/Advanced K2 Complex
Tocotrienols w/Sesame Lignans
Vitamin B3 (Niacin) Capsules
Vitamin B6
Vitamin B12 Lozenges
Vitamin C
Vitamin D3
Vitamin D3 w/Sea-Iodine™
Vitamins D and K w/Sea-Iodine™
Vitamin E
Vitamin K2

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Advanced Anti-Adipocyte Formula w/AdipoStat & Integra Lean®
Advanced Natural Appetite Suppress
Alli® Refill Pack
Calorie Control Weight Management™ Formula w/CoffeeGenic® Green Coffee Extract
CoffeeGenic® Weight Management™ with Green Coffee Extract
7-KETO DHEA
DHEA® Complete
Fucoxanthin Slim™
Garcinia HCA
Integra-Lean® African Mango Irvingia
LuraLean® Caps Special Propolmannan Particle Size
Optimized Irvingia w/Phase 3™ Calorie Control Complex
Optimized Saffron with Satiereal®
Natural Appetite Control
Natural Glucose Absorption Control
Super CLA Blend w/Guarana and Sesame Lignans
Super CLA Blend w/Sesame Lignans
WellBetX PGX® plus Mulberry

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No.		Retail Each	Member Each	Qty	Total
	A				
01524	**ACETYL-L-CARNITINE** - 500 mg, 100 veg. caps	$34.00	$25.50		
	Buy 4 bottles, price each	30.00	22.50		
01525	**ACETYL-L-CARNITINE ARGINATE** - 100 veg. caps	59.00	44.25		
	Buy 4 bottles, price each	50.99	38.24		
01628	**ADRENAL ENERGY FORMULA** - 60 veg. caps	24.00	18.00		
	Buy 4 bottles, price each	22.00	16.50		
01630	**ADRENAL ENERGY FORMULA** - 120 veg. caps	46.00	34.50		
	Buy 4 bottles, price each	42.00	31.50		
01308	**ADVANCED LIPID CONTROL** - 60 veg. caps	30.00	22.50		
	Buy 4 bottles, price each	27.00	20.25		
01521	**ADVANCED ORAL HYGIENE** - 60 veg. mint lozenges	20.00	15.00		
	Buy 4 bottles, price each	18.00	13.50		
00681	**AHCC** - 500 mg, 30 caps	59.98	44.99		
*46925	**ALLI® REFILL PACK** - 120 caps	69.95	58.00		
00457	**ALPHA-LIPOIC ACID W/BIOTIN (SUPER)** - 250 mg, 60 caps	37.00	27.75		
	Buy 4 bottles, price each	32.00	24.00		
01440	**ANTI-ALCOHOL ANTIOXIDANTS w/HEPATOPRO** - 100 caps	26.00	19.50		
	Buy 4 bottles, price each	23.00	17.25		
01509	**ANTI-ADIPOCYTE FORMULA w/ADIPOSTAT & INTEGRA LEAN®(ADVANCED)** - 60 veg. caps	39.00	29.25		
	Buy 4 bottles, price each	36.00	27.00		
01625	**APPLEWISE POLYPHENOL EXTRACT** - 600 mg, 30 veg. caps	21.00	15.75		
	Buy 4 bottles, price each	19.00	14.25		
01039	**ARGININE/ORNITHINE** - 500/250, 100 caps	17.99	13.49		
00038	**ARGININE/ORNITHINE POWDER** - 150 grams	22.95	17.21		
	Buy 4 bottles, price each	19.00	14.25		
01624	**(L)-ARGININE CAPS** - 700 mg, 200 veg. caps	26.50	19.88		
	Buy 4 bottles, price each	23.25	17.44		
01617	**ARTHROMAX® w/THEAFLAVINS & APRESFLEX®** - 120 veg. caps	44.00	33.00		
	Buy 4 bottles, price each	40.00	30.00		
01618	**ARTHROMAX® ADVANCED w/UC-II® & APRESFLEX®** - 60 caps	36.00	27.00		
	Buy 4 bottles, price each	32.00	24.00		
01404	**ARTHRO-IMMUNE JOINT SUPPORT** - 60 veg. caps	32.00	24.00		
	Buy 4 bottles, price each	28.00	21.00		
00919	**ARTICHOKE LEAF EXTRACT** - 500 mg, 180 veg. caps	28.00	21.00		
	Buy 4 bottles, price each	25.38	19.04		
01533	**ASCORBYL PALMITATE** - 500 mg, 100 veg. caps	22.50	16.88		
	Buy 4 bottles, price each	20.00	15.00		
00888	**ASHWAGANDHA EXTRACT (OPTIMIZED)** - 60 veg. caps	10.00	7.50		
	Buy 4 bottles, price each	9.00	6.75		
01805	**ASIAN ENERGY BOOST** - 90 veg. caps	24.00	18.00		
	Buy 4 bottles, price each	22.00	16.50		
01066	**ASPIRIN** - 81 mg, 300 enteric coated tablets	6.00	4.50		
	Buy 4 bottles, price each	5.33	4.00		
01720	**ASTAXANTHIN WITH PHOSPHOLIPIDS** - 4 mg, 30 softgels	16.00	12.00		
	Buy 4 bottles, price each	14.00	10.50		
	B				
00920	**BENFOTIAMINE W/ THIAMINE** - 100 mg, 120 veg. caps	$19.95	$14.96		
	Buy 4 bottles, price each	18.60	13.95		
00925	**BENFOTIAMINE (MEGA)** - 250 mg, 120 veg. caps	30.00	22.50		
	Buy 4 bottles, price each	27.00	20.25		
01206	**BERRY COMPLETE** - 30 veg. caps	21.00	15.75		
	Buy 4 bottles, price each	18.67	14.00		

SUB-TOTAL OF COLUMN 1

No.		Retail Each	Member Each	Qty	Total
01496	**BERRY COMPLETE w/ACAI (ENHANCED)** - 60 veg. caps	$29.00	$21.75		
	Buy 4 bottles, price each	26.00	19.50		
00664	**BETA-CAROTENE** - 25,000 IU, 100 softgels	11.25	8.44		
01622	**BIFIDO GI BALANCE** - 60 veg. caps	20.00	15.00		
	Buy 4 bottles, price each	18.00	13.50		
01073	**BILBERRY EXTRACT** - 100 mg, 100 veg. caps	42.00	31.50		
	Buy 4 bottles, price each	38.00	28.50		
01512	**BIOACTIVE MILK PEPTIDES** - 30 caps	18.00	13.50		
	Buy 4 bottles, price each	16.00	12.00		
01631	**BIO-COLLAGEN w/PATENTED UC-II®** - 60 caps	36.00	27.00		
	Buy 4 bottles, price each	32.00	24.00		
*01006	**BIOSIL™** - 5 mg, 30 veg. caps	18.95	15.16		
*01007	**BIOSIL™** - 1 fl oz	31.99	25.59		
00102	**BIOTIN** - 600 mcg, 100 caps	7.50	5.63		
	Buy 4 bottles, price each	6.50	4.88		
01709	**BLACK CUMIN SEED OIL** - 60 softgels	16.00	12.00		
	Buy 4 bottles, price each	14.00	10.50		
01710	**BLACK CUMIN SEED OIL w/BIO-CURCUMIN®** - 60 softgels	32.00	24.00		
	Buy 4 bottles, price each	30.00	22.50		
01008	**BLAST™** - 600 grams of powder	26.95	20.21		
70000	**BLOOD PRESSURE MONITOR** - ARM CUFF (medium)	99.95	64.97		
70004	**BLOOD PRESSURE MONITOR** - WRIST (travel size)	69.95	52.46		
01214	**BLUEBERRY EXTRACT** - 60 veg. caps	22.50	16.88		
	Buy 4 bottles, price each	20.00	15.00		
01438	**BLUEBERRY EXTRACT w/ POMEGRANATE** - 60 veg. caps	30.00	22.50		
	Buy 4 bottles, price each	27.00	20.25		
01506	**BONE FORMULA (DR. STRUM'S INTENSIVE)** - 300 caps	56.00	42.00		
	Buy 4 bottles, price each	50.00	37.50		
01726	**BONE RESTORE** - 120 caps	22.00	16.50		
	Buy 4 bottles, price each	19.00	14.25		
01727	**BONE RESTORE W/VITAMIN K2** - 120 caps	24.00	18.00		
	Buy 4 bottles, price each	22.00	16.50		
01725	**BONE STRENGTH FORMULA w/KOACT®** - 120 veg. caps	45.00	33.75		
	Buy 4 bottles, price each	40.00	30.00		
00313	**BONE-UP®** - 240 caps	28.95	21.71		
	Buy 4 bottles, price each	27.21	20.41		
01379	**BOOSTER** - 60 softgels	48.00	36.00		
	Buy 4 bottles, price each	44.00	33.00		
01680	**BOOSTER w/ADVANCED K2 COMPLEX (SUPER)** - 60 softgels	42.00	31.50		
	Buy 4 bottles, price each	38.00	28.50		
01661	**BORON** - 3 mg, 100 veg. caps	5.95	4.46		
	Buy 4 bottles, price each	5.25	3.94		
00202	**BOSWELLA** - 100 caps	38.00	28.50		
	Buy 4 bottles, price each	30.00	22.50		
01802	**BRAIN SHIELD™** - 60 veg. caps	33.00	24.75		
	Buy 4 bottles, price each	30.00	22.50		
01253	**BRANCHED CHAIN AMINO ACIDS** - 90 veg. caps	19.50	14.63		
	Buy 4 bottles, price each	17.00	12.75		
01699	**BREAST HEALTH FORMULA** - 60 veg. caps	34.00	25.50		
	Buy 4 bottles, price each	30.00	22.50		
00893	**BRITE EYES III** - 2 vials, 5 ml each	34.00	25.50		
	Buy 4 boxes, price each	32.00	24.00		

SUB-TOTAL OF COLUMN 2

To order online visit: www.LifeExtension.com

Buyers Club Order Form

No.		Retail Each	Member Each	Qty	Total
01203	**BROMELAIN (SPECIALLY-COATED)** - 500 mg, 60 enteric coated tablets	$21.00	$15.75		
	Buy 4 bottles, price each	19.00	14.25		
00884	**BUTTERBUR EXT. w/STANDARDIZED ROSMARINIC ACID** - 60 softgels	44.00	33.00		
	Buy 4 bottles, price each	39.60	29.70		
	C				
01653	**CALCIUM CITRATE w/VITAMIN D** - 300 caps	$24.00	$18.00		
	Buy 4 bottles, price each	21.25	15.94		
01651	**CALCIUM D-GLUCARATE** - 200 mg, 60 veg. caps	18.00	13.50		
	Buy 4 bottles, price each	15.00	11.25		
01693	**CALORIE CONTROL WEIGHT MANAGEMENT FORMULA w/COFFEEGENIC® GREEN COFFEE EXTRACT BLUEBERRY FLAVOR** - 414 grams powder	60.00	45.00		
	Buy 4 jars, price each	54.00	40.50		
	Buy 8 jars, price each	50.00	37.50		
01700	**CARDIO PEAK™ W/STANDARDIZED HAWTHORN & ARJUNA** - 120 veg. caps	36.00	27.00		
	Buy 4 bottles, price each	32.00	24.00		
00916	**CARNITINE w/GLYCOCARN® (OPTIMIZED)** - 60 veg. caps	36.00	27.00		
	Buy 4 bottles, price each	32.00	24.00		
01532	**L-CARNITINE** - 500 mg, 30 veg. caps	15.00	11.25		
	Buy 4 bottles, price each	13.20	9.90		
01719	**L-CARNITINE POWDER NATURAL LEMON FLAVOR** - 114 grams	28.00	21.00		
	Buy 4 jars, price each	24.00	18.00		
01258	**CARNOSOOTHE w/PICROPROTECT™** - 60 veg. caps	29.95	22.46		
	Buy 4 bottles, price each	27.00	20.25		
01687	**CARNOSINE (SUPER)** - 500 mg, 90 veg. caps	66.00	49.50		
	Buy 4 bottles, price each	60.00	45.00		
01003	**CAT MIX** - 100 grams powder	15.00	11.25		
	Buy 4 jars, price each	12.00	9.00		
01659	**CDP CHOLINE CAPS** - 250 mg, 60 veg. caps	36.00	27.00		
	Buy 4 bottles, price each	34.00	25.50		
01391	**CHILDREN'S FORMULA LIFE EXTENSION MIX™** - 100 chewable tablets	20.00	15.00		
	Buy 4 bottles, price each	18.00	13.50		
00550	**CHLORELLA** - 500 mg, 200 tablets	23.50	17.63		
01571	**CHLOROPHYLLIN** - 100 mg, 100 veg. caps	24.00	18.00		
	Buy 4 bottles, price each	20.00	15.00		
01359	**CHO-LESS™** - 90 capsules	32.50	24.38		
01477	**CHROMIUM ULTRA** - 100 veg. caps	24.00	18.00		
	Buy 4 bottles, price each	21.00	15.75		
01504	**CHROMIUM W/CROMINEX® 3+ (OPTIMIZED)** - 500 mcg, 60 veg. caps	9.00	6.75		
	Buy 4 bottles, price each	8.00	6.00		
01503	**CINSULIN® W/INSEA2® AND CROMINEX® 3+** - 90 veg. caps	38.00	28.50		
	Buy 4 bottles, price each	34.00	25.50		
00818	**CLA BLEND W/SESAME LIGNANS (SUPER)** - 1,000 mg, 120 softgels	36.00	27.00		
	Buy 4 bottles, price each	33.00	24.75		
	Buy 10 bottles, price each	26.33	19.75		
00819	**CLA BLEND w/GUARANA & SESAME (SUPER)**-1,000 mg, 120 softgels	42.00	31.50		
	Buy 4 bottles, price each	38.33	28.75		
01707	**COFFEEGENIC® WEIGHT MANAGEMENT™ w/GREEN COFFEE EXTRACT** - 90 veg. caps	48.00	36.00		
	Buy 4 bottles, price each	42.00	31.50		
01896	**COGNITEX® w/BRAIN SHIELD™** - 90 softgels	66.00	49.50		
	Buy 4 bottles, price each	58.00	43.50		
	Buy 8 bottles, price each	52.00	39.00		

SUB-TOTAL OF COLUMN 3

No.		Retail Each	Member Each	Qty	Total
01897	**COGNITEX® w/PREGNENOLONE & BRAIN SHIELD™** - 90 softgels	$68.00	$51.00		
	Buy 4 bottles, price each	60.00	45.00		
	Buy 8 bottles, price each	54.00	40.50		
01421	**COGNITEX® BASICS** - 60 softgels	38.00	28.50		
	Buy 4 bottles, price each	35.00	26.25		
	Buy 12 bottles, price each	32.00	24.00		
01735	**COMPLETE B-COMPLEX** - 60 veg. caps	10.00	7.50		
	Buy 4 bottles, price each	9.00	6.75		
01795	**COMPREHENSIVE NUTRIENT PACKS BASIC** - 30 packs	48.00	36.00		
	Buy 4 boxes, price each	44.00	33.00		
01796	**COMPREHENSIVE NUTRIENT PACKS ADVANCED** - 30 packs	90.00	67.50		
	Buy 4 boxes, price each	82.00	61.50		
00119	**COPPER CAPSULES** - 2 mg, 100 caps	9.91	7.43		
00949	**COQ10™ w/ d-LIMONENE (SUPER ABSORBABLE)** - 50 mg, 60 softgels	25.00	18.75		
	Buy 4 bottles, price each	22.00	16.50		
	Buy 10 bottles, price each	20.00	15.00		
00950	**COQ10™ w/ d-LIMONENE (SUPER ABSORBABLE)** - 100 mg, 100 softgels	66.00	49.50		
	Buy 4 bottles, price each	60.00	45.00		
	Buy 10 bottles, price each	56.00	42.00		
01226	**COQ10 (SUPER UBIQUINOL)** - 100 mg, 60 softgels	56.00	42.00		
	Buy 4 bottles, price each	52.00	39.00		
	Buy 10 bottles, price each	48.00	36.00		
01733	**COQ10 w/BIOPQQ® (SUPER UBIQUINOL)** - 100 mg, 30 softgels	54.00	40.50		
	Buy 4 bottles, price each	50.00	37.50		
	Buy 10 bottles, price each	46.00	34.50		
01426	**COQ10 W/ENH MITOCHONDRIAL SUPPORT™ (SUPER UBIQUINOL)**-100 mg, 60 softgels	62.00	46.50		
	Buy 4 bottles, price each	56.00	42.00		
	Buy 10 bottles, price each	52.00	39.00		
01425	**COQ10 W/ENH MITOCHONDRIAL SUPPORT™ (SUPER UBIQUINOL)**-50 mg, 100 softgels	58.00	43.50		
	Buy 4 bottles, price each	53.00	39.75		
	Buy 10 bottles, price each	50.00	37.50		
01427	**COQ10 W/ENH MITOCHONDRIAL SUPPORT™ (SUPER UBIQUINOL)**-50 mg, 30 softgels	20.00	15.00		
	Buy 4 bottles, price each	18.00	13.50		
01431	**COQ10 W/ENH MITOCHONDRIAL SUPPORT™ (SUPER UBIQUINOL)**-200 mg, 30 softgels	62.00	46.50		
	Buy 4 bottles, price each	56.00	42.00		
	Buy 10 bottles, price each	52.00	39.00		
01053	**CORIOLUS SUPER STRENGTH** - 600 mg, 150 veg. caps	99.95	74.96		
80140	**COSMESIS ADVANCED UNDER EYE SERUM w/STEM CELLS** - .33 oz	49.00	36.75		
	Buy 2 bottles, price each	42.00	31.50		
80139	**COSMESIS AMBER SELF MICRODERMABRASION** - 2 oz	49.00	36.75		
	Buy 2 jars, price each	42.00	31.50		
80151	**COSMESIS ANTI-AGING FACE CREAM W/COFFEE EXTRACTS** - 2 oz jar	65.00	48.75		
	Buy 2 jars, price each	57.00	42.75		
80118	**COSMESIS ANTI-AGING MASK** - 2 oz	72.00	54.00		
	Buy 2 bottles, price each	63.36	47.52		
80134	**COSMESIS ANTI-GLYCATION SERUM** - 1 oz **W/BLUEBERRY & POMEGRANATE EXTRACTS**	33.00	24.75		
	Buy 2 bottles, price each	31.35	23.51		
80133	**COSMESIS ANTIOXIDANT FACIAL MIST** - 2 oz	32.00	24.00		
	Buy 2 bottles, price each	30.40	22.80		
80127	**COSMESIS ANTIOXIDANT REJUVENATING FOOT CREAM** - 2 oz	45.00	33.75		
	Buy 2 jars, price each	42.80	32.10		

SUB-TOTAL OF COLUMN 4

Buyers Club Order Form

To order call: 1.954.766.8433 or 1.800.544.4440

No.		Retail Each	Member Each	Qty	Total
	C CONTINUED				
80128	**COSMESIS ANTIOXIDANT REJUVENATING FOOT SCRUB** - 2 oz	$59.00	$44.25		
	Buy 2 jars, price each	51.92	38.94		
80117	**COSMESIS ANTIOXIDANT REJUVENATING HAND CREAM** - 2 oz	64.00	48.00		
	Buy 2 jars, price each	57.49	43.12		
80121	**COSMESIS ANTIOXIDANT REJUVENATING HAND SCRUB** - 2 oz	58.00	43.50		
	Buy 2 jars, price each	51.04	38.28		
80105	**COSMESIS ANTI-REDNESS & ADULT BLEMISH LOTION** - 1 oz	74.50	55.88		
	Buy 2 bottles, price each	65.56	49.17		
80147	**COSMESIS BIOFLAVONOID CREAM** - 1 oz jar	46.00	34.50		
	Buy 2 jars, price each	39.00	29..25		
80144	**COSMESIS BROCCOLI SPROUT CREAM** - 1 oz	46.00	34.50		
	Buy 2 jars, price each	39.00	29.25		
80120	**COSMESIS CORRECTIVE CLEARING MASK** - 2 oz	64.50	48.38		
	Buy 2 jars, price each	56.76	42.57		
80141	**COSMESIS DNA REPAIR CREAM** - 1 oz jar	49.00	36.75		
	Buy 2 jars, price each	42.00	31.50		
80108	**COSMESIS ESSENTIAL PLANT LIPIDS REPARATIVE SERUM** - 1 oz	74.95	56.21		
	Buy 2 bottles, price each	65.95	49.46		
80123	**COSMESIS FACE REJUVENATING ANTIOXIDANT CREAM** - 2 oz	69.50	52.13		
	Buy 2 jars, price each	61.16	45.87		
80107	**COSMESIS FINE LINE-LESS** - 1 oz	74.50	55.88		
	Buy 2 bottles, price each	65.56	49.17		
80131	**COSMESIS HAIR SUPPRESS FORMULA** - 4 oz	59.00	44.25		
	Buy 2 bottles, price each	51.92	38.94		
80137	**COSMESIS HEALING FORMULA ALL-IN-ONE CREAM** - 1 oz	53.00	39.75		
	Buy 2 jars, price each	45.43	34.07		
80115	**COSMESIS HEALING MASK** - 2 oz	64.50	48.38		
	Buy 2 bottles, price each	56.76	42.57		
80102	**COSMESIS HEALING VITAMIN K CREAM** - 1 oz	79.50	59.63		
	Buy 2 bottles, price each	69.96	52.47		
80109	**COSMESIS HYALURONIC FACIAL MOISTURIZER** - 1 oz	58.00	43.50		
	Buy 2 bottles, price each	51.04	38.28		
80110	**COSMESIS HYALURONIC OIL-FREE FACIAL MOISTURIZER** - 1 oz	58.00	43.50		
	Buy 2 bottles, price each	51.04	38.28		
80138	**COSMESIS HYDRATING ANTIOXIDANT FACE MIST** - 4 oz	39.95	29.96		
	Buy 2 bottles, price each	38.00	28.50		
80103	**COSMESIS LIFTING & TIGHTENING COMPLEX** - 1 oz	74.50	55.88		
	Buy 2 tubes, price each	65.56	49.17		
80146	**COSMESIS LYCOPENE CREAM** - 1 oz jar	28.00	21.00		
	Buy 2 jars, price each	25.40	19.05		
80135	**COSMESIS MELATONIN CREAM** - 1 oz	33.00	24.75		
	Buy 2 jars, price each	27.10	20.33		
80114	**COSMESIS MILD FACIAL CLEANSER** - 8 oz	59.00	44.25		
	Buy 2 bottles, price each	51.92	38.94		
80122	**COSMESIS NECK REJUVENATING ANTIOXIDANT CREAM** - 2 oz	64.00	48.00		
	Buy 2 jars, price each	56.32	42.24		
80111	**COSMESIS PIGMENT CORRECTING CREAM** - 1/2 oz	74.00	55.50		
	Buy 2 bottles, price each	65.12	48.84		
80106	**COSMESIS REJUVENATING SERUM** - 1 oz	74.50	55.88		
	Buy 2 bottles, price each	65.56	49.17		
80150	**COSMESIS RENEWING EYE CREAM** - 1/2 oz	65.00	48.75		
	Buy 2 jars, price each	57.00	42.75		
80142	**COSMESIS RESVERATROL ANTI-OXIDANT SERUM** - 1 oz	46.00	34.50		
	Buy 2 bottles, price each	39.00	29.25		

SUB-TOTAL OF COLUMN 5

No.		Retail Each	Member Each	Qty	Total
80112	**COSMESIS SKIN LIGHTENING SERUM** - 1/2 oz	$85.00	$63.75		
	Buy 2 bottles, price each	74.80	56.10		
80130	**COSMESIS SKIN STEM CELL SERUM** - 1 oz	74.00	55.50		
	Buy 2 bottles, price each	69.00	51.75		
80143	**COSMESIS STEM CELL CREAM W/ALPINE ROSE** - 1 oz jar	66.00	49.50		
	Buy 2 jars, price each	58.00	43.50		
80148	**COSMESIS TIGHTENING & FIRMING NECK CREAM** - 2 oz jar	39.00	29.25		
	Buy 2 jars, price each	35.00	26.25		
80116	**COSMESIS ULTRA LIP PLUMPER** - 1/3 oz	64.00	48.00		
	Buy 2 bottles, price each	56.32	42.24		
80101	**COSMESIS ULTRA WRINKLE RELAXER** - 1 oz	89.95	67.46		
	Buy 2 bottles, price each	79.76	59.82		
80113	**COSMESIS UNDER EYE REFINING SERUM** - 1/2 oz	74.50	55.88		
	Buy 2 bottles, price each	65.56	49.17		
80104	**COSMESIS UNDER EYE RESCUE CREAM** - 1/2 oz	74.50	55.88		
	Buy 2 bottles, price each	65.56	49.17		
80129	**COSMESIS VITAMIN C SERUM** - 1 oz	85.00	63.75		
	Buy 2 bottles, price each	74.80	56.10		
80136	**COSMESIS VITAMIN D LOTION** - 4 oz	36.00	27.00		
	Buy 2 bottles, price each	33.66	25.25		
80145	**COSMESIS VITAMIN E-ESSENTIAL CREAM** - 1 oz	28.00	21.00		
	Buy 2 jars, price each	26.00	19.50		
80149	**COSMESIS YOUTH SERUM** - 1 oz	65.00	48.75		
	Buy 2 bottles, price each	57.00	42.75		
00862	**CRAN-MAX®** - 500 mg, 60 veg. caps	17.50	13.13		
	Buy 4 bottles, price each	15.00	11.25		
01424	**CRAN-MAX® with UTI*ROSE*™ (OPTIMIZED)** - 60 veg. caps	18.00	13.50		
	Buy 4 bottles, price each	16.00	12.00		
01529	**CREATINE CAPSULES** - 120 veg. caps	10.95	8.21		
	Buy 4 bottles, price each	9.25	6.94		
01746	**CREATINE WHEY GLUTAMINE POWDER** - 454 grams (vanilla)	30.00	22.50		
	Buy 4 jars, price each	27.00	20.25		
01429	**CR MIMETIC LONGEVITY FORMULA** - 60 veg. caps	39.00	29.25		
	Buy 4 bottles, price each	36.00	27.00		
*33840	**CRWAY GREAT GLUCOSE CONTROL CD**	98.00	82.00		
**CRWAY	**CR WAY OPTIMAL HEALTH PROGRAM SOFTWARE**	195.00	195.00		
00407	**CURCUMIN® (SUPER BIO)** - 400 mg, 60 veg. caps	38.00	28.50		
	Buy 4 bottles, price each	35.00	26.25		
01808	**CURCUMIN® w/GINGER & TURMERONES (ADVANCED BIO)**-30 softgels	30.00	22.50		
	Buy 4 bottles, price each	27.00	20.25		
01804	**CYTOKINE SUPPRESS™ w/EGCG** - 30 veg. caps	30.00	22.50		
	Buy 4 bottles, price each	27.00	20.25		
	D				
00658	**7-KETO® DHEA METABOLITE** - 25 mg, 100 caps	$28.00	$21.00		
	Buy 4 bottles, price each	24.00	18.00		
01479	**7-KETO® DHEA METABOLITE** - 100 mg, 60 veg. caps	40.00	30.00		
	Buy 4 bottles, price each	36.00	27.00		
01640	**DHA (VEGETARIAN SOURCED)** - 200 mg, 30 veg. softgels	20.00	15.00		
	Buy 4 bottles, price each	18.00	13.50		
00607	**DHEA** - 25 mg, 100 tablets (dissolve in mouth)	14.00	10.50		
	Buy 4 bottles, price each	11.75	8.81		
01478	**DHEA COMPLETE** - 60 veg. caps	48.00	36.00		
	Buy 4 bottles, price each	43.20	32.40		

SUB-TOTAL OF COLUMN 6

To order online visit: www.LifeExtension.com

Buyers Club Order Form

No.		Retail Each	Member Each	Qty	Total
00335	**DHEA** - 25 mg, 100 caps	$18.00	$13.50		
	Buy 4 bottles, price each	15.00	11.25		
00454	**DHEA** - 15 mg, 100 caps	14.00	10.50		
	Buy 4 bottles, price each	12.00	9.00		
00882	**DHEA** - 50 mg, 60 caps	19.00	14.25		
	Buy 4 bottles, price each	17.00	12.75		
01689	**DHEA** - 100 mg, 60 veg. caps	24.00	18.00		
	Buy 4 bottles, price each	22.00	16.50		
01358	**DIGEST RC** - 30 tablets	19.95	14.96		
	Buy 4 boxes, price each	17.00	12.75		
01272	**DIGESTIVE ENZYMES (ENHANCED SUPER)** - 100 veg. caps	18.95	14.21		
	Buy 4 bottles, price each	16.00	12.00		
01671	**D,L-PHENYLALANINE CAPSULES** - 500 mg, 100 veg. caps	18.75	14.06		
	Buy 4 bottles, price each	16.00	12.00		
01540	**DMAE BITARTRATE** - 150 mg, 200 veg. caps	18.00	13.50		
	Buy 4 bottles, price each	15.00	11.25		
00059	**DMG** - 125 mg, 60 tablets	22.80	17.10		
	Buy 4 boxes, price each	21.00	15.75		
01570	**DNA PROTECTION FORMULA** - 60 veg. caps	34.00	25.50		
	Buy 4 bottles, price each	32.00	24.00		
00544	**DOG MIX** - 100 grams powder	19.50	14.63		
	Buy 4 jars, price each	16.00	12.00		
00321	**DR. PROCTOR'S ADVANCED HAIR FORMULA** - 2 oz	39.95	29.96		
	Buy 4 bottles, price each	32.00	24.00		
00320	**DR. PROCTOR'S HAIR FORMULA SHAMPOO** - 8 oz	24.95	18.71		
	Buy 4 bottles, price each	22.00	16.50		
00899	**DUAL-ACTION MICRODERMABRASION ADV. EXFOLIATE** - 2.4 oz	39.95	29.96		
	Buy 4 jars, price each	38.95	29.21		
	E				
01528	**ECHINACEA EXTRACT** - 250 mg, 60 veg. caps	$14.35	$10.76		
	Buy 4 bottles, price each	12.50	9.38		
01498	**ENDOTHELIAL DEFENSE™ w/FULL-SPECTRUM POMEGRANATE™** - 60 softgels	56.00	42.00		
	Buy 4 bottles, price each	52.00	39.00		
00997	**ENDOTHELIAL DEFENSE™ w/GLISODIN®** - 60 veg. caps	54.00	40.50		
	Buy 4 bottles, price each	48.00	36.00		
00625	**EPA/DHA (MEGA)** - 120 softgels	19.95	14.96		
	Buy 4 bottles, price each	18.00	13.50		
01737	**ESOPHAGEAL GUARDIAN** (Berry flavor) - 60 chewable tablets	36.00	27.00		
	Buy 4 bottles, price each	32.00	24.00		
01042	**EUROPEAN LEG SOLUTION DIOSMIN 95** - 600 mg, 30 veg. tabs	20.00	15.00		
	Buy 4 bottles, price each	18.00	13.50		
01706	**EXTRAORDINARY ENZYMES** - 60 caps	26.00	19.50		
	Buy 4 bottles, price each	24.00	18.00		
01514	**EYE PRESSURE SUPPORT w/MIRTOGENOL®** - 30 veg. caps	38.00	28.50		
	Buy 4 bottles, price each	34.00	25.50		
	F				
†01054	**FACE MASTER® PLATINUM**	$199.00	$199.00		
00965	**FAST-ACTING JOINT FORMULA** - 30 caps	39.00	29.25		
	Buy 4 bottles, price each	36.00	27.00		
01717	**FAST-C® w/DIHYDROQUERCETIN** - 120 veg. tabs	26.00	19.50		
	Buy 4 bottles, price each	24.00	18.00		
20053	**FEM DOPHILUS®** - 30 caps	25.95	19.46		
20055	**FEM DOPHILUS®** - 60 caps	39.95	29.96		

SUB-TOTAL OF COLUMN 7

No.		Retail Each	Member Each	Qty	Total
01064	**FEMMENESSENCE MACAPAUSE®** - 120 veg. caps	$34.99	$26.24		
01728	**FERNBLOCK® w/RED ORANGE COMPLEX (ENHANCED)** - 30 veg. caps	42.00	31.50		
	Buy 4 bottles, price each	38.00	28.50		
01670	**FIBER FOOD CAPS** - 200 veg. caps	16.00	12.00		
	Buy 4 bottles, price each	14.00	10.50		
	Buy 10 bottles, price each	13.00	9.75		
00718	**FIBRINOGEN RESIST™** - 30 veg. caps	49.00	36.75		
	Buy 4 bottles, price each	44.00	33.00		
01806	**FLORASSIST™ PROBIOTIC** - 30 liquid veg. caps	33.00	24.75		
	Buy 4 boxes, price each	30.00	22.50		
01439	**FOLATE (OPTIMIZED) (L-METHYLFOLATE)** 1,000 mcg - 100 veg. caps	28.00	21.00		
	Buy 4 bottles, price each	25.00	18.75		
01641	**FOLIC ACID + B12 CAPSULES** - 200 veg. caps	10.50	7.88		
	Buy 4 bottles, price each	9.50	7.13		
01544	**FORSKOLIN** - 10 mg, 60 veg.caps	16.00	12.00		
	Buy 4 bottles, price each	14.00	10.50		
01513	**FUCOIDAN w/MARITECH® 926 (OPTIMIZED)** - 60 veg. caps	36.00	27.00		
	Buy 4 bottles, price each	33.00	24.75		
00993	**FUCOXANTHIN-SLIM™** - 90 softgels	44.00	33.00		
	Buy 4 bottles, price each	39.00	29.25		
	G				
00559	**GAMMA E TOCOPHEROL/TOCOTRIENOLS** - 60 softgels	$42.00	$31.50		
	Buy 4 bottles, price each	37.00	27.75		
00759	**GAMMA E TOCOPHEROL W/SESAME LIGNANS** - 60 softgels	32.00	24.00		
	Buy 4 bottles, price each	29.00	21.75		
01394	**(OPTIMIZED) GARLIC** - 200 veg. caps	24.95	18.71		
	Buy 4 bottles, price each	21.00	15.75		
01301	**GH PITUITARY SUPPORT DAY FORMULA** - 120 tabs	48.00	36.00		
	Buy 4 bottles, price each	44.00	33.00		
01302	**GH PITUITARY SUPPORT NIGHT FORMULA** - 120 veg. caps	25.00	18.75		
	Buy 4 bottles, price each	22.50	16.88		
***01228	**GINGER FORCE** - 60 softgels	29.95	22.46		
01658	**GINKGO BILOBA CERTIFIED EXTRACT™** - 120 mg, 365 veg. caps	46.00	34.50		
	Buy 2 bottles, price each	43.50	32.63		
01648	**GINKGO EXTRACT 28/7 (SUPER)** - 120 mg, 100 veg. caps	29.00	21.75		
	Buy 4 bottles, price each	26.50	19.88		
00756	**GLA WITH SESAME LIGNANS (MEGA)** - 60 softgels	19.50	14.63		
	Buy 4 bottles, price each	18.00	13.50		
00345	**(L) GLUTAMINE CAPSULES** - 500 mg, 100 caps	14.95	11.21		
	Buy 4 bottles, price each	13.50	10.13		
00141	**(L)-GLUTAMINE POWDER** - 100 grams	22.00	16.50		
	Buy 4 bottles, price each	20.00	15.00		
00522	**GLUCOSAMINE/CHONDROITIN CAPSULES** - 100 caps	38.00	28.50		
	Buy 4 bottles, price each	32.00	24.00		
01541	**GLUTATHIONE, CYSTEINE & C** - 100 veg. caps	20.00	15.00		
	Buy 4 bottles, price each	18.00	13.50		
00314	**L-GLUTATHIONE (MEGA)** - 250 mg, 60 caps	39.64	29.73		
01731	**GLYCEMICPRO™ TRANSGLUCOSIDASE** - 60 veg. caps	48.00	36.00		
	Buy 4 bottles, price each	42.00	31.50		
01669	**GLYCINE** - 1,000 mg, 100 veg. caps	12.00	9.00		
	Buy 4 bottles, price each	10.80	8.10		
01091	**GRAPE EXTRACT w/RESVERATROL (WHOLE)** - 60 veg. caps	36.00	27.00		
	Buy 4 bottles, price each	34.00	25.50		

SUB-TOTAL OF COLUMN 8

Buyers Club Order Form

To order call: 1.954.766.8433 or 1.800.544.4440

No.		Retail Each	Member Each	Qty	Total
	G CONTINUED				
01411	**GRAPE SEED EXTRACT w/RESVERATROL & PTEROSTILBENE** - 100 mg, 60 veg. caps	$36.00	$27.00		
	Buy 4 bottles, price each	34.00	25.50		
01604	**GREEN COFFEE EXTRACT COFFEEGENIC®** - 200 mg, 90 veg. caps	25.00	18.75		
	Buy 4 bottles, price each	22.00	16.50		
01620	**GREEN COFFEE EXTRACT COFFEEGENIC®** - 400 mg, 90 veg. caps	38.00	28.50		
	Buy 4 bottles, price each	34.00	25.50		
00953	**GREEN TEA EXTRACT (MEGA)** - lightly caffeinated - 100 veg. caps	30.00	22.50		
	Buy 4 bottles, price each	28.00	21.00		
00954	**GREEN TEA EXTRACT (MEGA)** - decaffeinated - 100 veg. caps	30.00	22.50		
	Buy 4 bottles, price each	28.00	21.00		
	H				
01074	**5 HTP** - 100 mg, 60 caps	$27.95	$20.96		
01738	**HCA (GARCINIA)** - 90 veg. caps	16.00	12.00		
	Buy 4 bottles, price each	14.00	10.50		
01393	**HEPATOPRO** - 900 mg, 60 softgels	50.00	37.50		
	Buy 4 bottles, price each	46.00	34.50		
01435	**HOMOCYSTEINE RESIST** - 100 caps	24.00	18.00		
	Buy 4 bottles, price each	21.60	16.20		
01527	**HUPERZINE A** - 200 mcg, 60 veg caps	40.00	30.00		
	Buy 4 bottles, price each	36.00	27.00		
00661	**HYDRODERM®** - 1 oz	79.95	59.96		
	Buy 2 bottles, price each	65.33	49.00		
	I				
*01060	**i26® HYPERIMMUNE EGG** - 140 grams powder	$54.99	$46.75		
01704	**IMMUNE MODULATOR W/TINOFEND®** - 60 veg. caps	17.00	12.75		
	Buy 4 bottles, price each	15.00	11.25		
00955	**IMMUNE PROTECT W/PARACTIN®** - 30 veg. caps	29.50	22.13		
	Buy 4 bottles, price each	26.55	19.91		
01049	**INNERPOWER™** - 555 grams powder	42.00	31.50		
01674	**INOSITOL CAPSULES** - 1,000 mg, 360 veg. caps	62.00	46.50		
	Buy 4 bottles, price each	58.00	43.50		
01292	**INTEGRA-LEAN® AFRICAN MANGO IRVINGIA** - 150 mg, 60 veg. caps	28.00	21.00		
	Buy 4 bottles, price each	24.00	18.00		
01002	**IODORAL®** - 180 tabs	50.00	37.50		
01677	**IRON PROTEIN PLUS** - 300 mg, 100 veg. caps	28.00	21.00		
	Buy 4 bottles, price each	26.00	19.50		
01492	**IRVINGIA W/PHASE 3™** - 120 veg. caps **CALORIE CONTROL COMPLEX (OPTIMIZED AFRICAN MANGO)**	56.00	42.00		
	Buy 4 bottles, price each	48.00	36.00		
	J, K				
00056	**JARRO-DOPHILUS EPS™** - 60 veg. caps	$22.95	$17.21		
01388	**JARRO-DOPHILUS ORAL PROBIOTIC LOZENGE** - Pom-Berry flavor, 8 pieces	4.95	3.71		
01724	**K w/ADVANCED K2 COMPLEX (SUPER)** - 90 softgels	30.00	22.50		
	Buy 4 bottles, price each	27.00	20.25		
01600	**KRILL HEALTHY JOINT FORMULA** - 30 softgels	32.00	24.00		
	Buy 4 bottles, price each	29.00	21.75		
01050	**(NKO) KRILL OIL PHOSPH OMEGA** - 60 softgels	33.95	25.46		
00316	**KYOLIC® GARLIC FORMULA 102** - 200 caps	26.45	19.84		
00214	**KYOLIC® GARLIC FORMULA 105** - 200 caps	27.45	20.59		
00789	**KYOLIC® RESERVE** - 600 mg, 120 caps	27.95	20.96		

SUB-TOTAL OF COLUMN 9

No.		Retail Each	Member Each	Qty	Total
	L				
01681	**LACTOFERRIN (APOLACTOFERRIN) CAPS** - 60 caps	$48.00	$36.00		
	Buy 4 bottles, price each	44.00	33.00		
01702	**LACTOSOLV™ LONG LASTING LACTASE** - 30 caps	30.00	22.50		
	Buy 4 boxes, price each	27.00	20.25		
00020	**LECITHIN** - 16 oz. granules	15.00	11.25		
	Buy 4 jars, price each	12.50	9.38		
01855	**LIFE EXTENSION MIX™** - 315 tablets	98.00	73.50		
	Buy 4 bottles, price each	86.00	64.50		
	Buy 10 bottles, price each	69.50	52.13		
01857	**LIFE EXTENSION MIX™ W/EXTRA NIACIN** - 315 tablets	98.00	73.50		
	Buy 4 bottles, price each	86.00	64.50		
	Buy 10 bottles, price each	69.50	52.13		
01854	**LIFE EXTENSION MIX™** - 490 caps	110.00	82.50		
	Buy 4 bottles, price each	98.00	73.50		
	Buy 10 bottles, price each	85.00	63.75		
01856	**LIFE EXTENSION MIX™ POWDER** - 14.81 oz	98.00	73.50		
	Buy 4 bottles, price each	86.00	64.50		
	Buy 10 bottles, price each	72.00	54.00		
01865	**LIFE EXTENSION MIX™** - 315 tablets w/o copper	98.00	73.50		
	Buy 4 bottles, price each	86.00	64.50		
	Buy 10 bottles, price each	69.50	52.13		
01867	**LIFE EXTENSION MIX™ W/EXTRA NIACIN** 315 tablets w/o copper	98.00	73.50		
	Buy 4 bottles, price each	86.00	64.50		
	Buy 10 bottles, price each	69.50	52.13		
01864	**LIFE EXTENSION MIX™** - 490 caps w/o copper	110.00	82.50		
	Buy 4 bottles, price each	98.00	73.50		
	Buy 10 bottles, price each	85.00	63.75		
01866	**LIFE EXTENSION MIX™ POWDER** - 14.81 oz w/o copper	98.00	73.50		
	Buy 4 bottles, price each	86.00	64.50		
	Buy 10 bottles, price each	72.00	54.00		
00263	**LIFE FLORA™** - 300 mg, 120 caps	20.50	15.38		
01608	**LIVER EFFICIENCY FORMULA** - 30 veg. caps	18.00	13.50		
	Buy 4 bottles, price each	16.00	12.00		
01639	**5-LOX INHIBITOR W/APRESFLEX®** - 100 mg, 60 veg. caps	22.00	16.50		
	Buy 4 bottles, price each	20.00	15.00		
01678	**L-LYSINE** - 620 mg, 100 veg. caps	9.00	6.75		
	Buy 4 bottles, price each	8.00	6.00		
01470	**LURALEAN® CAPS SPECIAL PROPOLMANNAN PARTICLE SIZE** - 120 veg. caps	28.00	21.00		
	Buy 4 bottles, price each	25.00	18.75		
00455	**LYCOPENE EXTRACT (MEGA)** - 15 mg, 90 softgels	35.00	26.25		
	Buy 4 bottles, price each	30.00	22.50		
	M				
01459	**MAGNESIUM CAPS** - 500 mg, 100 veg. caps	$12.00	$9.00		
	Buy 4 bottles, price each	10.00	7.50		
01682	**MAGNESIUM CITRATE** - 160 mg, 100 veg. caps	9.00	6.75		
	Buy 4 bottles, price each	7.50	5.63		
01668	**MELATONIN** - 300 mcg, 100 veg. caps	5.75	4.31		
	Buy 4 bottles, price each	5.00	3.75		
01083	**MELATONIN** - 500 mcg, 200 veg. caps	18.00	13.50		
	Buy 4 bottles, price each	16.00	12.00		

SUB-TOTAL OF COLUMN 10

To order online visit: www.LifeExtension.com

Buyers Club Order Form

No.		Retail Each	Member Each	Qty	Total
00329	**MELATONIN** - 1 mg, 60 caps	$5.00	$3.75		
	Buy 4 bottles, price each	4.63	3.47		
00330	**MELATONIN** - 3 mg, 60 caps	8.00	6.00		
	Buy 4 bottles, price each	6.88	5.16		
01786	**MELATONIN TIME RELEASE** - 3 mg, 60 veg. tabs	12.00	9.00		
	Buy 4 bottles, price each	11.00	8.25		
00331	**MELATONIN** - 10 mg, 60 caps	28.00	21.00		
	Buy 4 bottles, price each	24.00	18.00		
00332	**MELATONIN** - 3 mg, 60 veg. lozenges	8.00	6.00		
	Buy 4 bottles, price each	6.88	5.16		
01734	**MELATONIN** (Fast Acting Liquid) - 3 mg (Natural Citrus-Van)	12.00	9.00		
	Buy 4 bottles, price each	11.00	8.25		
01787	**MELATONIN TIME RELEASE** - 300 mcg, 100 veg. tabs	12.00	9.00		
	Buy 4 bottles, price each	11.00	8.25		
01788	**MELATONIN TIME RELEASE** - 750 mcg, 60 veg. tablets	8.00	6.00		
	Buy 4 bottles, price each	7.00	5.25		
01536	**METHYLCOBALAMIN** - 1 mg, 60 lozenges (vanilla)	9.95	7.46		
	Buy 4 bottles, price each	8.00	6.00		
01537	**METHYLCOBALAMIN** - 5 mg, 60 lozenges (vanilla)	32.00	24.00		
	Buy 4 bottles, price each	25.00	18.75		
	Buy 10 bottles, price each	23.00	17.25		
00709	**MIGRA-EEZE™ (BUTTERBUR)** - 60 softgels	29.50	22.13		
	Buy 4 bottles, price each	26.33	19.75		
01800	**MIGRA-MAG w/BRAIN SHIELD™** - 90 veg. caps	22.00	16.50		
	Buy 4 bottles, price each	20.00	15.00		
01822	**MILK THISTLE (EUROPEAN)** - 60 softgels	28.00	21.00		
	Buy 4 bottles, price each	25.00	18.75		
01817	**MILK THISTLE (EUROPEAN)** - 120 softgels	44.00	33.00		
	Buy 4 bottles, price each	40.00	30.00		
01698	**MIRAFORTE w/STANDARDIZED LIGNANS (SUPER)** - 120 caps	62.00	46.50		
	Buy 4 bottles, price each	56.00	42.00		
01769	**MITOCHONDRIAL BASICS w/BIOPQQ®** - 30 caps	52.00	39.00		
	Buy 4 bottles, price each	46.00	34.50		
01768	**MITOCHONDRIAL ENERGY OPTIMIZER w/BIOPQQ®** - 120 caps	94.00	70.50		
	Buy 4 bottles, price each	84.00	63.00		
00065	**MK-7** - 90 mcg, 60 softgels	28.00	21.00		
	Buy 4 bottles, price each	25.00	18.75		
01279	**MOUTHWASH W/POMEGRANATE** - 16 oz	18.50	13.88		
	Buy 4 bottles, price each	17.00	12.75		
00451	**MSM (METHYLSULFONYLMETHANE)** - 1,000 mg, 100 caps	14.00	10.50		
	Buy 4 bottles, price each	11.95	8.96		
	N				
01534	***N*-ACETYL-L-CYSTEINE** - 600 mg, 60 veg. caps	$14.00	$10.50		
	Buy 4 bottles, price each	13.50	10.13		
00066	**NATTOKINASE** - 60 softgels	25.50	19.13		
00891	**NATURAL APPETITE CONTROL** - 90 softgels	28.00	21.00		
	Buy 4 bottles, price each	25.20	18.90		
01807	**NATURAL APPETITE SUPPRESS (ADVANCED)** - 60 veg. caps	38.00	28.50		
	Buy 4 bottles, price each	34.00	25.50		
00984	**NATURAL BP MANAGEMENT** - 60 tablets	42.00	31.50		
	Buy 4 bottles, price each	37.80	28.35		
00913	**NATURAL ESOPHAGUARD** - 10 softgels	19.95	14.96		
	Buy 2 boxes, price each	19.00	14.25		

SUB-TOTAL OF COLUMN 11

No.		Retail Each	Member Each	Qty	Total
01692	**NATURAL ESTROGEN w/POMEGRANATE EXTRACT** - 60 caplets	$38.00	$28.50		
	Buy 4 bottles, price each	33.00	24.75		
01221	**NATURAL FEMALE SUPPORT** - 30 veg. caps	28.00	21.00		
	Buy 4 bottles, price each	24.00	18.00		
01471	**NATURAL GLUCOSE ABSORPTION CONTROL** - 60 veg. caps	39.00	29.25		
	Buy 4 bottles, price each	36.00	27.00		
01626	**NATURAL SEX FOR WOMEN ® 50+ (ADVANCED)** - 90 veg. caps	59.00	44.25		
	Buy 4 bottles, price each	45.33	34.00		
01444	**NATURAL SLEEP®** - 60 veg. caps	13.00	9.75		
	Buy 4 bottles, price each	10.00	7.50		
01551	**NATURAL SLEEP® w/ MELATONIN (ENHANCED)** - 30 caps	22.00	16.50		
	Buy 4 bottles, price each	20.00	15.00		
01511	**NATURAL SLEEP® w/o MELATONIN (ENHANCED)** - 30 caps	20.00	15.00		
	Buy 4 bottles, price each	18.00	13.50		
01445	**NATURAL SLEEP® MELATONIN** - 5 mg, 60 veg. caps	18.00	13.50		
	Buy 4 bottles, price each	16.00	12.00		
00987	**NATURAL STRESS RELIEF** - 30 veg. caps	28.00	21.00		
	Buy 4 bottles, price each	24.00	18.00		
01603	**NEURO-MAG™ MAGNESIUM L-THREONATE** - 90 veg. caps	40.00	30.00		
	Buy 4 bottles, price each	36.00	27.00		
01602	**NEURO-MAG™ L-THREONATE W/CALCIUM & VITAMIN D** 225 grams - Lemon flavor	40.00	30.00		
	Buy 4 bottles, price each	36.00	27.00		
00373	**NO-FLUSH NIACIN** - 800 mg, 100 caps	19.00	14.25		
	Buy 4 bottles, price each	17.00	12.75		
	O				
01623	**OLIVE LEAF VASCULAR SUPPORT** - 500 mg, 60 veg. caps	$22.00	$16.50		
	Buy 4 bottles, price each	20.00	15.00		
01483	**OMEGA 3 EPA/DHA w/SESAME LIGNANS & OLIVE FRUIT EXTRACT (SUPER)** - 60 softgels	18.00	13.50		
	Buy 4 bottles, price each	16.00	12.00		
	Buy 10 bottles, price each	14.00	10.50		
01482	**OMEGA 3 EPA/DHA w/SESAME LIGNANS & OLIVE FRUIT EXTRACT (SUPER)** - 120 softgels	32.00	24.00		
	Buy 4 bottles, price each	28.00	21.00		
	Buy 10 bottles, price each	24.90	18.68		
01484	**OMEGA 3 EPA/DHA W/SESAME LIGNANS & OLIVE FRUIT EXTRACT (SUPER)** - 120 enteric coated softgels	34.00	25.50		
	Buy 4 bottles, price each	31.00	23.25		
	Buy 10 bottles, price each	28.00	21.00		
01485	**OMEGA 3 EPA/DHA W/SESAME LIGNANS & OLIVE FRUIT EXTRACT (SUPER)** - 60 enteric coated softgels	20.00	15.00		
	Buy 4 bottles, price each	18.00	13.50		
	Buy 10 bottles, price each	16.00	12.00		
01619	**OMEGA 3 EPA/DHA W/SESAME LIGNANS & OLIVE FRUIT EXTRACT (SUPER)** - 240 softgels (SMALL SOFTGEL)	32.00	24.00		
	Buy 4 bottles, price each	28.00	21.00		
	Buy 10 bottles, price each	24.90	18.68		
01632	**OMEGA-3 LEMON WHIRL** - 16 oz bottle	24.00	18.00		
	Buy 4 bottles, price each	22.00	16.50		
01633	**OMEGA-3 TROPICAL WHIRL** - 16 oz bottle	24.00	18.00		
	Buy 4 bottles, price each	22.00	16.50		

SUB-TOTAL OF COLUMN 12

Buyers Club Order Form

To order call: 1.954.766.8433 or 1.800.544.4440

No.		Retail Each	Member Each	Qty	Total
	O CONTINUED				
01801	**ONE-PER-DAY** - 60 tablets	$22.00	$16.50		
	Buy 4 bottles, price each	20.00	15.00		
01328	**ONLY TRACE MINERALS** - 90 caps	15.00	11.25		
	Buy 4 bottles, price each	12.50	9.38		
00915	**OPTIZINC®** - 30 mg, 90 veg. caps	5.95	4.46		
	Buy 4 bottles, price each	5.00	3.75		
00073	**PANCREATIN** - 500 mg, 50 caps	13.22	9.92		
01323	**PEAK ATP® WITH GLYCOCARN®** - 60 veg. caps	54.00	40.50		
	Buy 4 bottles, price each	50.00	37.50		
00342	**PECTA SOL-C® MODIFIED CITRUS PECTIN** - 454 grams powder	99.95	74.96		
01080	**PECTA SOL-C® MODIFIED CITRUS PECTIN** - 270 veg. caps	69.95	52.46		
00673	**PGX™ PLUS MULBERRY (WELLBETX®)** -180 caps	34.95	26.21		
00865	**PHARMAGABA®** - 60 chewable tablets	29.95	22.46		
	Buy 4 bottles, price each	27.00	20.25		
01676	**PHOSPHATIDYLSERINE CAPS** - 100 mg, 100 veg. caps	54.00	40.50		
	Buy 4 bottles, price each	48.00	36.00		
01390	**PHOSPHOMEGA®** - 60 softgels	39.95	26.96		
	P				
01436	**POLICOSANOL** - 10 mg, 60 veg. caps	$20.00	$15.00		
	Buy 6 bottles, price each	15.00	11.25		
01423	**POMEGRANATE™ (FULL-SPECTRUM)** - 30 softgels	24.00	18.00		
	Buy 4 bottles, price each	21.00	15.75		
00956	**POMEGRANATE EXTRACT** - 30 veg. caps	19.50	14.63		
	Buy 4 bottles, price each	17.55	13.16		
00957	**POMEGRANATE JUICE CONCENTRATE** - 16 oz. liquid	30.00	22.50		
	Buy 4 bottles, price each	28.00	21.00		
01797	**POMI-T®** - 60 veg. caps	33.33	25.00		
	Buy 4 bottles, price each	30.00	22.50		
00577	**POTASSIUM IODIDE** - 1 box, 14 tablets	6.95	5.21		
	Buy 4 boxes, price each	5.25	3.94		
01500	**PQQ CAPS W/BIOPQQ®** - 10 mg, 30 veg. caps	24.00	18.00		
	Buy 4 bottles, price each	22.00	16.50		
01647	**PQQ CAPS W/BIOPQQ®** - 20 mg, 30 veg. caps	40.00	30.00		
	Buy 4 bottles, price each	36.00	27.00		
00302	**PREGNENOLONE** - 50 mg, 100 caps	26.00	19.50		
	Buy 4 bottles, price each	22.00	16.50		
00700	**PREGNENOLONE** - 100 mg, 100 caps	30.00	22.50		
	Buy 4 bottles, price each	27.00	20.25		
***01373	**PRELOX® NATURAL SEX FOR MEN®** - 60 tablets	52.00	39.00		
	Buy 4 bottles, price each	48.00	36.00		
00525	**PROBOOST THYMIC PROTEIN A™** - 4 mcg, 30 packets	59.95	44.96		
01441	**PROGESTACARE FOR WOMEN** - 4 oz cream	35.00	26.25		
	Buy 4 bottles, price each	32.00	24.00		
01895	**PROSTATE FORMULA (ULTRA NAT)** 60 softgels	38.00	28.50		
	Buy 4 bottles, price each	35.00	26.25		
	Buy 12 bottles, price each	32.00	24.00		
01742	**PROTEIN-ISOLATE (WHEY) VANILLA** - 1 lb. powder	30.00	22.50		
	Buy 4 jars, price each	27.00	20.25		
01743	**PROTEIN-ISOLATE (WHEY) CHOCOLATE** - 1 lb. powder	30.00	22.50		
	Buy 4 jars, price each	27.00	20.25		

SUB-TOTAL OF COLUMN 13

No.		Retail Each	Member Each	Qty	Total
01770	**PROTEIN CONCENTRATE** (New Zealand Whey) **Vanilla** - 520 gr	$30.00	$22.50		
	Buy 4 bottles, price each	26.60	19.95		
01771	**PROTEIN CONCENTRATE** (New Zealand Whey) **Chocolate** - 660 gr	30.00	22.50		
	Buy 4 bottles, price each	26.60	19.95		
01508	**PTEROPURE™** - 50 mg Pterostilbene 60 veg. caps	32.00	24.00		
	Buy 4 bottles, price each	30.00	22.50		
01587	**PURE PLANT PROTEIN** - Veg. Vanilla 540 grams powder	38.00	28.50		
	Buy 4 jars, price each	35.00	26.25		
01209	**PUMPKIN SEED EXTRACT (WATER-SOLUBLE)** - 60 veg. caps	20.00	15.00		
	Buy 4 bottles, price each	18.00	13.50		
01210	**PUMPKIN SEED EXT w/SOY ISOFLAVONES (WATER-SOLUBLE)**- 60 veg. caps	22.00	16.50		
	Buy 4 bottles, price each	20.00	15.00		
01637	**PYCNOGENOL® FRENCH MARITIME PINE BARK EXTRACT**-100 mg, 60 veg. caps	64.00	48.00		
	Buy 4 bottles, price each	60.00	45.00		
01217	**PYRIDOXAL 5'-PHOSPHATE** - 100 mg, 60 veg. caps	22.00	16.50		
	Buy 4 bottles, price each	19.80	14.85		
	Q, R				
01309	**QUERCETIN (OPTIMIZED)** - 250 mg, 60 veg. caps	$22.00	$16.50		
	Buy 4 bottles, price each	20.00	15.00		
01030	**RED YEAST RICE** (Bluebonnet)- 600 mg, 60 veg. caps	16.95	13.56		
00605	**REGIMINT** - 60 enteric-coated caps	19.95	14.96		
	Buy 4 bottles, price each	18.67	14.00		
01708	**REISHI EXTRACT MUSHROOM COMPLEX** - 60 veg. caps	30.00	22.50		
	Buy 4 bottles, price each	27.00	20.25		
01448	**REJUVENEX® BODY LOTION** - 6 oz	24.00	18.00		
	Buy 4 tubes, price each	19.80	14.85		
	Buy 8 tubes, price each	17.00	12.75		
01621	**REJUVENEX® FACTOR FIRMING SERUM** - 1.7 oz	65.00	48.75		
	Buy 2 bottles, price each	50.66	38.00		
	Buy 6 bottles, price each	38.52	28.89		
01220	**REJUVENEX® (ULTRA)** - 2 oz	52.00	39.00		
	Buy 2 jars, price each	48.00	36.00		
	Buy 4 jars, price each	44.00	33.00		
	Buy 8 jars, price each	39.93	29.95		
00676	**REJUVENIGHT® (ULTRA)** - 2 oz	39.95	29.96		
	Buy 4 jars, price each	36.00	27.00		
01413	**RESVERATROL W/PTEROSTILBENE** - 20 mg, 60 veg. caps	24.00	18.00		
	Buy 4 bottles, price each	22.00	16.50		
01410	**RESVERATROL W/PTEROSTILBENE** - 100 mg, 60 veg. caps	36.00	27.00		
	Buy 4 bottles, price each	32.00	24.00		
01430	**RESVERATROL w/SYNERGISTIC GRAPE-BERRY ACTIVES (OPTIMIZED)** - 250 mg, 60 veg. caps	46.00	34.50		
	Buy 4 bottles, price each	41.33	31.00		
00889	**RHODIOLA EXTRACT** - 250 mg, 60 veg. caps	11.75	8.81		
	Buy 4 bottles, price each	10.58	7.94		
00972	**(D) RIBOSE POWDER** - 150 grams	27.50	20.63		
	Buy 4 jars, price each	24.75	18.56		
01473	**(D) RIBOSE TABLETS** - 100 veg. tabs	32.00	24.00		
	Buy 4 bottles, price each	28.00	21.00		
01609	**RICH REWARDS® BREAKFAST GROUND COFFEE** - 12 oz. bag	13.00	9.75		
01729	**RICH REWARDS® BREAKFAST BLEND GROUND COFFEE** - 12 oz. bag	15.00	11.25		
	Natural Vanilla				
01730	**RICH REWARDS® BREAKFAST BLEND GROUND COFFEE** - 12 oz. bag	15.00	11.25		
	Natural Mocha				

SUB-TOTAL OF COLUMN 14

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No.		Retail Each	Member Each	Qty	Total
01610	**RICH REWARDS® DECAFFEINATED ROAST GROUND COFFEE** -12 oz. bag	$14.00	$10.50		
01809	**RICH REWARDS™ DARK CHOCOLATE** - 15 piece bag	15.00	11.25		
	Buy 4 bags, price each	12.96	9.72		
01712	**RICH REWARDS™ BLACK BEAN VEGETABLE SOUP** - 32 oz. bottle	13.00	9.75		
	Buy 6 bottles, price each	12.25	9.19		
01530	**RICH REWARDS™ CRUCIFEROUS VEGETABLE SOUP** - 32 oz. bottle	11.95	8.96		
	Buy 6 bottles, price each	11.25	8.44		
01531	**RICH REWARDS™ (SPICY) CRUCIFEROUS VEGETABLE SOUP** - 32 oz. bottle	11.95	8.96		
	Buy 6 bottles, price each	11.25	8.44		
01705	**RICH REWARDS™ LENTIL VEGETABLE SOUP** - 32 oz. bottle	13.00	9.75		
	Buy 6 bottles, price each	12.25	9.19		
01810	**RICH REWARDS™ MUNG BEAN SOUP W/TURMERIC** - 32 oz. bottle	13.00	9.75		
	Buy 6 bottles, price each	12.25	9.19		
01208	**R-LIPOIC ACID (SUPER)** - 300 mg, 60 veg. caps	49.00	36.75		
	Buy 4 bottles, price each	45.00	33.75		
00070	**RNA CAPSULES** - 500 mg, 100 caps	17.95	13.46		
	Buy 4 bottles, price each	16.16	12.12		
	S				
01432	**SAFFRON w/SATIEREAL (OPTIMIZED)** - 60 veg. caps	$36.00	$27.00		
	Buy 4 bottles, price each	32.00	24.00		
00358	**SAME (S-ADENOSYL-METHIONINE)** - 200 mg, 20 enteric coated tablets	16.00	12.00		
	Buy 8 boxes, price each	14.00	10.50		
00453	**SAME (S-ADENOSYL-METHIONINE)** - 200 mg, 50 enteric coated tablets	36.00	27.00		
	Buy 4 bottles, price each	32.00	24.00		
00557	**SAME (S-ADENOSYL-METHIONINE)** - 400 mg, 20 enteric coated tablets	28.00	21.00		
	Buy 6 boxes, price each	24.00	18.00		
01055	**SAME (S-ADENOSYL-METHIONINE)** - 400 mg, 50 enteric coated tablets	66.00	49.50		
	Buy 4 bottles, price each	60.00	45.00		
01543	**SEA-IODINE™** - 1,000 mcg, 60 caps	8.00	6.00		
	Buy 4 bottles, price each	7.20	5.40		
00046	**SELENIUM** - 2 oz dropper bottle	11.75	8.81		
01679	**SE-METHYL L-SELENOCYSTEINE** - 200 mcg, 100 veg. caps	12.00	9.00		
	Buy 4 bottles, price each	11.00	8.25		
00318	**SERRAFLAZYME** - 100 tablets	18.00	13.50		
	Buy 4 bottles, price each	16.00	12.00		
00284	**SHARK LIVER OIL (NORWEGIAN)** - 1,000 mg, 30 softgels	18.00	13.50		
	Buy 4 bottles, price each	16.00	12.00		
01684	**SILYMARIN** - 100 mg, 50 veg. caps	9.25	6.94		
	Buy 4 bottles, price each	8.25	6.19		
01596	**SKIN RESTORING PHYTOCERAMIDES w/LIPOWHEAT®** - 30 veg. liquid caps	25.00	18.75		
	Buy 4 bottles, price each	23.00	17.25		
00961	**SODZYME® w/GLISODIN® AND WOLFBERRY** - 90 veg. caps	28.00	21.00		
	Buy 4 bottles, price each	24.00	18.00		
00657	**SOLARSHIELD SUNGLASSES** - 1 pair smoke color	12.99	9.74		
	Buy 2 pairs, price each	11.50	8.63		
01097	**SOY EXTRACT (ULTRA)** - 150 veg. caps	87.00	65.25		
	Buy 4 bottles, price each	78.00	58.50		
00432	**STEVIA EXTRACT** - 100 packets, 1 gram each	9.95	7.46		
01396	**ST. JOHN'S WORT EXTRACT** - 300 mg, 60 veg. caps	10.98	8.24		
	Buy 4 bottles, price each	10.00	7.50		
01476	**STRONTIUM** - 750 mg, 90 veg. caps	20.00	15.00		
	Buy 4 bottles, price each	18.00	13.50		

SUB-TOTAL OF COLUMN 15

No.		Retail Each	Member Each	Qty	Total
01649	**SUPER ABSORBABLE SOY ISOFLAVONES** - 60 veg. caps	$28.00	$21.00		
	Buy 4 bottles, price each	25.00	18.75		
01790	**SUPER SAW PALMETTO/NETTLE ROOT W/BETA-SITOSTEROL** -60 softgels	28.00	21.00		
	Buy 4 bottles, price each	26.00	19.50		
	Buy 12 bottles, price each	24.00	18.00		
01407	**SUPER SAW PALMETTO W/BETA-SITOSTEROL** - 30 softgels	15.00	11.25		
	Buy 12 bottles, price each	12.00	9.00		
01778	**SUPER SELENIUM COMPLEX** - 200 mcg, 100 veg. caps	14.00	10.50		
	Buy 4 bottles, price each	12.00	9.00		
	Buy 12 bottles, price each	11.00	8.25		
	T				
01723	**TART CHERRY EXTRACT w/STANDARDIZED CHERRYPURE®** - 60 veg. caps	$22.00	$16.50		
	Buy 4 bottles, price each	20.00	15.00		
00199	**TAURINE** - 1,000 mg, 50 caps	8.95	6.71		
	Buy 4 bottles, price each	8.00	6.00		
00133	**TAURINE POWDER** - 300 grams	20.00	15.00		
	Buy 4 bottles, price each	16.88	12.66		
01304	**THEAFLAVIN STANDARDIZED EXTRACT** - 30 veg. caps	18.00	13.50		
	Buy 4 bottles, price each	16.00	12.00		
01683	**(L) THEANINE** - 100 mg, 60 veg. caps	24.00	18.00		
	Buy 4 bottles, price each	20.50	15.38		
††01038	**THERALAC PROBIOTICS** - 30 caps	47.95	35.96		
00668	**THYROID FORMULA™ (METABOLIC ADVANTAGE)** - 100 caps	21.95	16.46		
00349	**TMG POWDER** - 50 grams	14.00	10.50		
	Buy 4 bottles, price each	11.00	8.25		
01559	**TMG** - 500 mg, 60 veg. tablets	11.00	8.25		
	Buy 4 boxes, price each	10.00	7.50		
00781	**TOCOTRIENOLS WITH SESAME LIGNANS** - 60 softgels	38.00	28.50		
	Buy 4 bottles, price each	36.00	27.00		
01400	**TOCOTRIENOLS (SUPER-ABSORBABLE)** - 60 softgels	30.00	22.50		
	Buy 4 bottles, price each	28.00	21.00		
01278	**TOOTHPASTE** - 4 oz (Mint)	9.50	7.13		
	Buy 4 tubes, price each	8.67	6.50		
01468	**TRIPLE ACTION CRUCIFEROUS VEGETABLE EXTRACT** - 60 veg. caps	24.00	18.00		
	Buy 4 bottles, price each	22.00	16.50		
01469	**TRIPLE ACTION CRUCIFEROUS VEGETABLE EXTRACT W/RESVERATROL** -60 veg. caps	32.00	24.00		
	Buy 4 bottles, price each	29.60	22.20		
01803	**TRI SUGAR SHIELD™** - 60 veg. caps	36.00	27.00		
	Buy 4 bottles, price each	32.00	24.00		
01386	**TRUFIBER®** - 180 grams	32.95	24.71		
01389	**TRUFLORA PROBIOTICS & ENZYMES** - 32 veg. caps	42.95	32.21		
01722	**L-TRYPTOPHAN** - 500 mg, 90 veg. caps	33.00	24.75		
	Buy 4 bottles, price each	30.00	22.50		
01721	**TRYPTOPHAN PLUS (OPTIMIZED)** - 90 veg. caps	32.00	24.00		
	Buy 4 bottles, price each	29.00	21.75		
01816	**TWO-PER-DAY** - 60 tablets	10.50	7.88		
	Buy 4 bottles, price each	9.50	7.13		
01815	**TWO-PER-DAY** - 120 tablets	20.00	15.00		
	Buy 4 bottles, price each	18.00	13.50		
01814	**TWO-PER-DAY** - 120 caps	22.00	16.50		
	Buy 4 bottles, price each	20.00	15.00		
00326	**L-TYROSINE** - 500 mg, 100 tablets	12.98	9.74		

SUB-TOTAL OF COLUMN 16

Buyers Club Order Form

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No.		Retail Each	Member Each	Qty	Total
	V				
00213	**VANADYL SULFATE** - 7.5 mg, 100 tablets	$15.00	$11.25		
	Buy 4 bottles, price each	12.50	9.38		
00408	**VENOTONE** - 60 caps	18.95	14.21		
	Buy 4 bottles, price each	16.00	12.00		
01327	**VINPOCETINE** - 10 mg, 100 tablets	18.00	13.50		
	Buy 4 bottles, price each	14.00	10.50		
01526	**VITAMIN B3 NIACIN** - 1,000 mg, 100 veg. caps	12.75	9.56		
	Buy 4 bottles, price each	12.00	9.00		
00372	**VITAMIN B3 NIACIN** - 500 mg, 100 caps	7.65	5.74		
	Buy 4 bottles, price each	6.65	4.99		
00098	**VITAMIN B5** - 500 mg, 100 caps (Pantothenic Acid)	10.50	7.88		
	Buy 4 bottles, price each	9.38	7.04		
01535	**VITAMIN B6** - 250 mg, 100 veg. caps	12.50	9.38		
	Buy 4 bottles, price each	11.00	8.25		
00361	**VITAMIN B12** - 500 mcg, 100 lozenges	8.75	6.56		
	Buy 4 bottles, price each	7.25	5.44		
01634	**VITAMIN C w/ DIHYDROQUERCETIN** - 1,000 mg, 60 tablets	10.00	7.50		
	Buy 4 bottles, price each	9.00	6.75		
00927	**VITAMIN C w/ DIHYDROQUERCETIN** - 1,000 mg, 250 tablets	25.50	19.13		
	Buy 4 bottles, price each	23.25	17.44		
00084	**VITAMIN C (BUFFERED) POWDER** - 454.6 grams	23.95	17.96		
	Buy 4 bottles, price each	22.00	16.50		
01736	**(EFFERVESCENT) VITAMIN C-MAGNESIUM CRYSTALS** - 180 grams	20.00	15.00		
	Buy 4 bottles, price each	18.00	13.50		
01732	**VITAMIN D3** - 2,000 IU, 1 fl oz, Mint flavor	28.00	21.00		
	Buy 4 bottles, price each	25.00	18.75		
01753	**VITAMIN D3** - 1,000 IU, 90 softgels	7.00	5.25		
	Buy 4 bottles, price each	6.00	4.50		
01751	**VITAMIN D3** - 1,000 IU, 250 softgels	12.50	9.38		
	Buy 4 bottles, price each	11.25	8.44		
01713	**VITAMIN D3** - 5,000 IU, 60 softgels	11.00	8.25		
	Buy 4 bottles, price each	9.90	7.43		
01718	**VITAMIN D3** - 7,000 IU, 60 softgels	14.00	10.50		
	Buy 4 bottles, price each	12.60	9.45		
01573	**VITAMIN D3 w/SEA-IODINE™** - 5,000 IU, 60 caps	14.00	10.50		
	Buy 4 bottles, price each	12.50	9.38		
00864	**VITAMIN D3** Liquid Emulsion - 2,000 IU	28.00	21.00		
	Buy 4 bottles, price each	25.00	18.75		
01572	**VITAMINS D AND K w/SEA-IODINE™** - 60 caps	24.00	18.00		
	Buy 4 bottles, price each	22.00	16.50		
01763	**VITAMIN E (NATURAL)** - 400 IU, 100 softgels	30.00	22.50		
	Buy 4 bottles, price each	28.00	21.00		
	Buy 10 bottles, price each	26.00	19.50		
01225	**VITAMIN K2 (LOW-DOSE)** - 45 mcg, 90 softgels	18.00	13.50		
	Buy 4 bottles, price each	16.00	12.00		
	W				
01739	**WINTER WELLNESS™** - 60 caps	$15.00	$11.25		
	Buy 4 bottles, price each	13.00	9.75		

SUB-TOTAL OF COLUMN 17

No.		Retail Each	Member Each	Qty	Total
	Z				
01686	**ZEAXANTHIN w/LUTEIN & MESO-ZEAXANTHIN PLUS ASTAXANTHIN AND C3G (SUPER)** - 60 softgels	$42.00	$31.50		
	Buy 4 bottles, price each	38.00	28.50		
01685	**ZEAXANTHIN w/LUTEIN & MESO-ZEAXANTHIN AND C3G (SUPER)** - 60 softgels	22.00	16.50		
	Buy 4 bottles, price each	19.80	14.85		
00061	**ZINC LOZENGES** - 75 lozenges	9.50	7.13		
	Buy 4 bottles, price each	6.75	5.06		
***01051	**ZYFLAMEND® WHOLE BODY** - 120 softgels	60.95	45.71		

*** These products are not 25% off retail price.**

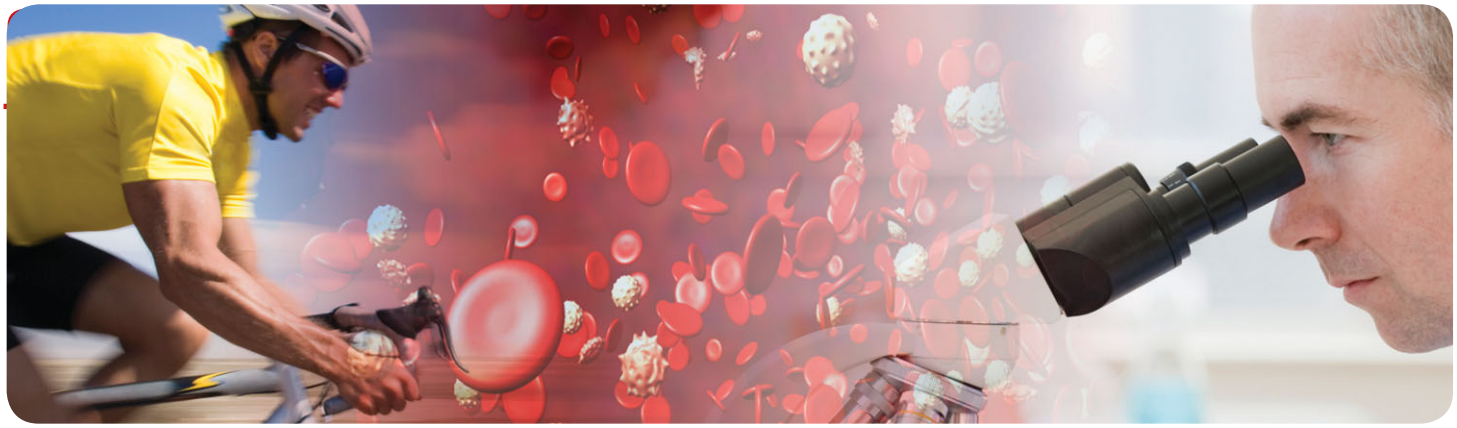
**** Not eligible for member discount or member renewal product credit.**

***** Due to license restrictions, this product is not for sale to customers outside of the USA.**

† Member pricing not valid on this item.

†† Due to license restrictions, this product is not for sale to Canada.

SUB-TOTAL OF COLUMN 18



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33958	**THE VITAMIN D SOLUTION** • by Michael F. Holick, PhD, MD (paperback)	2013	$16.00	$12.00		
33861	**THE SOUTH BEACH DIET GLUTEN SOLUTION** • Dr. Arthur Agatston	2013	$25.99	$19.49		
33860	**YOUNG FOR LIFE** • by Marilyn Diamond and Dr. Donald Schnell	2013	$26.99	$20.24		
33835	**PHARMOCRACY** • by William Faloon Buy 4 books, price each	2011	$24.00	$9.60 $8.00		
33859	**THE BLOOD SUGAR SOLUTION** • by Mark Hyman, MD	2013	$27.99	$20.99		
33855	**POWER FOODS FOR THE BRAIN** • by Neal D. Barnard, MD	2013	$26.99	$20.24		
33854	**THE GREAT CHOLESTEROL MYTH** • by Jonny Bowden, PhD, CNS and Stephen Sinatra, MD	2012	$19.99	$14.99		
33852	**THE MAGIC OF CHOLESTEROL NUMBERS** • by Dr. Sergey Dzugan	2012	$29.95	$22.46		
33848	**YOUR BEST INVESTMENT SECRETS TO A HEALTHY BODY AND MIND** • by Edwin Lee, MD	2012	$24.95	$18.71		
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33844	**ABUNDANCE: THE FUTURE IS BETTER THAN YOU THINK** • by Steven Kotler and Petere Diamandis	2012	$26.99	$20.24		
33843	**BOMBSHELL** • by Suzanne Somers	2012	$26.00	$19.50		
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High Potency FAT-SOLUBLE NUTRIENTS in ONE Softgel

Most people don't get enough oil-based nutrients like **vitamin K**, **lycopene,** and **gamma tocopherol**. This problem is solved with a one-per-day softgel called **Super Booster**. It provides high potencies of **fat-soluble** compounds lacking in dry powder formulas, along with other nutrients.

Just one ***SUPER BOOSTER*** provides:

• **VITAMIN K2** Scientific studies show **vitamin K2** provides superior benefits for the bones, arteries, and other tissues. The **MK-4** form of vitamin K2 is the most rapidly absorbed and is now routinely used in Japan to maintain healthy bone density. **MK-4,** however, only remains active in the blood for a few hours. The **MK-7** form of K2, on the other hand, remains bioavailable to the human body over a sustained **24-hour period**. Super Booster provides a potent dose of **MK-7 and MK-4** to keep calcium in the bone and out of the arteries.

• **LUTEIN** The carotenoid lutein helps maintain healthy cell division, supports the macula of the eye, and protects the endothelial lining of the arteries.

• **GINKGO** Hundreds of studies substantiate the multifaceted effects of *Ginkgo biloba* in promoting healthy circulatory and neurological function.

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• **GAMMA TOCOPHEROL** If one consumes only alpha tocopherol, the critically important gamma tocopherol is displaced from cells within the body. While *alpha tocopherol* vitamin E inhibits *lipid peroxidation*, the *gamma tocopherol* form quenches the dangerous *peroxynitrite* free radical. It is especially important for those who take vitamin E supplements to make sure they consume at least 200 mg a day of gamma tocopherol.

• **LYCOPENE** Evidence suggests that people who ingest the carotenoid lycopene enjoy healthier prostate function. Lycopene also helps guard against LDL oxidation.

• **CHLOROPHYLLIN** Scientific studies indicate that chlorophyllin may protect against environmentally induced damage to DNA.

JUST *ONE* SOFTGEL OF SUPER BOOSTER SUPPLIES:

Vitamin K2 (as menaquinone-7)	200 mcg	Gamma Tocopherol	197.45-296.25 mg
Vitamin K2 (as menaquinone-4)	1000 mcg	Lycopene	10 mg
Vitamin K1 (as phytonadione)	1000 mcg	Lutein	2 mg
Ginkgo extract	120 mg	Vitamin B12	300 mcg
Sesame lignans	20 mg	Vitamin C	95 mg
Chlorophyllin	100 mg		

A bottle of 60 **Super Booster** softgels retails for $42. If a member buys four bottles, the price is reduced to **$28.50** per bottle.

The **Super Booster** saves consumers **huge dollars** by combining a wide variety of costly nutrients into one daily softgel. If you add up the price of the individual ingredients contained in the **Super Booster**, you would spend **two to three times more** for this potency if taken separately.

To order Super Booster, call 1-800-544-4440 or visit www.LifeExtension.com

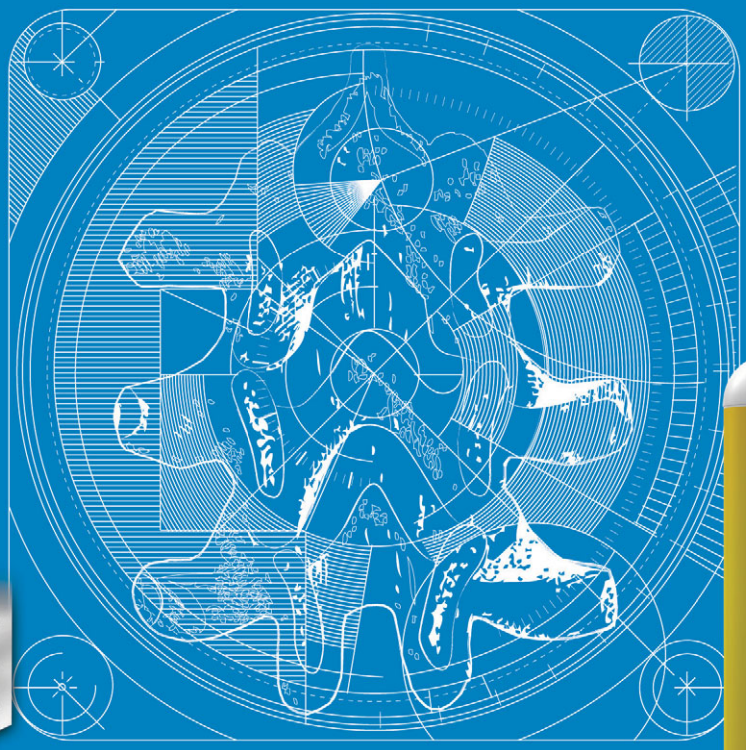
Contains soybeans.

CAUTION: If you are taking anti-coagulant or anti-platelet medications, or have a bleeding disorder, consult your healthcare provider before taking this product.

Tomat-O-Red® is a registered trademark of LycoRed, Ltd.

Better Bones by Design

2%-4% of your skeleton is "rebuilt" every year as calcium and minerals leave the bone and must be replaced.



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Bone-Up® provides your body with much needed calcium as well as essential nutrients for building strong bones.* It utilizes the finest source of calcium available: Australian/New Zealand bovine bone hydroxyapatite from chemical-free, range grazed calves less than two years old.

Bone-Up® is a clinically-validated formula and an effective addition to any bone health regimen.* It features added vitamins and minerals that synergistically support healthy bone density and overall bone health*:

- **Ossein Microcrystalline Hydroxyapatite (MCHA):** Promotes calcium balance.*
- **Vitamin D_3:** Converts to calcitriol to enhance calcium absorption.
- **MK-7:** The more bioavailable form of Vitamin K_2, which is needed for building bone matrix and proper calcium distribution.*
- **Boron:** A trace mineral important in calcium retention.*
- **Manganese, Copper and Zinc:** Essential trace minerals involved in the formation of bone.*

Jarrow Formulas® Bone-Up®, 240 capsules Item # 00313: $28.95
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To order, call (800)544-4440 or visit www.LifeExtension.com

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Jarrow® FORMULAS®

* These statements have not been evaluated by the Food and Drug Administration. This product is not intended to diagnose, treat, cure or prevent any disease.

A Partnership in Heart Health

New Chapter Zyfla*mend* & Life Extension Super Omega-3

A Holistic Approach to Cardiovascular Health

Maintaining heart health and a strong cardiovascular system are vital to a healthy body. Diet and exercise are the most important factors. Scientists and doctors both agree that a program of preventive health today is preferable to a treatment program tomorrow. But unfortunately, most Americans don't eat enough heart-healthy foods or get enough exercise. We now know that there are several additional factors that can support cardiovascular health, including:

- Supporting the body's healthy inflammation response*
- Consuming "good fats" such as Omega-3 fatty acids

What is the Inflammation Response?

Our body's inflammation response is a natural healing process. We often think of the inflammation response as something we can feel—such as in our joints and muscles where there are large numbers of sensitive nerve endings. But we can also have a response we can't feel, where sensitive nerves aren't concentrated—including in the heart and blood vessels. Whether we're aware of it or not, this inflammation response can affect every organ and cell.

Extensively Researched Herbal Blend

New Chapter's Zyflamend represents a scientific breakthrough in supporting a healthy inflammation response.* Zyflamend is formulated based on a large body of scientific research showing its ten herbs and spices contain hundreds of plant compounds that support a healthy inflammation response.* Just as important as a daily multivitamin, Zyflamend is the patented herbal protocol to help your whole body's natural inflammation process stay balanced and healthy every day.* Zyflamend has been studied at leading research institutions and shown to benefit multiple areas of health, including heart health.*

Super Omega-3
120 Softgels Item #01482
Retail Price: ~~$32.00~~
Member Price: $24.00

Zyfla*mend*
120 Softgels Item #01051
Retail Price: ~~$60.95~~
Member Price: $45.71

Omega-3 is Important for Cardiovascular Health

Life Extension's Super Omega-3 is a premium, scientifically validated fish oil concentrate. Super Omega-3 EPA/DHA with Sesame Lignans and Olive Fruit Extract promotes a healthy heart.* Fish oils (and other fatty acids) have a tendency to oxidize, rendering them nutritionally inferior. Scientific studies show that when added to fish oil, sesame lignans safeguard against oxidation and direct fatty acids toward pathways that help with inflammatory reactions.[1] To further emulate the benefits of a Mediterranean diet, Super Omega-3 delivers standardized, high-potency olive fruit extract. Research shows that when combined with olive oil, fish oil supplements help with inflammation better than fish oil alone.[2**]

1. ***Biochem Biophys Acta.*** 2004 Jun 1;1682(1-3):80-91.
2. ***Nutrition.*** 2005 Feb;21(2):131-6.

† According to 2012 SPINS® Market Research

**Supportive but not conclusive evidence shows that consumption of EPA and DHA Omega-3 fatty acids may reduce the risk of coronary heart disease.

To order Zyfla*mend* or Super Omega-3, call 1-800-544-4440 or visit www.LifeExtension.com

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30 capsules	6.2 OZ	32 Capsules
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Call *Life Extension*® now to order **Theralac**®, **TruFlora**® or **TruFiber**® to feel the benefits for yourself. **800-544-4440**

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ULTIMATE eye HYDRATION

Maintaining eye support is essential for optimal eye health.

As we get older, our eyes become vulnerable to a variety of insults that can cause irritation and dry eye. With just a few drops of the proper eye lubricant, **eye irritation** stemming from **dryness** may be alleviated.

Brite Eyes provides a powerful dose of two well-established lubricants in every drop, soothing eye discomfort without irritation.

Hydroxymethyl-cellulose and **glycerin** are FDA-approved for ophthalmic use and are uniquely preserved with potent **antioxidants** and **anti-glycating** agents.

The **Brite Eyes** formula is buffered in a way to make it **soothing to the eye**. The suggested use of **Brite Eyes III** is to apply 1 to 2 drops in each eye every day.

Each box of **Brite Eyes III** contains two individual vials that provide **5 mL** each. The reason for putting **Brite Eyes** into individual vials is to reduce the risk of bacterial contamination. Having small vials also makes it convenient for consumers to keep **Brite Eyes** readily accessible at home, the office, in one's purse or pocket, and other places where access to a soothing eye drop is needed.

The retail price for a box containing two **5 mL** vials of **Brite Eyes III** is $34. If a member buys four boxes, the price is reduced to **$24 per box**.

Item # 00893

To order **Brite Eyes III**, call 1-800-544-4440
or visit www.LifeExtension.com

NEXT-GENERATION CoQ10

Super Ubiquinol CoQ10 with Enhanced Mitochondrial Support™

Since **Life Extension**® introduced CoQ10 in **1983**, our scientists have continued to develop increased potency and absorbability.

Super Ubiquinol CoQ10 with Enhanced Mitochondrial Support™ contains **PrimaVie® shilajit** that **doubles** levels of CoQ10 in the mitochondria.[1]

Combining CoQ10 and **shilajit** produced a **56%** increase in energy production in the **brain**, and in muscle there was a **144%** increase in energy production.[2]

The primary reason people take CoQ10 supplements is to help **restore** youthful **energy** levels.

Shilajit boosts CoQ10's beneficial effects by stabilizing CoQ10 in the superior **ubiquinol** form, which *prolongs* its action at the cellular level.[3,4] Additionally, **shilajit** facilitates the more efficient *delivery* of CoQ10 into the mitochondria, which results in enhanced cellular energy.[5-9]

Shilajit helps the mitochondria convert fats and sugars into the body's main source of energy, ATP (adenosine triphosphate).[5-9]

Combining ubiquinol **CoQ10** with **shilajit** generates a powerful *synergy* that supports more youthful cellular energy production than CoQ10 alone.[2,4,5]

Restore Cellular Energy with...

The retail price for 60 100 mg softgels of **Super Ubiquinol CoQ10 with Enhanced Mitochondrial Support™** is **$62**. If a member buys four bottles, the price is reduced to **$42** per bottle.
Item # 01426

The retail price for 100 50 mg softgels of **Super Ubiquinol CoQ10 with Enhanced Mitochondrial Support™** is **$58**. If a member buys four bottles, the price is reduced to **$39.75** per bottle.
Item # 01425

The retail price for 30 200 mg softgels of **Super Ubiquinol CoQ10 with Enhanced Mitochondrial Support™** is **$62**. If a member buys four bottles, the price is reduced to **$42** per bottle.
Item # 01431

To order Super Ubiquinol CoQ10 with Enhanced Mitochondrial Support™ call 1-800-544-4440 or visit www.LifeExtension.com

References

1. Systemic CoQ level in animals: Part II. Unpublished study. Natreon, Inc.; 2007.
2. *Pharmacologyonline*. 2009;1:817-25.
3. *Pharmacologyonline*. 2009;2:690-8.
4. *Electronic Journal of Biotechnology*. 2008 Jul 15;11(3).
5. Ghosal S. *Shilajit in Perspective*. Alpha Science International Limited; 2006.
6. *Sci Total Environ*. 1987 Apr;62:347-54.
7. *Environ Sci Technol*. 2002 Jul 15;36(14):3170-5.
8. *Environ Sci Technol*. 2002 May 1;36(9):1939-46.
9. *Environ Sci Technol*. 2009 Feb 1;43(3):878-83.

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