

Hearing Loss Linked to Homocysteine

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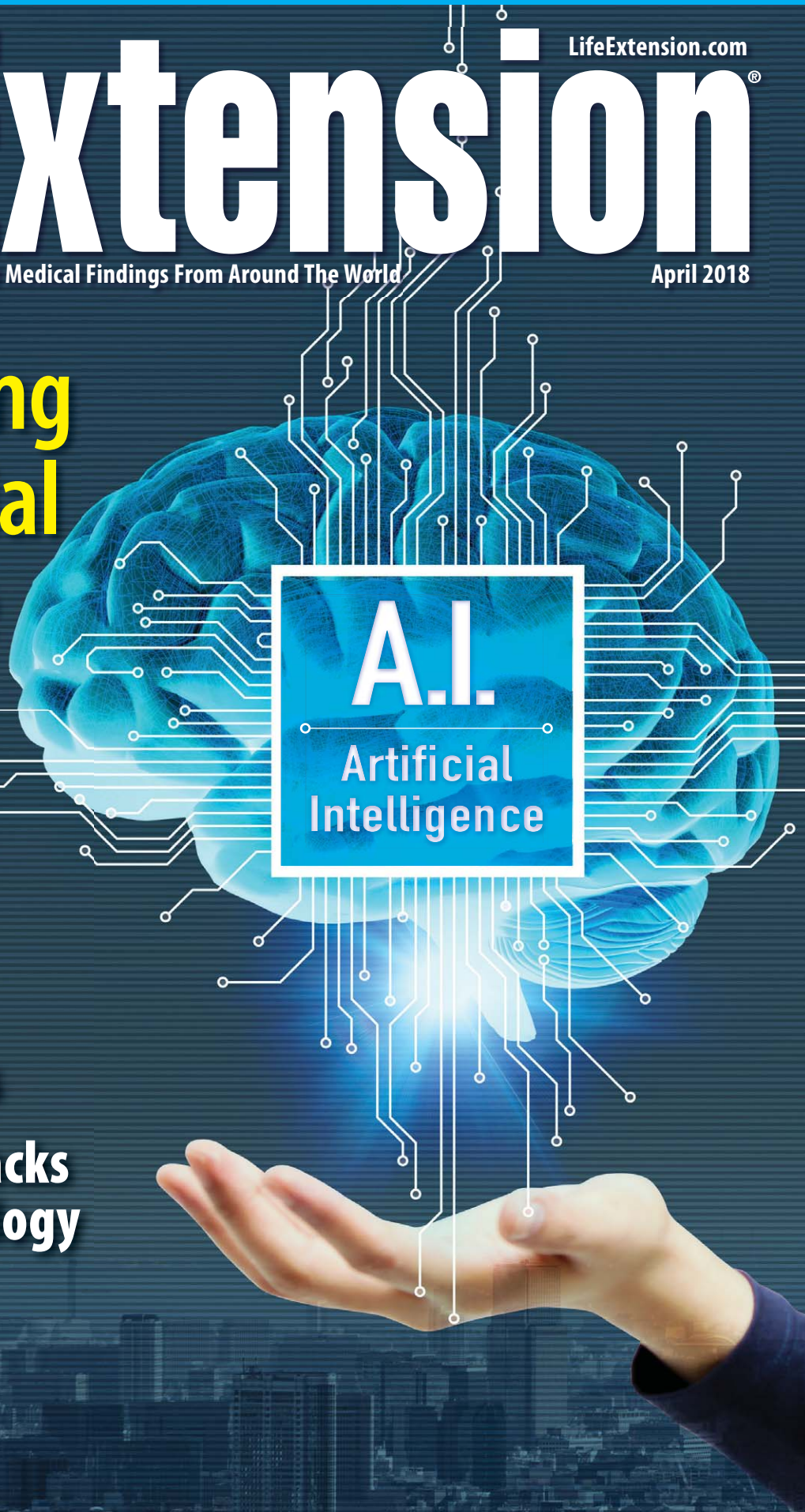
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22 BORON: AN OVERLOOKED MICRONUTRIENT

Boron plays a crucial role in maintaining bone health and has important anti-cancer properties. Studies show that boron interferes with the life cycle of the *human papillomavirus* (HPV), a contributing factor in approximately **95%** of all cervical cancers.

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Elevated blood sugar impacts the brain and can lead to cognitive conditions such as Alzheimer's. A groundbreaking study showed that **benfotiamine** can improve cognition in these patients.

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The key factor behind **green tea's** many health benefits lies in its rich **polyphenol** content. A patented processing technology has led to a rich-tasting new tea in quick-dissolving crystal form that boasts **three times** the **polyphenol** content of regular green teas.

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82 WHO NEEDS DIGESTIVE ENZYMES?

As we age, our body produces fewer digestive **enzymes**. Without these enzymes, undigested food passes into the colon, causing bloating, gas, and diarrhea. Supplementing with **digestive enzymes** before meals assists in the proper breakdown of starch, proteins, fats, cellulose, and milk.

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Aging results in altered cell-to-cell signaling that causes systemic degeneration. Utilizing deep-learning artificial intelligence, scientists have identified a method to restore more youthful cell signaling. This may facilitate leaner body mass, improved cognition, reduced inflammation, more youthful gene expression, and improved cell protein stability.

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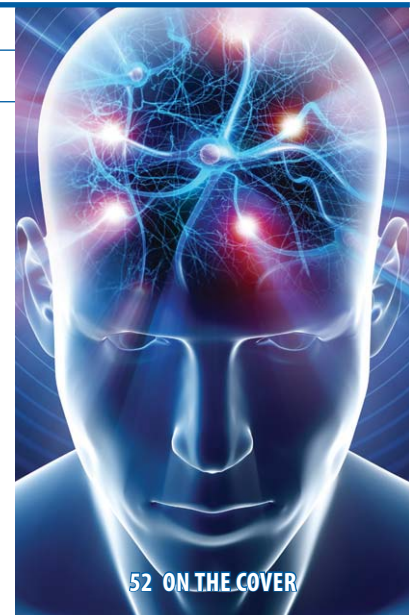
A staple of Eastern cuisine for hundreds of years, ginger can ease arthritis pain and inflammation, fight certain kinds of cancer, and suppress obesity.

93 HEALTHY EATING: BREAD IS GOLD

Famed Italian chef Massimo Bottura has long fought against food waste. In his book, *Bread is Gold*, the world's top chefs describe their experiences working with Bottura. We present some of their recipes.

99 PROFILE: DR. SCOTT HOFFER, OUTRUNNING DISEASE AND DISABILITY

Dr. Scott Hoffer has spent much of his life running marathons in an attempt to "outrun" his genetic predisposition to disease. Two key events transformed his life: his studies in the mind/body connection and his discovery of **Life Extension[®]**.



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COMBAT AGING VIA ARTIFICIAL INTELLIGENCE

Aging disrupts youthful cell-**signaling pathways** leading to whole-body degeneration. Seeking to mitigate this cellular deficit, researchers used **artificial intelligence (A.I.)** to assess tens of thousands of **signaling pathways**. Their findings uncovered three **nutrients** that can *modulate* many of the same anti-aging pathways as the drug **metformin**, and help restore youthful **cell signaling**.



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BY WILLIAM FALOON

Novel Healthy Longevity Strategy

We live in an unprecedented era as it relates to our understanding of the fundamental causes of biological **aging**.

This knowledge enables us to investigate and measure the effectiveness of **interventions** that may enable meaningful reversals of degenerative processes.

The enthusiasm surrounding the prospect of systemic **rejuvenation** has not gone unnoticed. Headline news reports on today's billionaires who are funding projects aimed at achieving longer human healthspans.¹⁻⁹

We at **Life Extension®** applaud all those seeking to turn aging into a relic of the past, as was done with smallpox, polio, and other diseases.

What makes **aging** different are the multiple biological and environmental factors involved.

It is unlikely any one person will discover the ultimate cure.

Aging creates an alteration of **signals** that cells emit to enable youthful functionality. The impact of disrupted **cell signaling** is senile degeneration, along with unwanted body **fat** stores.

Until recently, little could be done to mitigate this malfunction of cell-to-cell **signaling**.

I'm pleased to announce that a group of scientists, utilizing deep-learning **artificial intelligence**, has identified a method we can utilize today to restore more youthful **cell signaling**.

Based on published laboratory results, this new approach may facilitate leaner body mass, improved cognition, reduced inflammation, more youthful gene expression and improved cell-protein stability.



Youthful Cell Signaling Prompts Weight Loss

In youth, our cells emit **signals** that enable them to function at peak performance.¹⁰

As we age, youthful cell signaling declines.

One effect of restoring healthy **cell signaling** is a reduction in excess **fat storage**.

This was demonstrated in a study published in **2016**, where supplementing with a novel **plant extract** resulted in a **20%-25% reduction** of body weight in diet-induced **obese mice**.

A mechanism that prompted this beneficial effect was **sensitizing** brain cells to **leptin**, a hormone that induces **satiety**.¹¹

Fat cells secrete leptin to tell our brains we are full after we eat.

In states of obesity and advanced age, **leptin receptors** in the brain become *desensitized* to the satiety signals sent out by our fat cells. The result is we eat too much and store excess energy as fat.

In response to a concentrated extract from ashwagandha, a group of obese mice ate less food (compared to controls) and subsequently lost substantial weight.¹¹

The name of the extract used in this weight-loss study is **withaferin A**.

Compared to commercially available ashwagandha supplements, this novel withaferin A provides a **7.5-fold** greater concentration.

Research into **withaferin A** is yielding a treasure trove of additional health benefits.

The effects induced by **withaferin A** include suppression of **inflammatory** factors while upregulating **genes** that protect against abnormal **fat storage**.¹¹⁻¹³

Delay of Brain Aging

Normal aging results in loss of **brain cell** function and structure.¹⁴

This manifests outwardly as mild **cognitive impairment** and loss of **motor coordination** that can progress to **dementia**.^{14,15}

A study was done on mice genetically programmed to develop loss of **neuronal** (brain cell) **function**.¹⁶

Supplementation with **withaferin A** was started before the onset of neuronal dysfunction.¹⁶ Compared to controls, the **withaferin A** group showed:

1. Alleviation of **neuro-inflammation**
2. Decreased levels of **mis-folded protein** in the spinal cord by **39%**
3. Reduced loss of **motor neurons** by more than **60%**
4. Delayed progression of **neuronal dysfunction**
5. Extension of **lifespan**

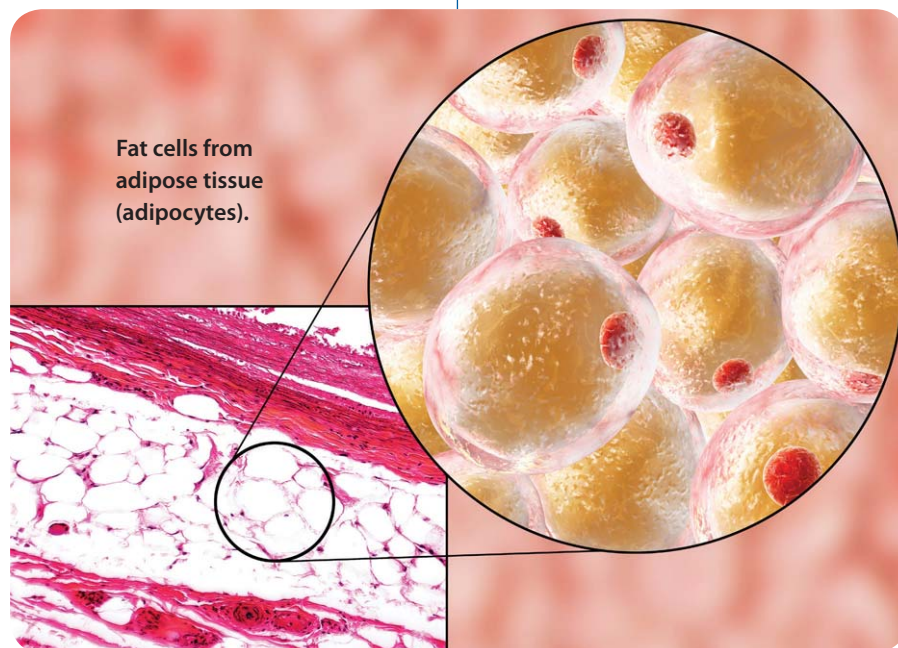
These findings are pertinent to people who have not yet experienced significant cognitive impairment, but may also be relevant to elderly individuals.

Overcoming a Limit on Maximum Lifespan

Withaferin A is an exceptionally active **plant** compound with a broad range of actions. These actions include favorably targeting **proteins** in our body that are structurally **distorted** by normal aging and are linked to degenerative conditions.^{11,16,17}

By restoring youthful cell **protein stability**, a number of challenging limitations we face with lifespan potential can be ameliorated.¹⁷

For example, our cells survive via a process that involves precise **folding** of new **proteins** into cellular components, along with removal of **damaged** cell proteins.¹⁷



Aging causes “**misfolding**” of cellular proteins and an inability to degrade **damaged** proteins that accumulate inside cells.^{18,19}

A limitation on **maximal life-span** is loss of **youthful** protein function.¹⁸

“**Proteostasis**” is a term you’re going to start hearing a lot about. Youthful **proteostasis** involves the optimal synthesis, folding, and removal of proteins inside cells.¹⁷

As healthy **proteostasis** declines, cells become dysfunctional and chronic diseases develop.¹⁹

Withaferin A impedes cell protein **misfolding** that is linked to a number of age-related issues.^{11-13,16,17}

Activating Cell-Signaling Pathways

Life Extension® has partnered with a company called **Insilico Medicine** to evaluate **plant extracts** that confer **longevity** effects as identified in recent scientific studies.³⁰

The first step utilizing deep-learning **artificial intelligence** enabled **Insilico Medicine** to uncover specific **cell-signaling** pathways that confer longevity when activated.³⁰

Insilico Medicine then used their proprietary A.I. technology to **score** compounds based on their cumulative activation of known anti-aging pathways.

The **Insilico** analysis reveals three extracts that together **scored the best** out of thousands of ingredients and their combinations.³⁰

This enabled **Insilico Medicine** to patent a combination of three natural **extracts** in a formula designed to promote healthy aging.



We Fought Against This Aging Pathology in the 1980s

In the 1980s, **Life Extension Foundation** funded research at the **Florida Institute of Technology** to circumvent the **decline in protein synthesis** that occurs with normal aging.²⁰⁻²⁹

Before the first mouse study was completed, the lead scientist succumbed to heart failure and had to retire.

I thought back then how ironic it was that a brilliant scientist seeking to circumvent aging was himself taken out by a degenerative illness.

This is one of many reasons why I am working around the clock to accelerate human age-reversal research. If we don't enable scientists today to carry out their work, they will age to death and we lose forever their internal library of brilliance.

The **Florida Institute of Technology** is a research university with academic divisions that emphasizes science, engineering, mathematics, and aviation.

Here are **Life Extension** articles from the 1980s that discuss the role of protein synthesis and aging:

- “Genetic Control Mechanisms and Aging; Control of Protein Synthesis. Anti-Aging Conference Report Part II.” *Anti-Aging News*. 1985 Feb;5(2):16.
- “Protein Synthesis & Aging – George C Webster, PhD. Florida Institute of Technology. The Life Extension Breakthrough Conference.” *Anti-Aging News*. 1985 Sep;5(9):106.
- “First Project 2000 Grants to Extend the Human Lifespan. Unraveling the Mystery of Protein Synthesis; Decrease in Protein Synthesis with Age.” *Anti-Aging News*. 1985 Nov;5(11):122.
- “The Life Extension Breakthrough Conference. Restoring Youthful Levels of Protein Synthesis.” *Life Extension Report*. 1986 Jul;6(7):78.

(Note in years **1980-1985** the name of our scientific publication was **Anti-Aging News**. It was changed to **Life Extension Report** in **1986** and then **Life Extension Magazine** in **1994**.)

The **Insilico** formula contains *highly-standardized* **withaferin A** and **ginsenoside Rg3** extracts along with concentrated **gamma linolenic acid**.

The tradename of this formula is **Longevity A.I.™**. The box below shows how potent the ingredients are:

Ingredient	Concentration	
	Longevity A.I.™ Formula	Industry Standard
Withaferin A	3%	Under 0.4%
Ginsenoside Rg3	10%	Under 2%
Gamma linolenic acid	70%	Under 24%

Note the concentrations of active ingredients in the **Longevity A.I.™** are several magnitudes *higher* than conventional dietary supplements.

The initial cost of these *highly-standardized* botanical ingredients is relatively high, but we anticipate price reductions as greater volumes reduce costs.

The dose of the new **Longevity A.I.™** formula is one softgel daily.

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Our **track record** of translating research findings into practical approaches dates back to the early **1980s**.

We've entered a new phase of accelerated development utilizing deep-learning **artificial intelligence** to identify better methods to combat degenerative processes.

This enhanced ability to validate novel approaches to wellness is enabling us to rapidly design

formulas to stave off degenerative changes at the cellular level.

These advances are essential if we are to remain alive long enough to benefit from the age-reversal research initiatives that your supplement purchases are helping to fund today.

For a scientific report on the deep-learning **artificial intelligence** described in this editorial, please turn to page 52 of this month's issue.

For longer life,



William Faloon, Co-Founder
Life Extension Buyers Club

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1. Available at: <http://www.newsweek.com/2015/03/13/silicon-valley-trying-make-humans-immortal-and-finding-some-success-311402.html>. Accessed April 12, 2017.
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Patent Pending. Developed in collaboration with Insilico Medicine, Inc.



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Each **725 mg** capsule of **Mega Green Tea Extract** is standardized to 98% polyphenols that provide **326 mg of EGCG** to:

- Protect against DNA damage and oxidative stress¹
- Support healthy blood sugar levels²
- Enhance heart health³
- Boost brain function⁴
- Support strong bones⁵
- Maintain healthy cholesterol levels already within normal range⁶

Each cost-effective bottle lasts over three months!

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5. *BMC Musculoskelet Disord*. 2009;10:110.
6. *J Transl Med*. 2015;13:79.

Mega Green Tea Extract Decaffeinated

Item #00954 • 100 vegetarian capsules

	Retail Price	Your Price
1 bottle	\$30	\$22.50
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Mega Green Tea Extract Lightly Caffeinated

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Note: **EGCG** is the acronym for **epigallocatechin gallate**, which is the polyphenol in green tea that has demonstrated the most robust health benefits.



For full product description and to order **Mega Green Tea Extract**, call **1-800-544-4440** or visit **www.LifeExtension.com**

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Processed Meat Linked to Breast Cancer

A new study has found an increased risk of breast cancer for women who consume processed meat.*

Processed meat is any meat which is modified to extend shelf life, change the color and appearance and/or improve taste.

The research, which was led by the director of the Institute of Health and Wellbeing, Professor Jill Pell, found the link was mainly rooted in the risk of post-menopausal breast cancer.

Data for the study was based on 262,195 women from the UK Biobank who were recruited from the general public, aged 40 to 69.

Information on the subjects' meat consumption was collected from 2007 to 2010 and combined with a meta-analysis of prospective cohort studies based on rigorous criteria.

Findings showed that the subjects who ate processed meat had a higher risk of breast cancer, independent of other factors such as lifestyle, obesity, diet, and sociodemographics.

Some carcinogens in processed meat that have long been concerning are preservatives such as **sodium nitrite**. While high doses of **vitamin C** may help neutralize these mutagens, it's better to avoid them.

Editor's Note: These study results add to previous research that found a link between processed meats and cancer, as well as research showing a higher mortality risk in breast cancer survivors who consume grilled meat.

* *Eur J Cancer*. 2017 Dec 21;90:73-82.

Lithium Shows Potential for Treating Fetal Alcohol Syndrome

The journal *Neuroscience* reported that a dose of **lithium** blocked some of the effects of alcohol, including disordered sleep, in a mouse model of fetal alcohol syndrome.*

While lithium has been used for decades in the treatment of bipolar disorder, it has been recently associated with other benefits, including memory enhancement.

The research team administered ethanol or saline to a group of seven-day-old mice and gave half of them an injection of lithium chloride. In comparison with the controls, mice that received ethanol developed hyperactivity, cognitive impairment and reduced slow-wave sleep as adults, however, these effects were reduced by cotreatment with lithium.

Lithium additionally prevented the development of changes in specific brain cells experienced by ethanol-treated mice.

The researchers plan to investigate whether lithium can block other forms of neurological damage, such as results from stroke and trauma.

Editor's Note: "Developmental ethanol exposure is a well-known cause of lifelong cognitive deficits, behavioral hyperactivity, emotional dysregulation, and more," write authors M. Lewin and colleagues. "In healthy adults, sleep is thought to have a critical involvement in each of these processes. Our previous work has demonstrated that some aspects of cognitive impairment in adult mice exposed at postnatal day seven to ethanol correlate with slow-wave sleep fragmentation."

* *Neurosci.* 2018 Jan 15;269-277.

Calcium and Vitamin D May Fight Early Menopause

An article in the *American Journal of Clinical Nutrition* reports a lower risk of early menopause among women who consumed higher amounts of **calcium** and **vitamin D**.*

Premature menopause, defined as the cessation of ovarian function prior to the age of 45, affects approximately **10%** of women.

The investigation included 116,430 women between the ages of 25 and 42. Questionnaires completed by the participants at enrollment and every two years thereafter provided information concerning medical conditions. Dietary information was collected five times during the course of the 20-year study.

Early menopause was experienced by 2,041 subjects over follow-up. Among women whose calcium was categorized as high, the risk of early menopause was **13%** less than among those whose intake was low. Having a higher intake of vitamin D was associated with a **17%** reduction in risk.

Editor's Note: "The large size of this study allowed us to consider a variety of potential correlates of a healthy lifestyle that might explain our findings. However, adjusting for these factors made almost no difference in our estimates," remarked the study authors. "In addition to placing women at higher risk of adverse future health outcomes, early menopause is also problematic as women are increasingly delaying childbearing into their later reproductive years. As such, it is important to identify modifiable risk factors for early menopause, such as diet."

* *Am J Clin Nutr.* 2017 Jun;105(6):1493-1501.

Just-Published Protocol in the *Disease Prevention and Treatment Book*

The scientists and writers at **Life Extension®** continuously update the online *Disease Prevention and Treatment* protocol chapters based on the latest research. A recent update is briefly summarized here. Complete versions of these chapters with references are available online at: <http://www.lifeextension.com/Protocols>

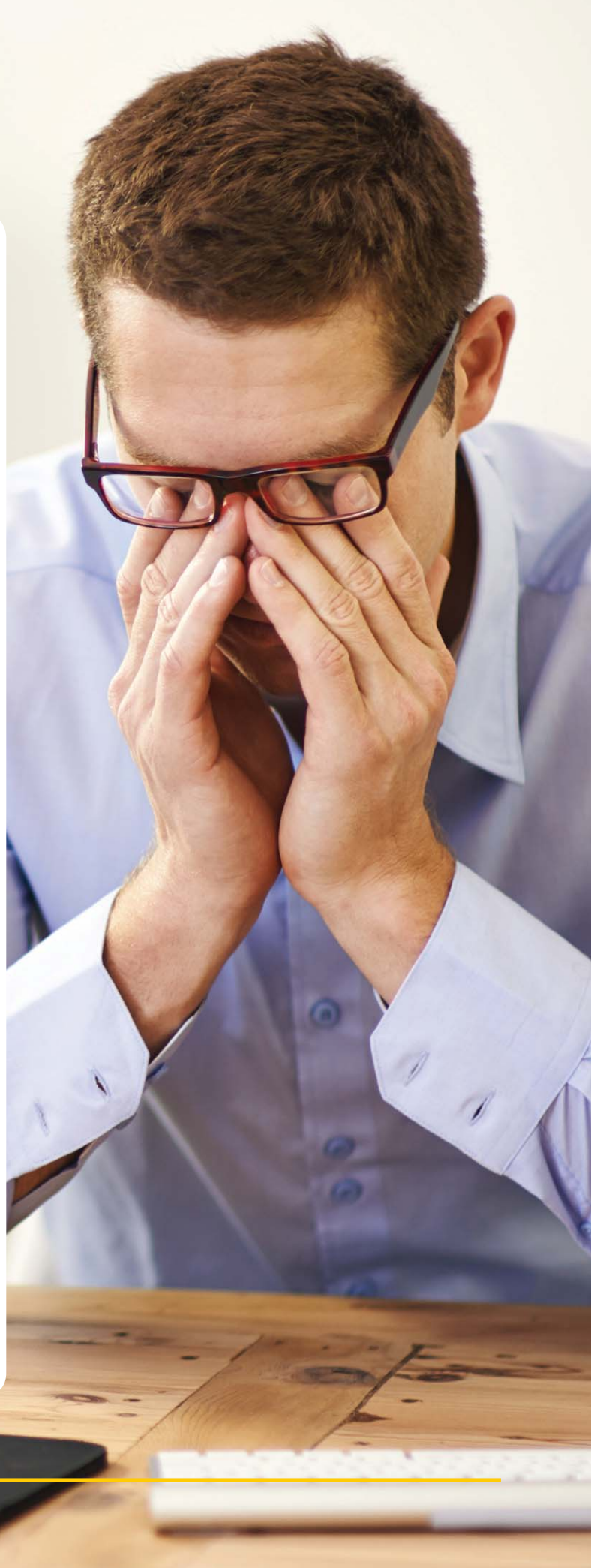
Sjögren Syndrome

Chronic dry eyes and dry mouth can be more than minor annoyances—they may be symptoms of Sjögren syndrome, a systemic autoimmune disease. Although many factors likely contribute to its development, studies have found strong links between Sjögren syndrome and **cytomegalovirus (CMV)**—a common virus to which about half of Americans have been exposed.

Because there is currently no cure for Sjögren syndrome, treatment options focus primarily on symptom relief with artificial tears and saliva substitutes. Unfortunately, more aggressive treatments such as immunosuppressants are often associated with unpleasant side effects.

Fortunately, researchers are uncovering promising new therapies, such as the drug *belimumab*, which modulates the excessive immune response that underlies Sjögren syndrome. Also, several integrative interventions such as **omega-3 fatty acids**, **maqui-berry extract**, and **white peony-extract** have been shown to improve symptoms and ease inflammation and autoimmunity.

Life Extension's updated Sjögren syndrome protocol summarizes the latest research and emerging treatment options for this troublesome condition.



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Life Extension®'s Rainforest Blends are made using a patented, **100% natural** process consisting of **100% USDA certified organic arabica** coffee beans.

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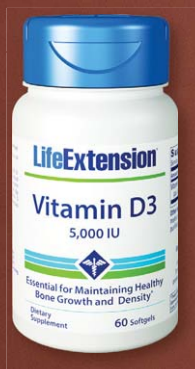
	Retail Price	Your Price
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Caution: Individuals consuming more than 2,000 IU/day of vitamin D (from diet and supplements) should periodically obtain a serum 25-hydroxy vitamin D measurement. Do not exceed 10,000 IU per day unless recommended by your doctor. Vitamin D supplementation is not recommended for individuals with high blood calcium levels.

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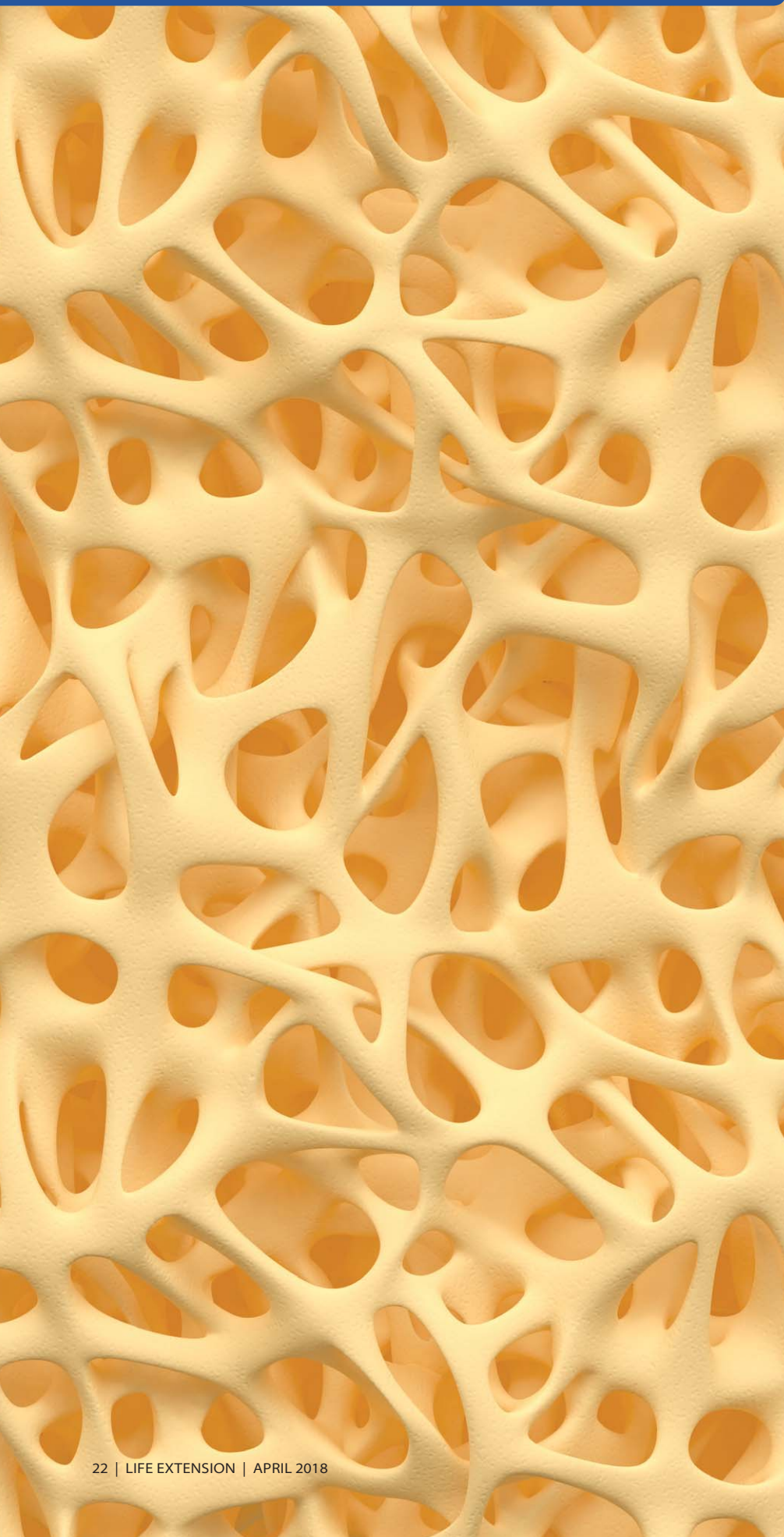
	Retail Price	Your Price
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Boron

An Overlooked Micronutrient

When it comes to nutrients that have critical roles in the body, there are the superstars, and then there are the unsung heroes.

Boron is one of the unsung heroes.

Boron, a trace mineral, remains underappreciated for its multiple roles in human health.¹

While not widely known like vitamin D, boron plays a crucial role in maintaining bone health by preventing calcium loss.²⁻⁵

Equally important, boron has demonstrated **anti-cancer** properties—specifically in the prostate, cervix, and lungs.⁶⁻⁸

As you will learn in this article, **boron** plays an essential role in healthy aging.

The good news is that most readers of this magazine have obtained ample boron potencies in their multinutrient supplements.

Boron and Bone Health

Most of us take our bones for granted.

Little do we realize that bones are living structures that renew throughout life. To maintain structural density, our bones need specific nutrients.

The first connection between boron and bone growth was made in 1981. A study conducted in vitamin-deficient chickens found that supplementation with boron promoted bone growth and enhanced skeletal structure.⁹

Since then, several studies conducted in **human** subjects confirmed the important connection between boron and bone health. In fact, among all tissues of the human body, bones, hair, and nails harbor the *highest* concentrations of boron.¹⁰

One of the features that makes boron so critical for bone health is that it *prevents* calcium loss, while also alleviating the problems associated with magnesium and vitamin D deficiency.^{3,11}

Magnesium and vitamin D are both necessary for the absorption and metabolism of calcium.¹² Low levels of *any* of these nutrients spell trouble for your bones.

These overlapping effects were seen in a study of 12 postmenopausal women, a group known for having an increased risk of osteoporosis.¹¹ All of the women were given **3 mg** of boron per day, but one group consumed a low-magnesium diet, while the other consumed adequate magnesium.

The researchers found that supplementation with boron prevented calcium loss and bone *demineralization* by reducing urinary excretion of both calcium and magnesium. This reduction was more marked on the low magnesium group. In other words, boron helped minimize loss of calcium and magnesium from bones.

More recently, a study in female rats showed just how harmful a boron deficiency is to bone health. A deficiency in boron resulted in:

- Decreased bone volume fraction, a measure of bone strength
- Decreased thickness of the bone's spongy inner layer
- Decreased maximum force needed to break the femur

But when rats were given **boron and fish oil** together, the duo exerted beneficial effects on the **strength** of the outer surface of the bone (called cortical bone) and **microarchitecture** of the spongy, inner layer of bone (called the trabecular bone).¹³

In this way, boron impacted both the *quantity* and the *quality* of bone. Bone density refers to the quantity of bone, while microarchitecture refers to its *quality*. It is related to the mechanical strength of the bone, which impacts fracture risk.



A study published in the *Archives of Oral Biology* confirmed that a deficiency in boron adversely affects bone formation and microstructure.⁴ In this study, mice fed a boron-deficient diet had a **63%** reduction in the percentage of *osteoblast* (bone-making cell) surfaces compared to control mice. In addition, the two main processes governing bone structure and mass formation (bone modeling and remodeling) were altered in mice on a boron-deficient diet. As a result, bone formation was inhibited in these boron-deficient mice.

Clearly, having ample boron is essential for many underlying factors that contribute to stronger bones.

Boron doesn't just keep our bones healthy. It also works tirelessly to prevent cancer from getting a start in our body.

Anticancer Effects

Boron works through numerous mechanisms to support **anticancer** effects. One of the best examples of this is its impact on **cervical cancer**.

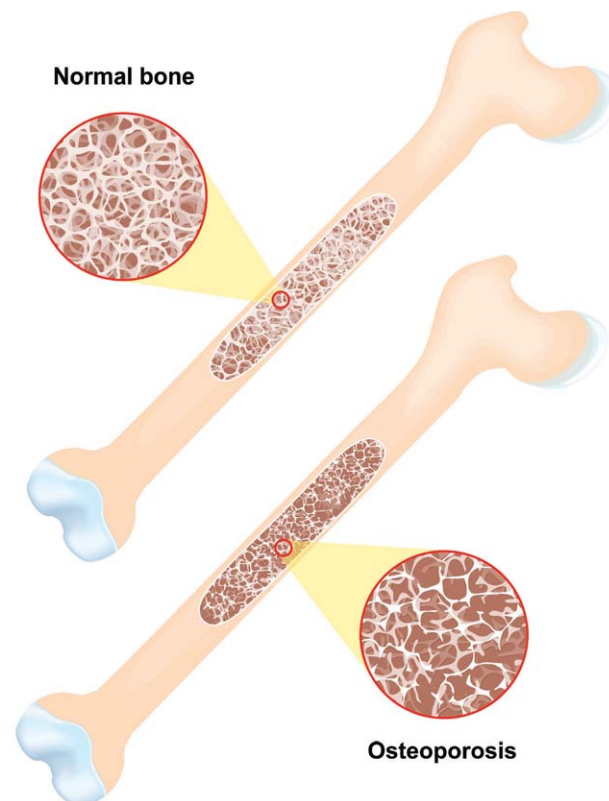
Turkey is a country with an extremely low incidence of cervical cancer, and scientists believe this can be partially attributed to its boron-rich soil.^{1,14,15} When comparing women who live in boron-rich regions versus boron-poor regions of Turkey, not a single woman living in the boron-rich regions had any indication of cervical cancer. (The mean dietary intake of boron for women in this group was **8.41 mg/day**.)

There's a good scientific explanation for this remarkable protection. Studies show that boron interferes with the life cycle of the *human papillomavirus* (HPV), which is a contributing factor in approximately **95%** of all cervical cancers.¹

Boric acid (the form in which boron occurs in nature) is a *serine protease inhibitor*, and serine protease inhibitors have been found to inactivate the E7 oncoprotein expressed by high-risk HPV strains (HPV-16 and HPV-18).¹⁶ Inactivation of the E7 oncoprotein helps prevent cervical cancer because it interferes with tumor growth and malignant transformation.

Cervical cancer is just the start. Research shows that boron-rich diets and boron-rich geographic regions are associated with a lower incidence of lung and prostate cancers as well.^{1,17}

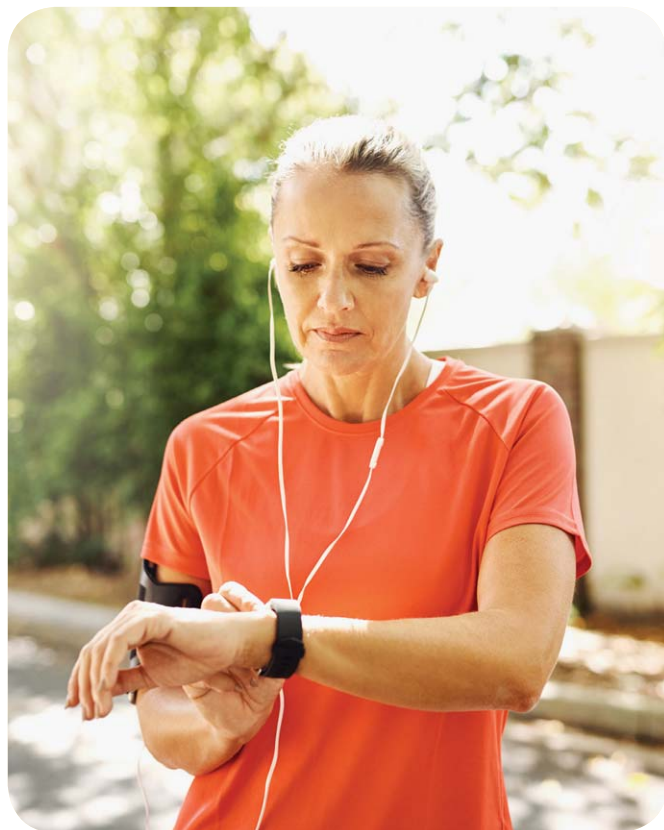
Considering that HPV viruses are increasingly implicated in **head and neck cancers**,^{18,19} supplementation with this ultra-low cost mineral could have significant benefits in protecting against this malignancy that is increasing in prevalence, even in nonsmokers.



What You Need to Know

The Total Body Benefits of Boron

- Boron is a trace mineral found in the earth's crust and in water.
- While its importance for human health has been largely overlooked, studies indicate that it is essential for the body to function properly.
- Boron is critical for strong and healthy bones.
- Numerous human and animal studies point to its strong anticancer effects, especially in cervical, lung, and prostate cancers.
- Boron levels in foods can be inconsistent, making supplementation the key to obtaining the benefits of this underappreciated mineral.



Boron and Lung Cancer

A study conducted at the University of Texas MD Anderson Cancer Center between 1995 and 2005 examined the effects of boron intake and *hormone replacement therapy* (HRT) in postmenopausal women. Hormone replacement therapy reduces the risk of lung cancer in women, and researchers wanted to find out the joint effects of boron intake and hormone replacement therapy use on lung-cancer risk.¹⁷

The results showed that increased **boron intake** was associated with a lower risk of lung cancer.¹⁷ The highest risk of lung cancer was observed in women who did not use hormone replacement therapy and whose dietary intake of boron was low. A more than **two-fold increased** risk for lung cancer was observed in this group of women compared to women with high dietary boron intake who used hormone replacement therapy.

Researchers postulated that the difference in lung cancer risk may have been due to the fact that women with high dietary boron intakes who also used hormone replacement therapy have higher estradiol levels. Estradiol has a greater affinity for binding to estrogen receptors than the **polycyclic aromatic hydrocarbons** from cigarette smoke—an action that would help prevent the initiation of cancer.¹⁷

Boron and Prostate Cancer

The most compelling evidence of boron's anti-cancer properties stems from research on **prostate cancer**. Studies conducted both in animal and human cancer-cell lines point to boron's ability to inhibit the growth and spread of prostate cancer cells.

Research conducted in mice found that when they were exposed to boric acid, tumors shrank by as much as **38%**.²⁰

Boric acid has also been shown to inhibit the *spread* of human prostate cancer cells in a dose-dependent manner.⁶

A human study has confirmed these findings, showing that boron intake was associated with a decreased risk of prostate cancer in humans.⁷ When the researchers compared the boron intake of 95 patients with prostate cancer with that of 8,720 men without cancer, they found a dose-dependent association between increased boron intake and a decreased prostate cancer risk.

With data pointing to a **66%** rise in the global incidence of prostate cancer between 2005 and 2015²¹—and with more than **1.5 million** men affected in 2015 alone—finding natural ways to combat prostate cancer is more important now than ever.²²

Summary

Among the many essential nutrients, boron has been widely overlooked.

Science has demonstrated the beneficial effects of boron on bone and prostate health. And numerous studies have demonstrated boron's anticancer properties as well.

Researchers largely agree that a mean dietary intake of boron of **3 mg** a day is needed to confer clinical benefit.

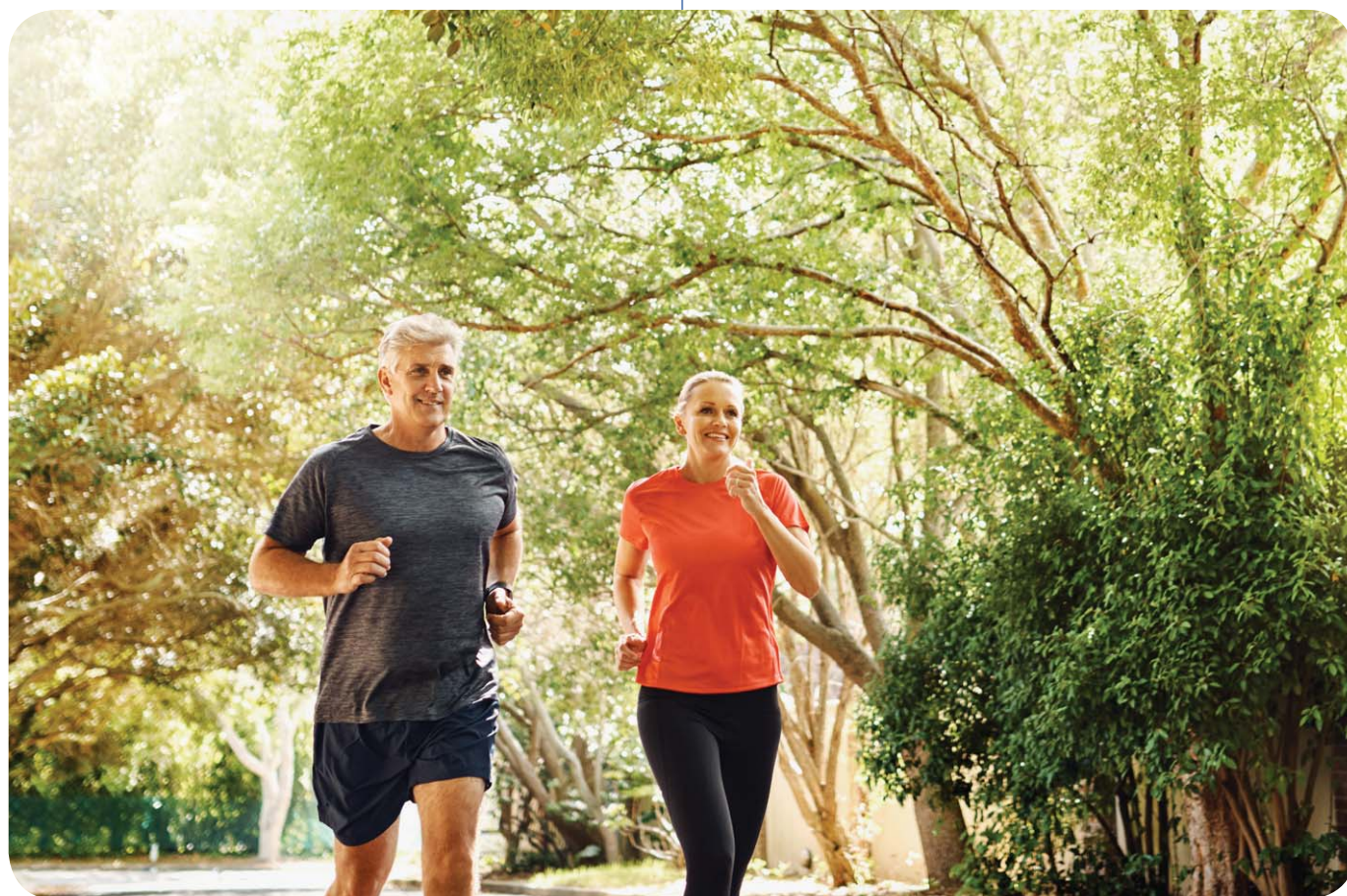
Because the amount of boron varies in the soil based on geographical location, obtaining enough boron through diet alone can be difficult. Supplementing with low-cost boron is an effective way to maintain adequate levels of this overlooked micronutrient.

For many years, most **Life Extension®** supporters have been getting **3 to 6 mg** of boron in their multi-nutrient supplements. For most individuals, this represents a likely optimal amount. ●

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

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- **Two-Per-Day**
- **Bone Restore**
- **Ultra Prostate Formula**
- **Life Extension Mix™**

The suggested daily dose for most adults is **6-9 mg** of boron.^{1,2} If you are already obtaining this potency in your multi-nutrient formulas, you may not need additional boron.

	Retail Price	Your Price
1 bottle	\$5.95	\$4.46
4 bottles		\$3.94 each

Item #01661 • 100 vegetarian capsules

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last one gets the modifier unless its not a new

Benfotiamine

Improves Cognition in Alzheimer's Patients

Alzheimer's disease is one of the most feared of all age-related conditions.

To date, no drug therapy has been shown to alter the course of Alzheimer's, much less prevent it.

A groundbreaking study published in **2016** showed that a dietary supplement called **benfotiamine** could improve cognition in Alzheimer's patients.¹

What makes this study exciting is not just benfotiamine's ability to improve cognitive function, but how the authors of the study believe it worked: by improving the brain's glucose metabolism and protecting against its harmful effects on the brain.¹

Increasingly, research has shown that elevated blood sugar impacts the brain and can lead to cognitive conditions such as Alzheimer's.²⁻⁸

Data from this study—as well as a host of other human, lab, and animal studies—suggest that this novel approach to Alzheimer's could open a new front in our fight against cognition-robbing neurodegenerative diseases.

Challenges in Treating Alzheimer's

Despite millions of dollars and decades of research spent on Alzheimer's disease, the only drugs available for Alzheimer's are those that may reduce *symptoms*. There is no treatment that meaningfully alters the course and progression of the disease.¹

In fact, no new drugs of *any* kind have been approved for use in Alzheimer's in nearly 15 years.^{9,10}

During that time, we've learned a lot more about the underlying factors in Alzheimer's disease—especially the impact of **chronically elevated blood sugar**.¹¹ The connection is so strong that many scientists are now referring to Alzheimer's disease as “**type III diabetes**.”²⁻⁸

Connecting the dots between Alzheimer's disease and the damage caused by high blood sugar highlighted a solution that had been sitting under researchers' noses all along: an especially potent form of vitamin B1 called **benfotiamine**.

A Brain-Protecting Vitamin

Thiamine (vitamin B1) is profoundly involved in maintaining healthy brain function.¹² It is an absolute requirement for normal cellular growth and function and vital metabolic processes.^{13,14}

A deficiency in thiamine impacts most organs in the body, but it is especially damaging to the brain. There, it triggers a cascade of events that lead to oxidative stress and inflammation—which are major contributors to Alzheimer's, Parkinson's, and other dementia-producing disorders.¹³



Researchers have used experimental thiamine deficiency for years to model many of these age-related brain diseases, and research shows that a deficiency in thiamine leads to many of the same brain abnormalities associated with those disorders.¹³

In addition to its known importance in brain function, **benfotiamine**, a synthetic derivative of thiamine, has the **dual ability** to help with **sugar metabolism** while also helping protect against the **damage** caused by elevated blood sugar^{1,15}—two properties that make it an ideal candidate for intervening in glucose-induced brain dysfunction.

Because of these findings, scientists wanted to determine whether supplementation with benfotiamine might be of use in preventing, slowing, or reversing some of the underlying factors that contribute to neurodegenerative disorders.

A team of researchers recently took an important first step to answering that question.

Cognitive Improvements in Alzheimer's Patients

The researchers performed a pilot study to determine whether or not **benfotiamine** would have a beneficial impact on cognitive impairment in patients with Alzheimer's disease.¹ A pilot study is essentially a small-scale trial run to find out if there's enough evidence to warrant a larger-scale study.

The study included five patients who were suffering from mild-to-moderate Alzheimer's disease. They had detectable cognitive decline as measured by the standard **Mini-Mental Status Examination (MMSE)**, a 30-point scale that measures cognitive function.

Prior to any treatment, patients underwent a specialized type of PET scan (*positron emission tomography*) that can predict progression of Alzheimer's disease and detect the toxic Alzheimer's protein **beta-amyloid**.

All subjects showed evidence of **beta-amyloid**. This damaging protein builds up in the brain, where it triggers brain inflammation, imposes oxidative stress, and has been closely associated with changes caused by long-term exposure to excessive blood **glucose**.

Subjects received **300 mg** of **benfotiamine** per day over the course of 18 months. At the end of the study period, they retaken the Mini-Mental Status Examination and the PET scan to see if the benfotiamine supplementation led to any improvements.

The results were impressive. Every single patient demonstrated **cognitive improvement** on the MMSE (with an average increase of nearly **19%**).

This study demonstrates *for the first time* how a low-cost nutritional supplement can improve cognitive function in Alzheimer's disease victims.¹



What You Need to Know

The Brain-Protective Effects of Benfotiamine

- Alzheimer's disease is now being referred to as "**type III diabetes**" because of its close connection with the effects of chronically elevated blood-sugar levels.
- Studies show that excessive blood glucose damages the endothelial lining of blood vessels, a factor that can contribute to cognitive decline, dementia, and Alzheimer's.
- Endothelial dysfunction and the changes associated with high blood glucose are known to alarmingly raise the risk of cognitive decline, dementia, and Alzheimer's disease.
- The connection between the effects of excessive blood sugar and dementia offers an entirely new approach to prevention: the use of natural supplements that can shield the body from the harmful effects of AGEs, and prevent the harm they could do to the blood vessels and the brain.
- **Benfotiamine**, a highly bioavailable form of vitamin B1, has many properties that may help explain how it was able to improve cognition in patients with Alzheimer's disease.
- A groundbreaking clinical study found that supplementation with benfotiamine improved cognitive function scores in individuals with mild-to-moderate Alzheimer's.
- A natural product with a long safety record, benfotiamine belongs on the short list of supplements recommended for maintaining brain health well into old age.

The study provided new insight into the possibility that benfotiamine might have a significant beneficial impact for Alzheimer's patients, and definitely warrants a larger-scale study in the future.

Benfotiamine's Track Record

Previous studies on benfotiamine may have predicted this favorable result, as shown by studies of people with two common conditions that serve as useful models of accelerated aging: diabetes and alcohol dependence.

In both cases, cognitive impairment appears early, and both conditions significantly raise the risk of Alzheimer's and other forms of dementia.^{16,17}

One especially relevant area of this clinical research has been in *diabetic neuropathy*, a painful, debilitating, and typically irreversible condition in which nerves throughout the body become damaged. A randomized controlled trial found that taking **400 mg/day** of benfotiamine for three weeks significantly reduced pain and neuropathy.¹⁸

This is an excellent example of benfotiamine's ability to help protect nerve tissues in diabetics.

People with **alcohol dependency** also display rapid acceleration of brain aging. This is because excessive alcohol leads to *thiamine deficiency*.^{12,17}

Two clinical trials have now shown that benfotiamine supplementation (**600 mg/day**) reduces alcohol consumption (a sign of reduced impulsivity) and improves psychiatric distress.^{19,20} These may be very important findings for people with Alzheimer's who often suffer from increased impulsivity.²¹



The AGE/RAGE Induces Oxidative Stress

Advanced glycation end products, or AGEs, result from chemical reactions that link free glucose molecules to proteins and other bioactive molecules.

Studies have shown that AGEs bind to specialized cell-surface receptors, called **receptors for AGE, or RAGE**.¹⁴

The AGE/RAGE interaction induces oxidative stress, activates inflammatory reactions, and promotes deposition of the toxic beta-amyloid proteins associated with Alzheimer's disease.^{38,39}

A form of RAGE, called **soluble RAGE (sRAGE)**, on the other hand, acts as a decoy, trapping AGEs and preventing them from activating the cell-bound RAGE.³⁸

A recent study demonstrated that people with mild cognitive impairment, a condition that frequently progresses to dementia, had higher AGE, and lower sRAGE levels, than did those without mild cognitive impairment.³⁸

Together these data indicate the urgency of reducing AGE formation using the safe nutritional supplement benfotiamine.

The Impact of Elevated Sugar on the Brain

To appreciate benfotiamine's benefits, it's helpful to understand how elevated blood sugar impacts the brain.

Growing evidence supports a *strong link* between elevated glucose levels in the brain and the development of Alzheimer's disease.^{22,23} Many people don't realize that *you don't have to have diabetes* to develop the glucose-induced brain dysfunction that eventually produces Alzheimer's.

Most people have blood-sugar levels that are higher than optimal, even if they are *technically* below the threshold for diagnosable diabetes. This is called *prediabetes*, which the American Diabetes Association defines as fasting blood sugar between **100 to 125 mg/dL**.²⁴

Prediabetes is now recognized to be associated with increased risk for Alzheimer's and other dementias.²⁵⁻²⁷

The good news is that supplementation with benfotiamine has been shown to improve cognition in patients with Alzheimer's disease.

Protection Against Blood-Sugar Damage

Given all these impressive results, there is now excellent evidence that **benfotiamine** supplementation may reduce and prevent many of the problems that lead to cognitive decline, dementia, and Alzheimer's disease — particularly among diabetics and prediabetics.

Since many people may find the lifestyle changes that would help prevent the formation of AGEs quite difficult, something as simple as taking benfotiamine can help shield our bodies from their damaging effects.

Higher doses of thiamine (achievable through the use of **benfotiamine**), have been recommended in order to avoid diabetic complications.

Summary

Studies over the past decade have revealed astonishing connections between Alzheimer's disease and the damaging changes associated with blood-glucose elevations, leading some experts to consider Alzheimer's as **type III diabetes**.

Recognizing the blood sugar/dementia connection suggests a new use for a proven supplement, **benfotiamine**.

A new human study has shown that supplementation with **300 mg/day** of benfotiamine produced significant cognitive improvement over 18 months.

Benfotiamine acts by preventing the formation of advanced glycation end products (AGEs), fighting oxidative stress, and thereby reducing inflammatory processes that contribute to dementia.

Benfotiamine is simply a highly bioavailable form of thiamine, or vitamin B1, which has a known track record of safety and effectiveness in metabolic disorders.

Benfotiamine represents a powerful way to help protect nerves, blood vessels, and the brain from damaging effects associated with elevated blood glucose. ●

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

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How Benfotiamine Works

One of the most damaging effects of chronic elevated blood glucose is the formation of **advanced glycation end-products** (AGEs). AGEs occur when sugar molecules chemically react with proteins and other critical biomolecules, altering their structure and impairing their function.¹⁴

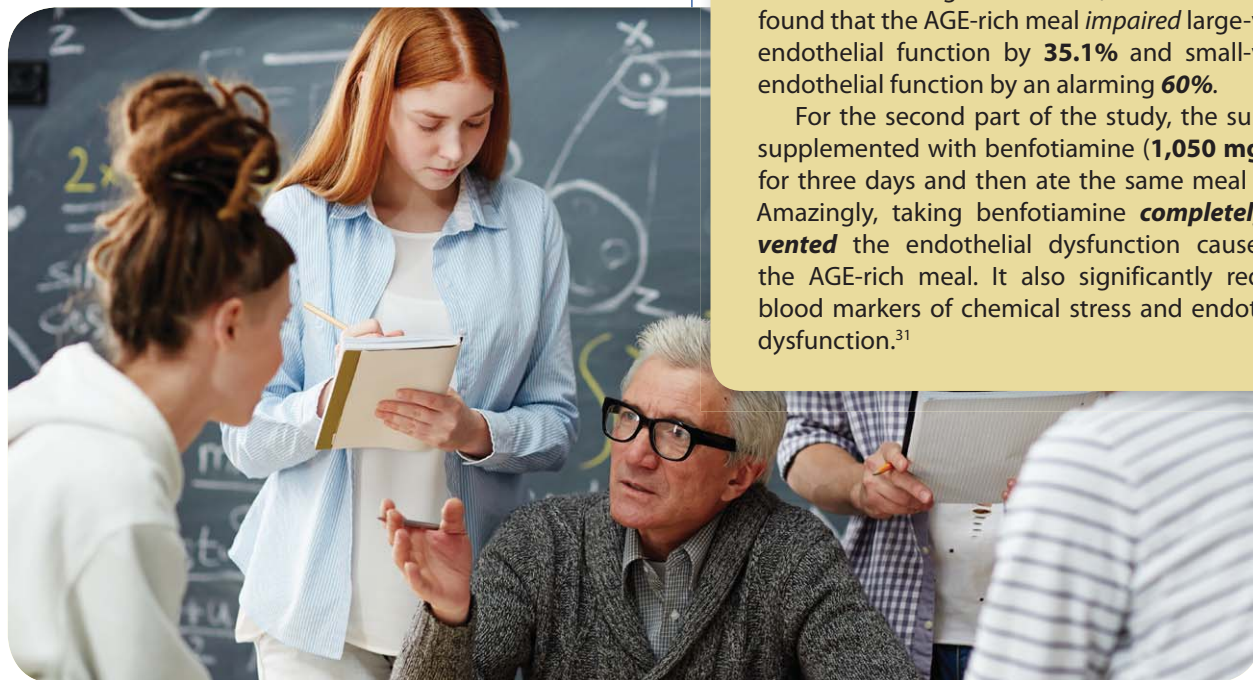
Benfotiamine mounts an all-out attack against AGEs. It has the ability to prevent AGEs from forming, but also to neutralize oxidative stress.²⁸ This unique combination powerfully protects against blood vessel and tissue damage. At the same time, it reduces their impact on inflammatory processes that contribute to dementia.^{29,30}

AGEs can lead to dysfunction of the critically important **endothelial** lining of arteries and smaller blood vessels.^{31,32} The endothelium regulates many aspects of blood flow and pressure.³³ When chronic endothelial damage occurs in the brain, it can result in cognitive decline, strokes, and neurodegenerative diseases like Alzheimer's disease.³⁴⁻³⁷

A human study demonstrated that benfotiamine supplementation completely prevented the **endothelial dysfunction** that results from AGEs in food.³¹

For the first part of the study, a group of type II diabetics was given a meal with a high AGE content from meat cooked at a high temperature (AGEs from such foods are one reason that experts recommend limiting their intake).³¹ The researchers found that the AGE-rich meal **impaired** large-vessel endothelial function by **35.1%** and small-vessel endothelial function by an alarming **60%**.

For the second part of the study, the subjects supplemented with benfotiamine (**1,050 mg/day**) for three days and then ate the same meal again. Amazingly, taking benfotiamine **completely prevented** the endothelial dysfunction caused by the AGE-rich meal. It also significantly reduced blood markers of chemical stress and endothelial dysfunction.³¹



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BY MICHAEL DOWNEY





Are You Getting the Full Benefits of *Drinking Green Tea?*

Green tea has been recognized as a natural defense against disorders ranging from cardiovascular disease and cancer to depression and cognitive decline.¹⁻⁵

Like other “smart drinks” such as coffee or cocoa, the key factor behind green tea’s many health benefits lies in its rich **polyphenol** content. These healthy compounds have been associated⁶—like green tea itself⁷—with lower all-cause mortality.

Many of the benefits associated with green tea require consumption of more than one cup per day. These benefits are usually seen in a dose-response relationship, meaning the more you drink, the more protection you get.

If you want all the same protective benefits—but do not necessarily want to drink that much every day—a unique option has emerged.

Thanks to a patented processing technology, a rich-tasting, Kenyan-sourced tea has been created that boasts **three times** the polyphenol content of most popular green teas.

It is so packed with polyphenols that just **one cup** daily delivers the *same* polyphenol levels as up to **three cups** of other green teas.

Green Tea's Secret Weapon

The **polyphenols** in green tea play critical roles in neutralizing free radicals, quelling inflammation, and supporting cell signaling.⁸⁻¹²

In the colon, bacteria break polyphenols down into smaller molecules, notably *phenols*. These and other polyphenol-derived molecules are carried to the liver, where they're further transformed and then transported to tissues to deliver potent bioactive effects.¹³

A compelling study conducted on individuals 65 and older demonstrated that those in the *highest* third of total urinary **polyphenols** (which reflect circulating levels of polyphenols) had a **30% lower** all-cause mortality risk over the 12-year follow up, compared with those in the lowest polyphenol third.⁶

Focusing on polyphenol-rich green tea itself, a meta-analysis found that the people who consumed the highest amount of green tea had a **20% reduction** in **all-cause** mortality risk compared to those who drank the least.⁷ In fact, a recent analysis showed that 15 polyphenols from green tea have 200 human target genes, including those involved in cancer, diabetes, neurodegenerative disease, cardiovascular disease, muscular disease, and inflammation.¹⁴

This broad-spectrum, multitargeted action is precisely what's required to seriously reduce chronic, age-related disease and significantly prolong life.

Let's examine some exciting clinical studies validating green tea's ability to combat a spectrum of age-related disorders.

Safer, More Healthful Tea Option

The new teas described in this article are sourced from a family farm in Emrok without chemical sprays. Although the state-of-the-art tea factory was only built in 2012, owners Robert and Emily Keter won the "Best Tea from Kenya" award at the 2015 North American Tea Conference.

Since then, their **green** and **purple** teas have taken on connoisseur status internationally for their uniquely rich taste, safety, purity—and most notably, their abundance of polyphenols.

This acclaim has enabled the Keters to finance many charitable and schooling projects throughout the region. Their farm is Rainforest Alliance certified, and a participant in the Ethical Tea Partnership.

Emrok tea is grown in Nandi County in Kenya's Rift Valley region at an altitude of 6,561 feet above sea level, where the cool climate and rich volcanic soil are considered *ideal* for tea cultivation.



Cardiovascular Health

Cardiovascular disease remains the leading killer of older Americans,¹⁵ making it a major contributor to all-cause mortality.

Chinese scientists investigated the history of 1,507 men and women newly diagnosed with hypertension (high blood pressure). Those who consumed **one to five cups** daily exhibited a **46%** reduced risk of developing hypertension, compared to those consuming less than one cup daily. And those who had drunk over **five cups** daily were **65%** less likely to develop hypertension.¹⁶

Another team mined data on 194,965 individuals from nine stroke studies. It showed that those who drank **three or more cups** of green or black tea daily demonstrated a **21%** lower risk of stroke, compared to those who drank less than a cup of tea daily.¹⁷

To assess cardiovascular mortality risk, researchers conducted a multi-year study on 40,530 adults aged 40-79 who had no history of stroke, heart disease, or cancer at baseline. They concluded that those who drank **3-4 cups** of green tea daily had a **23%** lower risk of death from cardiovascular disease than those drinking less than a cup daily. And those who drank **five or more cups** daily showed a **26%** lower risk.²

Cognitive Benefits

Green tea is prominent among a few beverages, such as coffee and cocoa, that are increasingly consumed for both pleasure and for their cognitive benefits.^{4,5}

One recent review concluded that green tea could be a “*very promising [agent] in the search for potent anti-Alzheimer’s drugs.*”¹⁸

Another found that green tea improves cognition and working memory. The researchers concluded that these benefits “cannot be attributed to a single constituent,” but rather to green tea as a beverage.¹⁹

And in a compelling prospective study, consuming green tea for just two months was found to improve cognitive function in 30 patients with severe Alzheimer’s.²⁰

Cancer

Cancer is the second-leading cause of death in the US.¹⁵ Fortunately, green-tea polyphenols have been shown in multiple preclinical and clinical studies to suppress the development and aggressiveness of many different cancers.²¹⁻²⁷

One group of researchers has suggested that drinking green tea may reduce the risk of several human malignancies. By regulating multiple signaling pathways, green-tea polyphenols can inhibit angiogenesis (growth of new blood vessels) and metastasis (the spread of cancer), while inducing growth arrest and apoptosis (beneficial cell-death).²⁸

DNA Damage

All living things rely on their genetic blueprint, preserved in DNA, to maintain functional molecules. But many factors, such as oxidative stress and environmental toxins, can damage DNA.

Green tea has demonstrated DNA-protective effects even during exposure to environmental contaminants such as cigarette smoke.²⁹⁻³¹

In one randomized, controlled trial, scientists found that compared to baseline, smokers who drank **four cups** of green tea daily experienced an approximate **31%** decrease in a urinary biomarker of oxidative DNA damage.³²

What You Need to Know

A More Potent Form of Green Tea

- Green tea’s many health benefits are derived from its rich abundance of polyphenols, which help protect against disorders ranging from cardiovascular disease to cancer.
- Green tea’s greatest health benefits are seen in those who consume **2-3 cups** (and more) daily— yet many fail to take full advantage of this remarkable plant, drinking just one cup a day.
- A new source of green tea grown in Kenya and processed using a patented technology has been shown to provide three times more polyphenols than most popular green teas.
- This means it would take **three cups** of regular green tea to provide the *same* polyphenol levels as just **one cup** of this Kenyan-sourced green tea.



Depression

This difficult-to-treat disease is experienced by an estimated **16.2 million** American adults in an average year.³³

A study of people aged 70 and over showed that those consuming **two to three cups** of green tea daily had a **4%** lower prevalence of mild and severe depressive symptoms, compared to those drinking less than one cup. Those consuming **four or more cups** daily had a **44%** lower prevalence.³



Periodontal Disease

People with gum disease are **34%-72%** more likely to die of cardiovascular disease and other complications, compared to those in good oral health.^{34,35}

Research suggests that green-tea polyphenols—specifically *catechins*—inhibit periodontal pathogens. In addition, researchers recommend **2-3 cups** of green tea daily for the prevention of periodontal disease.³⁶

Note that all of these studies have one thing in common: To get the maximum benefits of green tea, you have to consume **substantially more** than one cup daily. But when it comes to health benefits and safety, not all green tea is the same.

Understanding Green Tea

To put a common misconception to rest, all tea—black, green, white, or oolong—comes from the same plant: *Camellia sinensis*. The vast differences arise largely from the time of harvest and how the leaves are treated and processed *after* being picked.

Positioned at the start of the tea spectrum, **green tea** is the oldest known form of tea.³⁷ As soon as the leaves are picked, they are heated by steaming or firing to lock in their bright, green character. This provides green tea's uplifting flavor profile, which might be described as fresh and grassy.

Purple tea is only grown in Kenya at that country's highest peak, where it produces purple-reddish leaves.

Up to Three Times the Polyphenol Content

A problem with typical green teas is that you need to drink at least **three cups a day** to obtain the maximal health benefit.

The Emrok family teas are different because they are processed using a patented technology that provides up to three times the polyphenol content.

The patented **PhytoClean™ technology** is an ultra-efficient extraction process that recovers greater amounts of polyphenol compounds, resulting in pure, natural tea crystals with unrivaled **polyphenol concentration**.

This process is environmentally responsible, utilizing **no** chemical solvents. Instead, heat and pressure are applied to water to lower its polarity, an electrochemical change that alters the water's behavior. It is pure water—but it now acts like an organic solvent, easily extracting all the flavor, aroma, and nutrients from the leaves.

This technology ensures a consistently high amount of polyphenols—an incredible **300-500 mg**—in every cup.

This means that just **one cup** of this tea—green or purple—delivers the same level of polyphenols normally found in **two to three cups** of other popular green teas. You can enjoy as many cups as you wish, but only one cup is needed to derive all the multi-cup health benefits verified in a slew of published scientific studies.

And you don't need to be at home to enjoy a cup. Both green and purple versions of this tea come in one-cup, grab-and-go packets so you can make tea in just seconds. This super-convenient format means that all you need to do is tear open the packet, pour the crystals into a cup, and add hot water—**no steeping needed**.

And if just one refreshing cup is all you have time or inclination for during your busy day, keep in mind that one cup of this tea delivers all the polyphenol protection—and health benefits—of up to three cups of any other green tea.

Purple Tea

While many teas like black, white, and green are derived from the green leaves of the common tea leaf, *Camellia sinensis*, purple tea is harvested from the same plant when it is grown in mountainous regions, almost exclusively in Kenya.

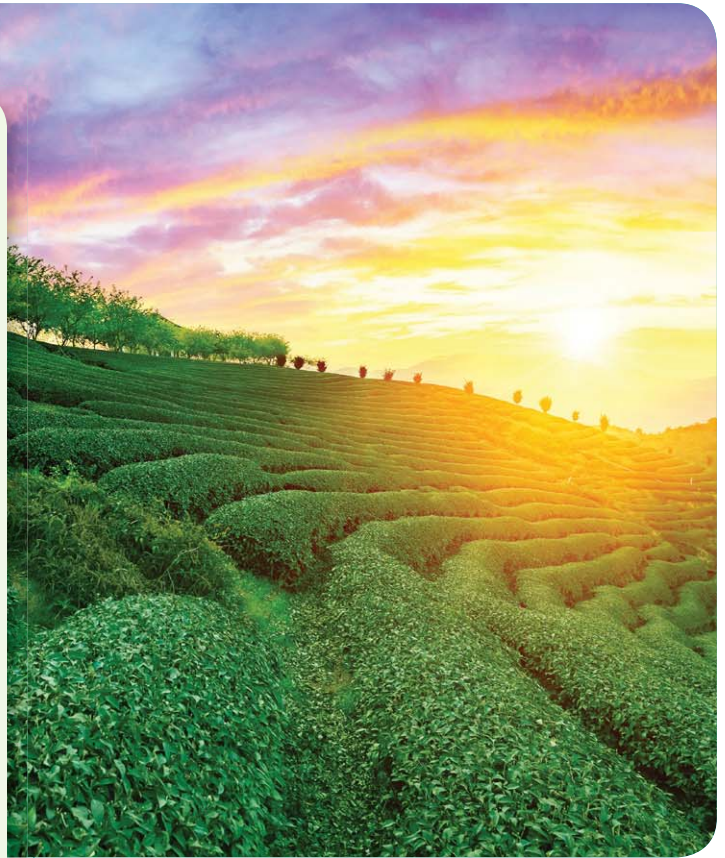
Purple tea was developed over many years, primarily for its drought resistance and productivity. It is grown at elevations between 4,500 and 7,500 feet, which—combined with the fact that Kenya is near the equator—results in greater UV-light bombardment. This causes the plants to produce anthocyanins to protect the leaves from damage, which creates leaves of a reddish-purple color.⁴¹

Overall, purple tea provides more oxidant reduction than any other teas.

Anthocyanins exert antimicrobial, cell-protective, antitumor, lipid-lowering, and neuroprotective properties—all of which have implications for disease prevention and promotion of good health.³⁸⁻⁴⁰

Although teas in general contain lower levels of caffeine than coffee, the caffeine content of purple tea is even lower than that of black or green tea.

Purple tea's flavor has elements of both green and black teas and must be tasted to be appreciated. This unique tea has now become a much sought-after prize in connoisseur-tea circles internationally.



Summary

The secret behind green tea's protective effects is its rich **polyphenol** content, which lowers the risk of diseases ranging from cancer to depression, and reduces all-cause mortality.

Many people drink a single cup of green tea daily, assuming that they are getting all the polyphenol benefits demonstrated in green tea studies. But these studies are usually based on consuming at least **2-3 cups** daily.

For those who want all the same protective polyphenol benefits—but do not necessarily want to drink that many cups—there's an impressive alternative.

A Kenyan-sourced, pesticide-free, Rainforest Alliance certified, and rich-tasting tea is so packed with polyphenols that just **one cup** daily delivers the *same* polyphenol levels as up to **three cups** of regular green tea. ●

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

It has only been produced recently after decades of research into developing a tea that would be drought-, disease-, and pest-resistant. The high altitude packs it with plant-protecting **anthocyanins**—which provide excellent health benefits for humans as well.

Anthocyanins are the same bioactive natural pigments responsible for the distinctive color in blueberries, cranberries, grapes, and even red cabbage or eggplants. Although berries are a rich source, any food or drink containing anthocyanins can provide antimicrobial, cell-protective, antitumor, lipid-lowering, and neuroprotective properties—all of which have implications for preventing disease and promoting good health.³⁸⁻⁴⁰

Thanks to a patented extract technology, both of these Kenyan varieties of green tea are now available in tea crystals that deliver higher levels of **polyphenols** than regular green tea—***much*** higher levels.

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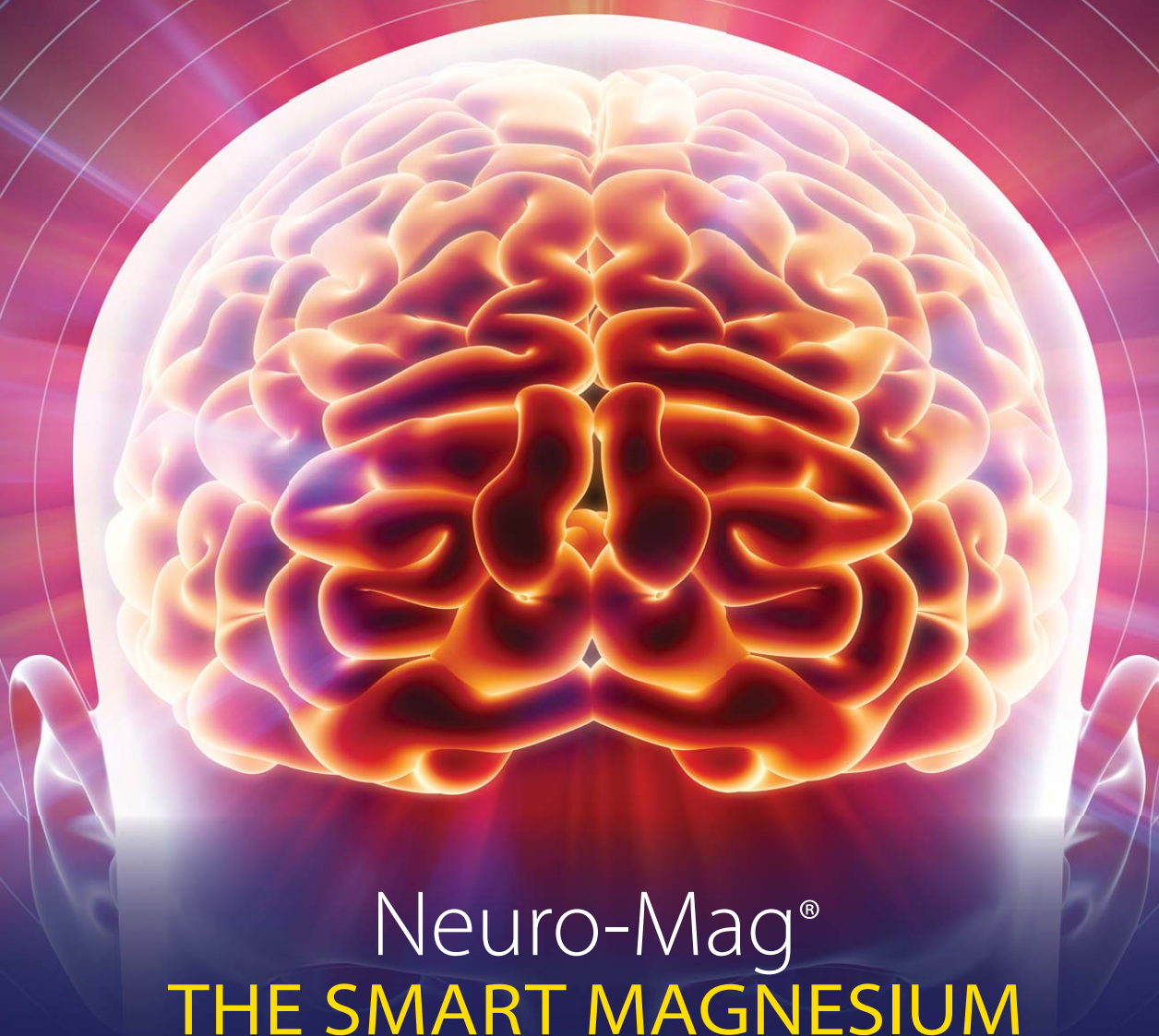
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* *Alzheimers Dis.* 2015;49(4):971-90.

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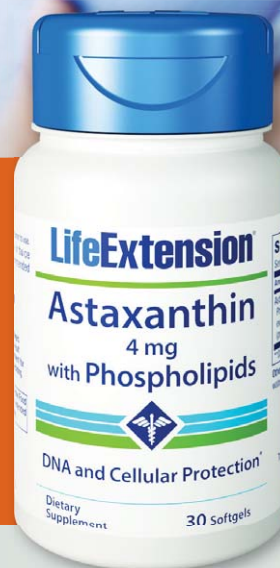
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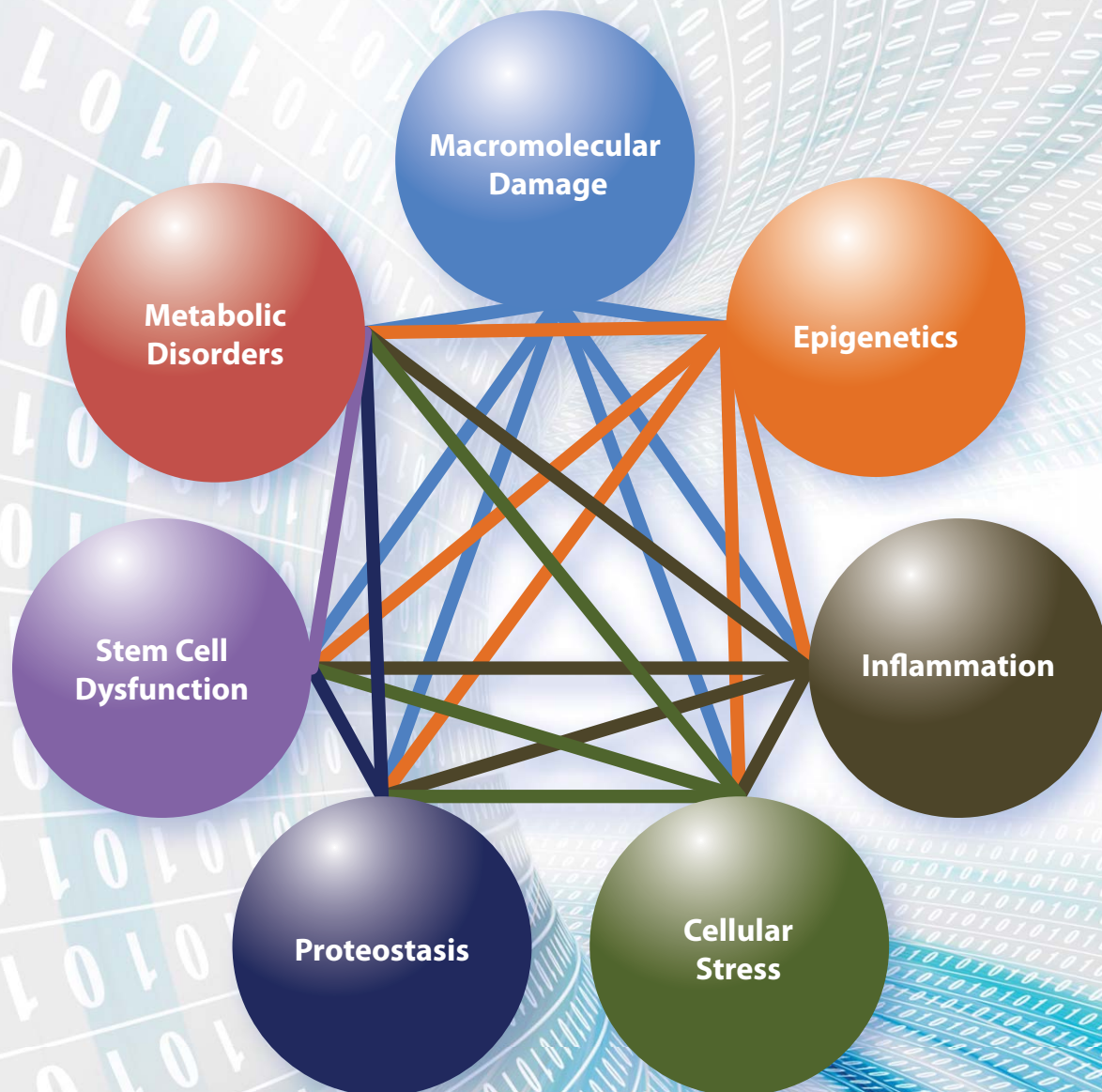
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The Seven Deadly “Pillars of Aging”

Figure 1. Each of the independent factors above contributes to what we see as **aging** of the entire individual.

To one extent or another, all seven processes are active in every chronic disorder that threatens human longevity and health.¹

Control over these aging processes can be better achieved via compounds that “turn on” beneficial cell **signaling pathways** while “turning off” degenerative factors.

Deep-learning **artificial intelligence** is helping identify interventions that enable the restoration of more youthful **cell signaling**.

Combating AGING *via* Artificial Intelligence

In youth, cells **communicate** by emitting precise **signals** that enable healthy tissue **function**.

Aging causes disruption of cell-**signaling pathways** that leads to whole-body **degeneration**.

Restoration of youthful **cell signaling** is a critical part of a healthy longevity strategy.

In the **March 1995** issue of **Life Extension Magazine®**, we advised readers to consider an antidiabetic drug called **metformin** to combat degenerative alterations.

We did so at great personal risk, as the **FDA** insisted we not do this.

We nonetheless continued extolling the use of **metformin** by normal aging persons because the drug protected against so many degenerative factors.

A significant number of people, however, cannot tolerate metformin's gastrointestinal side effects. Many others cannot persuade their doctors to prescribe metformin because they are not **type II diabetic**.

There are also newly identified **signaling pathways** that **metformin** itself might not adequately target.

These facts motivated **Life Extension®** to ally with an A.I. group called **Insilico Medicine**. The strategy involved using advanced **artificial intelligence (A.I.)** to assess tens of thousands of **signaling pathways** and how they can be youthfully restored.

The result is the discovery of concentrated **natural compounds** that can *modulate* many of the same anti-aging pathways as **metformin**. These landmark findings were recently published in a prestigious scientific journal.²

Never before has there been a targeted combination of natural compounds that can mimic so many longevity benefits via modulation of cell-**signaling pathways**.

Restoring youthful **functionality** is expected to help protect against age-related maladies, including cognitive decline, heart-muscle weakness, excess weight, metabolic disorders, and DNA gene mutations.

This research arena is accelerating because of proprietary **artificial intelligence** that analyzes complex biological activities and identifies **natural compounds** to reinstate more youthful functionality.

Why Mimic Metformin?

Metformin is a widely prescribed drug, first developed to lower blood sugar in people with type II diabetes.

It was approved in England in **1957**, but did not gain FDA approval until **1994**.

Increasingly, scientists are discovering that **metformin** provides multiple beneficial effects that extend beyond **glucose control**.

It turns out that metformin can inhibit key aspects of degenerative aging, which in turn can boost protection against diabetes, obesity, cardiovascular diseases, neurodegeneration, and cancer.³⁻⁸

Scientists have long known that metformin mimics many of the anti-aging **pathways activated** by **calorie restriction (CR)**.

CR works in a number of ways to modulate aging. It impacts how the body manages energy, how it controls cell replication, and how it recycles basic building blocks to prevent intracellular pollution and conserve resources.

Metformin’s potential anti-aging benefits are so profound that the FDA approved a clinical trial in **2015** to assess its impact against aging. This study will determine whether metformin can restore the **gene expression profile** of older adults to more closely resemble that of young, healthy subjects.⁹

Natural Extracts With Metformin’s Anti-Aging Impact

In reviewing massive amounts of data, **artificial intelligence** analyses identified a combination of three natural extracts that can impact many of the beneficial pathways targeted by metformin.²

These three highly concentrated **plant extracts are:**

- **Withaferin A** (from ashwagandha)
- **Ginsenoside** (from ginseng)
- **Gamma linolenic acid** (from borage seed oil)

The Seven “Pillars of Aging” Drive Healthspan

Pillar	Definition/ Role in Aging
Macromolecular Damage	Damage to large functional molecules (macromolecules) that increases with age. This damage to proteins, DNA, lipids, and other macromolecules is an important factor in specific age-related diseases. ⁶²
Epigenetics	Modifications of gene expression can be induced by the environment, altering which genes are either activated or suppressed. ⁶³
Inflammation	Chronic inflammation is a pervasive feature of age-related diseases. ⁶⁴
Cellular Stress	The rate of biological aging is modulated in part by genes interacting with environmental stressors. ⁶⁵
Proteostasis	Loss of proper regulation of protein structure and function, known as “proteostasis,” is a common feature of aging and disease that is characterized by the appearance of dysfunctional or destructive protein aggregates in various tissues. ⁶⁶
Stem Cell Dysfunction	Stem cells (capable of maturing into specialized, tissue-specific cells) normally provide sources of new tissue when regeneration is called for. Loss of stem cells or their ability to regenerate contribute to the age-related decline in tissue function. ⁶⁷
Metabolic Disorders	The aging process is characterized by changes in response to insulin (e.g., resistance), changes in body composition (e.g., increased fat, decreased muscle mass), and physiological declines in specific metabolic signaling molecules, e.g., growth hormone (GH), and sex steroids. ⁶⁸

Each pillar in this box is comprised of complex **biochemical pathways** that modulate the aging process at the whole organism level. Pathways that drive each pillar are capable of being modified to reduce impact on overall aging, with calorie restriction and metformin treatment being the best-studied to date.^{1,69,70}

Three Ingredients Cover Pathways in all Seven Pillars of Aging

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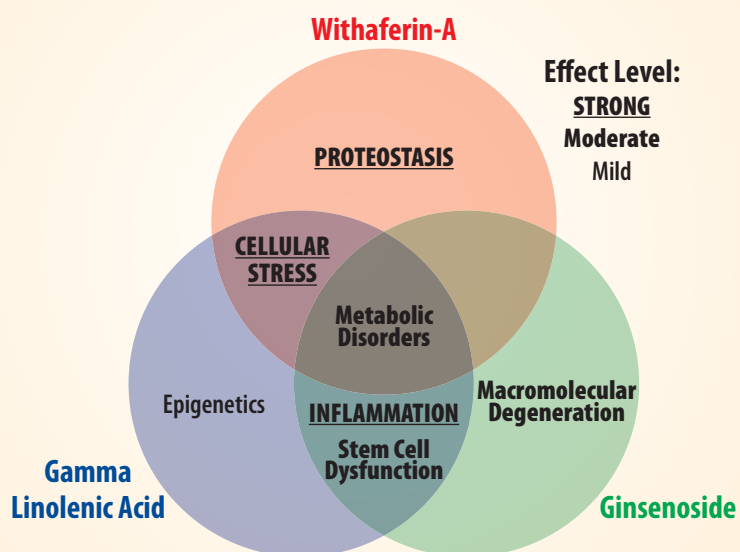


Figure 2. Insilico Medicine's analysis revealed how three natural ingredients work together to combat the pillars of aging. This diagram shows how each of the ingredients—**withaferin A** (red), **ginsenoside** (green), **gamma linolenic acid** (purple)—work together and independently to address each of the aging pillars and the biochemical signaling pathways they each represent.²

In combination, these three natural extracts are likely to provide broad-spectrum protection against underlying causes of age-related disorders.

To create a more comprehensive longevity strategy, **Life Extension** scientists expanded their search *beyond* metformin. They also incorporated the model of the **seven pillars of aging**, proposed by a consortium organized with the **National Institutes of Health**.¹

Life Extension believes the seven pillars of aging provide a framework for science-based interventions to extend both lifespan and healthspan.

Using this concept, **Life Extension** characterized the compounds identified by Insilico based on how they beneficially modulate each of the **seven pillars of aging**, thereby modulating critical factors related to systemic degeneration.

An abundance of published data reveals how each of these natural extracts can provide a similar level of protection as metformin and also modulate the seven pillars of aging to protect against the key destructive forces of aging.

Artificial Intelligence Identifies Plant Extracts That Fight Aging

- Science has progressed to the point that we understand aging as a risk factor for chronic diseases, which in turn can now be viewed as *symptoms* of aging.
- Seven fundamental processes, or pillars of aging, have been identified by a consortium organized with the *National Institutes of Health* as holding the keys to why our bodies age.
- Combating the age-accelerating signaling pathways that promote the pillars of aging, and enhancing those that decelerate aging, is therefore emerging as potentially the most powerful tool for extending both quantity and quality of life.
- Until quite recently, severe calorie restriction was seen as the leading candidate to favorably alter many of the pathways that contribute to the pillars of aging.
- Recent work shows that metformin, originally an antidiabetic drug, alters those same pathways in a fashion similar to calorie restriction.
- Groundbreaking work by **Life Extension** scientists using artificial intelligence networks has led to the discovery of a three-natural extract formulation with more than **78%** of the pathway-modifying actions of metformin.
- Withaferin A, ginsenoside, and gamma linolenic acid modulate pathways that contribute to all seven pillars of aging, and are predicted to have a similar age-decelerating effect as metformin, including protection against neurodegeneration, obesity, diabetes, cancer, and cardiovascular disease.
- Unlike other therapies and supplement regimens that target a specific disease, this formulation is intended for regular use by **healthy people** interested in an across-the-board protection from age-accelerating processes, with the anticipated result of lower rates of chronic, age-related disorders.

Seven Pillars, Many Pathways to Aging

Communications within and between cells are vital to the function of the entire organism. The molecular systems that produce those communications are called **signaling pathways**, because they involve multiple molecular signals, each triggering a new sequence of events until a final result is achieved.

Pathways associated with the pillars are associated with protecting cells from chemical and environmental stress, adverse gene expression, inflammatory changes, protein degradation, DNA damage and repair, control over cell replication, and many others. Each pillar involves many pathways, which overlap and reinforce one another, as shown in **Figure 2**.



Withaferin A Protects Against Neurodegeneration, Obesity, and Dysfunctional Proteins

In their research, **Life Extension** and Insilico Medicine scientists found that **withaferin A**, a component of the herb **ashwagandha**, was the closest in its predicted **gene-regulating** effects to **metformin**.²

Ashwagandha, an herb used in traditional Ayurvedic medicine, has important anti-aging properties that include antidiabetic, anti-obesity, anticancer, anti-inflammatory, and appetite-regulating.

What has scientists so excited about **withaferin A** is the multiple beneficial roles it demonstrates in peer-reviewed, published studies.

Protect Your Body's Proteins

Proteins make up about **42%** of the dry weight of our bodies. The protein collagen—which holds our skin, tendons, muscles, and bones together—makes up about a quarter of your body's total protein.¹⁰

Proteins play many critical roles in the body. They do most of the work in cells and are required for the structure, function, and regulation of the body's tissues and organs.

Recent scientific evidence has identified **loss of protein homeostasis** (protein quality control network) as a causative factor in age-related disorders, including cancer and heart disease, as well as neurodegenerative disorders such as Parkinson's, Alzheimer's, and amyotrophic lateral sclerosis (ALS), and even obesity.¹¹⁻¹⁶

Withaferin A has shown the ability to *activate* the protein **quality-control** network in human cells, also known as **proteostasis**, loss of which can lead to many destructive diseases of aging.¹⁷⁻¹⁹

One can think of **proteostasis** as the cellular protein quality-control network that removes damaged proteins and helps maintain healthy proteins.

When the cell accumulates excessive amounts of damaged or improperly folded proteins, degenerative disease often sets in. The goal is to prevent production of misfolded proteins and encourage elimination of damaged proteins.

Protecting Nerve Cells From Degeneration

ALS or Lou Gehrig's disease causes progressive loss of motor control, leading to weakness, tremors, and, eventually, difficulties with speaking, swallowing, and breathing. It is one of the neurodegenerative diseases associated with poor proteostasis,²⁰⁻²² making it a highly attractive first target for **withaferin A**.

Researchers treated mice genetically engineered to develop ALS with withaferin A or a placebo control solution to study the effects on ALS.²³

The study found that mice supplemented with **withaferin A** showed *reduced* inflammation, a **39% reduction** in damaged proteins in the spinal cord, a more than **60% reduction** in loss of motor nerve cells (cells that transmit movement signals from brain to spinal cord to muscles), and increases of lifespan (**5.6%** in animals with rapidly-progressing ALS, and **4.7%** in a slowly-progressing disease model).²³

In other words, treatment of animals with **withaferin A** reduced many of the underlying factors that result in the paralysis of ALS – most importantly the loss of motor nerve cells, which triggers the rapidly progressive weakness associated with ALS, eventually leading to death.

Withaferin A Fights Obesity

Obesity may be connected with loss of proteostasis.^{24,25}

A group of scientists decided to study the benefit of withaferin A on obesity resulting from excess calorie intake. Obesity is not just a cosmetic problem but a powerful accelerator of aging itself, so all efforts to fight obesity can lead to a reduction in aging.

In this study, obese mice were fed a high-fat diet and given **withaferin A** for 21 days. Other mice were fed the same diet but administered a control solution.²⁶

The mice supplemented with withaferin A experienced significant weight loss. By the end of the study they had nearly a **23% reduction in weight from baseline**.²⁶ This weight reduction did not occur in the placebo group.

The weight loss appeared to be largely driven by a significant reduction in food intake by more than **60%**.

Interestingly, these mice—with their reduced food intake—also showed higher sensitivity to **leptin**,²⁶ a hormone that inhibits hunger.²⁷ In obese animals with poor proteostasis, scientists found an overall *insensitivity* to **leptin** that contributes to obesity.²⁸

The mice that were supplemented with withaferin A showed significantly **lower** leptin levels after treatment.²⁶ This indicated that their bodies had recovered their normal sensitivity to leptin, producing the decreased appetite and food intake that in turn resulted in lower body weight.

Artificial Intelligence Identifies Natural Extracts With the Anti-Aging Capacity of Metformin

Until recently, conducting a comprehensive review of anti-aging pathways would have taken human researchers a decade or more.

Now, Artificial Intelligence (A.I.) is being utilized to accelerate this process so that more and more life-extending therapeutics can be brought to the public in a shorter time span.

In a first, **Life Extension** scientists teamed up with **Insilico Medicine**, Inc., to apply Insilico's "deep learning" A.I. technology in order to identify known natural compounds that activate similar anti-aging pathways as metformin. A paper detailing Insilico's unique discovery was published in the prestigious journal *Aging*.²

The researchers began exploring the *Library of Integrated Network-based Cellular Signatures*, which is a massive dataset containing all known biochemical cell-signaling pathways.² Next, applying sophisticated algorithms and "deep learning" methods to the dataset, they evaluated the genes and biochemical pathways specifically affected by metformin, to develop a comprehensive map of its impact on cells.

This process yielded more than 3,000 pathways that metformin actively modulates in living cells. Of those, **99 pathways** were identified as comprising the "anti-aging pathway cloud," and were placed on the map.

The researchers conducted a similar process on more than 800 natural compounds, identifying their relevant metabolic pathways.

Comparing results of these exhaustive searches, the researchers ranked the natural compounds in order of their "pathway similarity" to metformin, and identified the three that most emulated metformin's actions on the anti-aging pathways.

What they found is depicted in **Figure 2**. Withaferin A, ginseng and GLA – all with established safety records in humans – between them influenced the same aging pathways as metformin.



Introducing Proteostasis— Major New Anti-Aging Target

Many of the structural elements that hold cells and tissue together are made of **proteins**, as are all of the *enzymes* that carry out essential chemical reactions in our bodies.

A major activity of most cells in the body is regeneration of new proteins to replace those lost to age-inducing damage.

That constant protein manufacture and recycling process requires ongoing quality control, a process called proteostasis.

As a major pillar of aging, deficiencies in proteostasis can produce conditions we recognize as independent, age-related disorders, e.g., diabetes, cancer, cardiovascular diseases, and neurodegenerative diseases.¹⁷

There is now growing interest in attacking poor proteostasis as an anti-aging target, which offers the potential to prevent a host of different disorders involving poor protein quality control.⁷¹

For example, in healthy cells, a pathway called the **unfolded protein response** naturally supports the essential folding that long protein molecules require to achieve their normal functions. A defective unfolded protein response leads to proteins that fail to attain their functional structure, leading to cellular dysfunction and progression of aging-associated diseases.

Withaferin A has strong proteostasis-improving properties. It has been shown to attenuate the abnormal unfolded protein response that develops in high-fat-fed mice, which restores normal **signaling** by the anti-obesity protein hormone leptin, in turn resulting in weight loss and fat-mass reduction.²⁶

Biochemical analysis showed that withaferin A-supplemented mice also had a significant *reduction* in the harmful unfolded protein response.

This reduction is credited with restoring leptin sensitivity and the observed reductions in food intake and body-fat mass.²⁶ By contrast, untreated leptin-resistant mice maintained much higher levels of leptin, but failed to suppress their appetites because of their *resistance* to the leptin hormone.²⁶

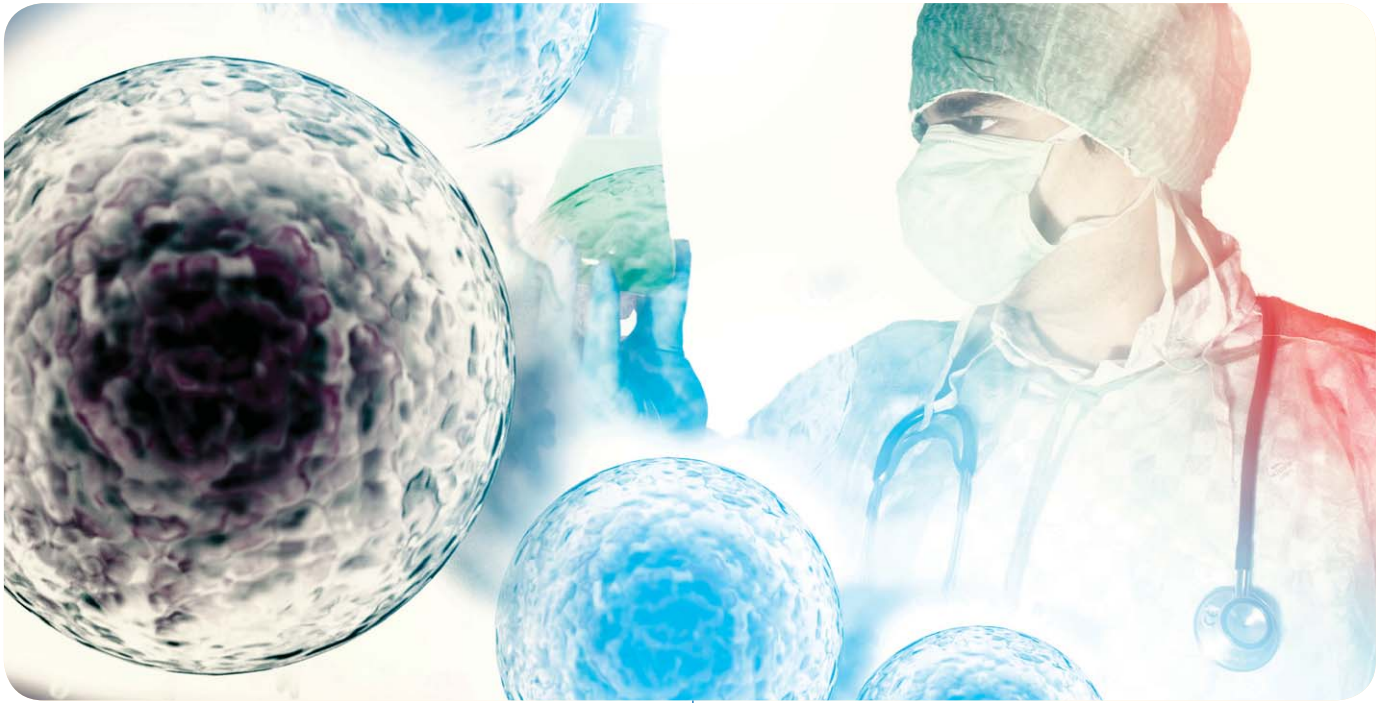
These two studies are a clear indicator of the effectiveness of withaferin A at *modulating* **proteostasis** to help fight neurodegenerative diseases and obesity, two conditions that account for a considerable share of degenerative aging.

Safety studies have shown that **withaferin A** has no adverse effects at doses up to **2,000 mg/kg** in rats—roughly equivalent to about **22 grams** in humans, vastly higher than the recommended doses.²⁹

Ginsenoside Protects Against Neurodegeneration, Cancer, Cardiovascular Disease

Ginsenoside is a steroid-like molecule from ginseng. It was identified by the **Insilico Medicine** team as having an overlap with many of the *age-decelerating pathways* that metformin regulates.²





They found that **ginsenoside** concentrate modulates pathways related to the *pillars of aging*.

Ginsenoside favorably impacts inflammation, and has moderate effects related to macromolecular degeneration, metabolism, stem cells, and regeneration.² It addresses mechanisms both separately and with some overlap with **withaferin A**.

Previous studies have shown that ginsenoside can reduce the inflammatory changes that underlie many of the consequences of aging, contributing to neurodegenerative diseases, cancer, and cardiovascular disease.³⁰⁻³⁴

Ginsenoside also works to prevent damage to DNA and other large molecules, which contributes to cancer development while inhibiting normal repairs in neurodegenerative disorders.^{35,36}

Ginsenoside also suppresses cancer **stem cells** that manage to survive both natural anticancer protections and chemotherapy, and are a major risk in cancer development and severity.^{31,37-39}

And ginsenoside prevents loss of energy-generating **mitochondria** that contributes to poor heart function and brain deterioration.^{40,41} Improving the quality and quantity of mitochondria is an innovative approach to the *deceleration of aging*.^{42,43}

The impressive results of these animal studies are supported by the safety profile of ginsenoside, which, in rat studies, was found to be tolerated at doses up to the equivalent of about **18 grams/day** in humans, without adverse effects.⁴⁴

GLA Slows Cancer, Prevents Diabetes, Fights Obesity, Lowers Cardiovascular Risk

Gamma Linolenic Acid (GLA), a fatty acid found in evening primrose, borage, and black currant oils, was found by the **Insilico Medicine** researchers to activate many pathways triggered by metformin, in many cases with greater potency.²

Specifically, GLA beneficially modifies pathways related to the **seven pillars of aging**, including inflammation and stress adaptation, with moderate impact on the metabolism and stem cells/regeneration pillars, and even a mild effect on epigenetics (regulation of gene expression).²

GLA is a fatty acid long associated with health benefits.⁴⁵ GLA is best known for its anti-inflammatory properties, with studies showing favorable impact on the body's overall inflammatory status through activation of many pathways in common with metformin.⁴⁵⁻⁴⁸

Regulation of inflammation gives GLA effects that can influence body weight, diabetes risk, cancer development, and brain function.

Like metformin, GLA also activates the metabolic regulator complex called **PPAR**, a group of biochemical receptors involved in everything from energy sensing in obesity and diabetes, to control of cell replication and controlled cell death in cancer.⁴⁹⁻⁵²

A healthy adaptation to stress, both environmental and biochemical, is essential for fighting aging's effects on health. In animal studies, GLA has demonstrated its ability to fight such stresses and preserve more youthful functions.

For example, GLA supplementation reduced the blood pressure elevation and heart-rate increases in rats confronted with psychosocial stress.^{53,54} GLA also improved nerve function in diabetic rats by attenuating the oxidative stress associated with the disease.⁵⁵ Metformin also fights such oxidative stress to protect against diabetic and nondiabetic age-accelerating processes.^{56,57}

These properties of GLA, and its sizable overlap with metformin in terms of aging pathways, make it an ideal component of a new metformin-mimicking formulation.

Like the other natural compounds identified by **Insilico Medicine** as having powerful metformin-like effects on aging, **GLA** has a proven safety record, including a lengthy history of human clinical trials.⁵⁸⁻⁶⁰

How A.I.-identified Natural Extracts Compare to Metformin

A study published last year in the journal *Aging* was titled:

“Towards natural mimetics of metformin and rapamycin.”

Source: *Aging* (Albany NY). 2017;9(11):2245-68.

This publication reported on the **artificial intelligence** algorithm that detected **withaferin A**, **ginsenoside**, and **gamma linolenic acid (GLA)**. It showed that these three concentrated **plant extracts** support more than **78%** of the beneficial anti-aging pathways activated by metformin.²

The race to develop natural mimetics to **metformin** and **rapamycin** is being fueled by consistent research findings showing these drugs delay onset and may reverse common age-related disorders.

The A.I. process led to a **metformin-mimic** formula, *predicted* to offer a large portion of the aging-decelerating actions of metformin.

This prediction is supported by a long record of independent studies showing that, by modulating pathways in common with metformin:

- **Withaferin A** restores proteostasis, protects against neurodegeneration, and can prevent obesity;
- **Ginsenoside** can protect against neurodegeneration, cancer, and cardiovascular disease, and;
- **GLA** can slow cancer growth, prevents experimentally induced diabetes, fights weight gain, and lowers blood pressure and other cardiovascular risk factors.



As it relates to what may be metformin's most important mechanism, which is activation of the cellular enzyme **AMPK**, these compounds appear to have a modest effect.²

So those using metformin to control their blood-sugar levels should continue doing so, with the knowledge that these three A.I.-identified compounds may provide additive protection against the effects of aging.

All maturing individuals should continue efforts to maintain youthful levels of activated AMPK.

Summary

Metformin is a multitargeted drug that confers protection against many age-related disorders.^{4,8,61}

It has been approved for the first-ever study of aging in **healthy humans**.

Metformin was selected for this human study because of its close overlap with the pathways activated by **calorie restriction**, which is still the only definitive way to extend lifespan in all species in which it has been tested.

Based on its known benefits, **Life Extension** scientists combed through thousands of data points to identify the crucial biochemical **signaling pathways** modulated by **metformin** utilizing proprietary **artificial intelligence**.

Findings from this meticulous analysis were published last year in a prestigious scientific journal.²

The results of **Life Extension's** A.I.-driven study make it possible to recommend the three compounds reported here for daily use in healthy adults who wish to decelerate their own cellular aging processes, by modulating the same group of biochemical pathways modulated by **metformin**. ●

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

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High HOMOCYSTEINE and Hearing Loss

BY CLYDE SIMMONS

Hearing loss is considered to be a normal part of aging, but recent studies indicate otherwise.

Research published over the past two years has identified an underlying cause of hearing loss not routinely considered by physicians.

These findings reveal that age-related hearing loss involves damage not just to the cells in the ear itself, but to *nerve cells* that support hearing.¹ This suggests that proven *nervous system-protective strategies* could be beneficial for hearing as well.

Most importantly, it reveals that elevated **homocysteine**—long associated with cardiovascular and neurological conditions—also contributes to hearing loss.²

Fortunately, research shows that supplementing with **folate** helps lower homocysteine while also protecting against the damage that it causes.²

This represents a novel approach to potentially mitigating hearing loss.

An Unexpected Cause of Hearing Loss

Sensorineural hearing loss, the kind associated with aging, reduces the ability to hear faint sounds while also making louder noises sound muffled.

The discovery that this type of hearing loss is caused by damage to **nerve cells** as well as to sound-sensing cells in the ear led scientists to look for factors common to both age-related hearing loss and brain degeneration.¹

An article published in **2017** reported on the growing epidemiological evidence of a strong association between elevated **homocysteine** and hearing loss.²

The **2017** study showed:

- High total plasma homocysteine is strongly associated with age-related hearing loss.
- Rare genetic diseases that cause high homocysteine levels are also strongly associated with sensorineural hearing loss.
- Animal studies demonstrating that high homocysteine levels—as well as deficiencies in vitamins required to clear homocysteine—produce the type of hearing loss seen in older people.

These findings bring together a clear relationship between hearing loss and homocysteine. They also highlight the role for nutritional supplementation as a potential means of preventing age-related deafness.

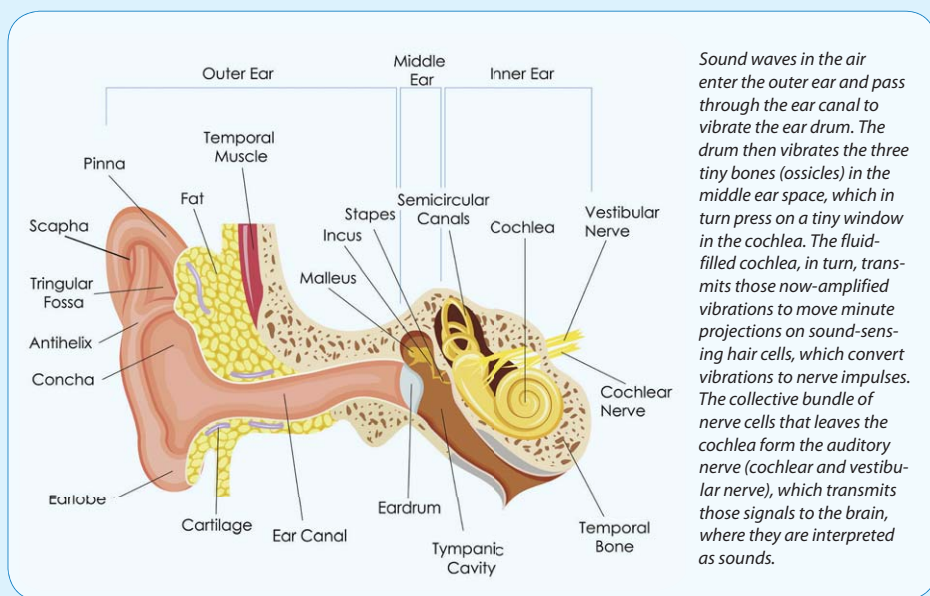
Hearing Loss in Older Adults: A Combination of Ear and Brain Injury

Not all forms of hearing loss are the same. The two most common forms of hearing loss are:¹⁵

- **Conductive** – in which sound cannot reach the inner ear, or cochlea, because of defects in the eardrum or the three tiny bones that connect it with the cochlea. Common causes are physical trauma or infection.
- **Sensorineural** – in which sound reaches the cochlea without trouble, but because of damage to the cochlea itself, or to the auditory nerve, the sound cannot be properly converted into nerve impulses that reach the brain.

Sensorineural hearing loss is the most common form of age-related hearing loss.^{16,17} It typically involves nerve damage – either to the minute hair cells in the cochlea that convert sound waves into nerve impulses, or to the nerve cells that transmit those impulses to the brain.^{1,17}

Anatomy of Hearing



While we once assumed that sensorineural hearing loss involved damage to those hair cells, recent studies show that up to **50%** of the nerve connections between hair cells and the auditory nerve may be lost before detectable damage to hair cells occurs. The implication is that this common form of hearing loss is as much a **nervous system condition** as it is an **ear condition**.¹

This means that anything that damages nerve cells will damage the connections between hair cells and the auditory centers of the brain, leading to sensorineural hearing loss. These factors include **oxidative stress** and resulting **inflammatory** changes, as well as mitochondrial dysfunction and, eventually, cell death.¹⁸

These considerations are making scientists take a second look at the role played by **homocysteine** in hearing loss.

High homocysteine levels are known to be associated with blood-vessel and nervous-system cell damage, and to contribute to stroke, Alzheimer's, and Parkinson's diseases.¹⁹⁻²⁵ Lowering homocysteine can help prevent those conditions.

It now makes perfect sense to use B vitamins to combat hearing loss as well as other forms of chronic, age-related brain disorders.

The Homocysteine/Folate Connection

Another recent article showed that a dietary deficiency in **follic acid**, a B vitamin necessary for clearing homocysteine from the blood, is associated with hearing loss.³ This is one of the key connections between homocysteine and hearing loss.

This study showed that after eight months of feeding healthy mice a diet deficient in folic acid, the animals started showing signs of hearing loss. Closer examination showed that their cochleae (the part of the ear where sound is converted to nerve impulses) was damaged and there was a loss of outer hair cells.³

Human studies have shown similar connections. When researchers evaluated people over 60 years old, they found that those with normal hearing had normal folate levels, while those with hearing loss had low folate levels.⁴

In a study involving nearly 3,000 people age 50 or older, those with elevated total homocysteine levels were **64% more** likely to have hearing loss compared with those having lower homocysteine levels.⁵ Again, most of that elevated risk was related to low plasma **folate** levels.

Other studies have shown similar hearing problems associated with low levels of **vitamin B12**, which is also required for lowering homocysteine.⁶

Mysterious Epidemic Causes Hearing Loss

The first indication that restoring folate levels could impact hearing came nearly a quarter-century ago. At the time, a mysterious epidemic swept through Cuba, leaving

more than 50,000 people suffering from a range of maladies related to poor nerve function. The most prominent included sensorineural hearing loss and deafness.⁷

No one ever found a cause. But when the government began treating victims with folate and other B vitamins, most patients had near-miraculous improvement, leaving less than one-tenth of one percent with permanent deficits.

Investigators concluded that micronutrient deficiencies—including thiamine, folate, and B12—were the root of the problem.⁷

Since that dramatic event, evidence has continued to reveal that folate supplementation can prevent, slow, and possibly even reverse age-related hearing loss.⁸

Folate Reverses Hearing Loss

A mouse study showed that high **homocysteine** levels led to significant leakage from blood vessels in brain areas associated with hearing, and surrounding tissues suffered severely from homocysteine-induced chemical stress.⁹ But when those mice were supplemented with folate for four weeks, the tissue levels of homocysteine plummeted, and the leaky blood vessels completely healed.

This suggested that reducing homocysteine levels with folate could potentially **reverse** ongoing hearing loss.⁹

A human study confirmed the hearing-related benefits.

More than 700 older adults with high homocysteine (but no hearing problems) were given **800 mcg** of folate per day or placebo for three years.¹⁰ While all subjects experienced mild hearing losses during the three-year period, the placebo group experienced a greater loss of hearing in low frequencies than the folate-supplemented group.

This helps demonstrate that regular folate supplementation is capable of slowing age-related hearing loss.¹⁰



Facts About Hearing Loss in Older Adults¹⁴

- Hearing loss is the third most common chronic physical condition among American adults. It is twice as prevalent as diabetes or cancer.
- Nearly half of people over age 60 have hearing loss, amounting to 46 million Americans in 2014 and predicted to grow to 82 million by 2040.
- People with hearing loss do worse socially and economically, are more likely to be unemployed, and have higher healthcare costs than those with normal hearing.

Summary

Rising levels of homocysteine are now closely associated with both brain-cell injury and hearing loss. Strategies aimed at lowering homocysteine levels, such as folate supplementation, convincingly slow hearing loss.

Supplementing with folate offers a unique strategy for combatting the dangers of elevated homocysteine—and represents a novel solution for preventing age-related hearing loss.

An issue for older individuals is that they lack the internal enzymes to convert folate from food and folic acid supplements to bioactive **5-methyltetrahydrofolate (5-MTHF)**.

For a long time, the only way of gaining access to this metabolically active folate (**5-MTHF**) was through an expensive prescription drug called Cerofolin® that cost over \$150 a month.

Fortunately, the **5-MTHF** patents expired several years ago. This enables consumers to gain access to optimized folate supplements that provide **1,000 to 5,000 mcg of 5-MTHF**, along with other B-vitamins (methylcobalamin B12, pyridoxal-5-phosphate B6 and vitamin B2), that work together and individually to reduce homocysteine via two detoxification pathways in the body. ●

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

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Life Extension Recommendations on Homocysteine

Homocysteine levels should be part of a yearly battery of blood tests to ensure a healthy, long life. **Life Extension®** advises that one should target their homocysteine levels below **12 µmol/L** with ideal numbers being **<8 µmol/L**.

Conventional reference ranges do not flag a homocysteine problem until blood levels reach **15 µmol/L**. Published data reveal those with **homocysteine** blood levels between **10-15 µmol/L** suffer greater risks.¹¹⁻¹³

Individuals with elevated homocysteine levels should begin supplementation with key B vitamins, especially higher doses of the activated form of folate (**5-MTHF**), and retest homocysteine blood levels after three months.

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TOPICAL Melatonin PROMOTES YOUTHFUL SKIN

The impact of a good night's sleep on maintaining younger-looking skin is often overlooked.

A recent study found that sleep quality strongly affects skin function and aging, concluding that:

“Chronic poor sleep quality is associated with increased signs of intrinsic aging, diminished skin barrier function, and lower satisfaction with appearance.”¹

The skin-rejuvenating effects of sleep are partially attributed to the hormone melatonin, which exerts a wide range of anti-aging benefits.²⁻⁶

As melatonin output decreases with age,⁷ many people become more vulnerable to sleep disturbances that fail to adequately repair aging and photodamaged skin.

Research has revealed that **topical melatonin**, along with additional compounds, restores youthful reparative processes during the night to produce visible and long-lasting improvements in the health and appearance of skin.

Melatonergic Antioxidative System: Your Skin's Internal Ultraviolet Defense

Derived from the amino acid tryptophan, **melatonin** is a hormone produced mainly by the brain's pineal gland, where it regulates our internal biological clock.⁸

Melatonin secretion is triggered in response to darkness, and diminished in the presence of light. Over the past decade, accumulating evidence indicates that melatonin offers health-promoting benefits that extend beyond regulating circadian rhythms. For example, it provides significant protection against UV-induced skin aging (*photoaging*).⁹

When melatonin attaches to receptors on various skin cells,^{10,11} it suppresses oxidative stress from sun exposure.⁴ Melatonin is known to:

- Act as a free-radical scavenger.¹² After interacting with free radicals, melatonin is degraded to **N¹-acetyl-N²-formyl-5-methoxykynuramine (AFMK)** and **N¹-acetyl-5-methoxykynuramine (AMK)**—both of which possess antioxidant and anti-inflammatory effects themselves.^{13,14} This antioxidant cascade is known as **melatonergic antioxidative system** of the skin.¹⁵
- Activate intracellular antioxidant systems including **superoxide dismutase (SOD)**, **glutathione peroxidase (GPx)**, and **catalase (CAT)**.¹⁶⁻¹⁹

Melatonin's versatility as a free-radical scavenger attenuates lipid peroxidation, protein oxidation, and DNA damage to promote the survival of healthy skin cells.^{2,4}

Dermal fibroblasts are cells that manufacture collagen and elastin, which are structural proteins that keep skin young, strong, and resilient. When dermal fibroblasts were treated with **melatonin** before sun exposure, they showed a survival rate of **92.5%** compared to just **56%** in those untreated.²⁰

By protecting against damage caused by photoaging, melatonin combats a prime culprit behind wrinkles, fine lines, loss of tone, and skin cancer, and is therefore an important ally for retaining a youthful appearance.

Why We Need Topical Melatonin

Melatonin secretion gradually declines over time, increasing our susceptibility to sleep debt that diminishes the skin's capacity to recover from external insults.^{21,22}

Oral ingestion of melatonin does not always provide optimal skin protection.²³ A more effective method is to apply melatonin topically, where it penetrates the stratum corneum and accumulates to initiate nightly repair and renewal.^{24,25}

A review of human studies found that topically applied melatonin safeguards against sun-induced erythema by reducing cell death, DNA damage, and oxidative stress.²⁶





What You Need to Know

Let's now take a look at how three other topical agents provide photoprotection, while repairing and regenerating damaged skin.

Ectoin: Natural Skin-Cell Protection

Ectoin is a natural substance found in halophilic bacteria that allows them to withstand harsh environmental stressors such as cold temperatures, sweltering UV rays, and droughts.^{27,28} Researchers have discovered that ectoin behaves like a sponge to bind and trap water molecules around skin structures, forming large hydration shells that protect against premature cell damage from extrinsic factors.²⁹

In a controlled study, human volunteers with crow's feet topically applied ectoin or a placebo twice daily for four weeks. Compared to the subjects on placebo, participants in the **ectoin-treatment** group experienced a mean reduction in wrinkle depth of **32%**, deepest wrinkle by **17%**, and wrinkle volume by **40%**.³⁰

In a double-blind, placebo-controlled trial, topical application of ectoin twice daily for four weeks in 24 women aged 30-60 significantly increased skin elasticity by **82.4%** over a placebo.²⁹

Ectoin enhances the skin's ability to retain moisture, making it visibly softer and smoother. In another double-blind, placebo-controlled trial, a topical cream with ectoin increased skin hydration by up to **200%** compared to a placebo after 12 days.²⁹ This increased hydration level of the skin was preserved for the next seven days without treatment, thereby demonstrating the sustained moisturizing effect of Ectoin.

Topical Melatonin Enhances Nightly Skin Repair and Renewal

- The skin rejuvenation effects of a good night's sleep are mediated by the broad and extensive antioxidant properties of the hormone melatonin.
- Melatonin secretion declines with age, increasing the likelihood of sleep debt that impairs the skin's ability to bounce back from external assaults, especially ultraviolet radiation.
- Topical melatonin has been shown to penetrate the stratum corneum and accumulate, to initiate nightly repair and renewal.
- Other topical agents including ectoin, acetyl-tetrapeptide-22, and coconut amino-acid complex, work through different modes of action to protect and repair damaged skin.
- The result is healthier, younger-looking skin and a marked reduction in wrinkles, fine lines, and uneven pigmentation.



Acetyl Tetrapeptide-22 Stimulates Stress-Responsive Heat-Shock Proteins

The skin relies on **heat-shock proteins**, which act as a clean-up crew for the cellular damage induced by stressful stimuli.^{31,32} When inside the cell, heat-shock proteins assist in the recovery of damaged proteins, while degrading others to halt protein aggregates that impair normal cellular processes.^{33,34}

The age-related decline in heat-shock proteins—notably **heat-shock protein 70 (HSP70)**—diminishes the skin's natural stress response and accelerates aging.

A novel peptide called **acetyl tetrapeptide-22** has been developed to boost HSP70 levels in the skin with or without prior stress, in turn maintaining protein homeostasis and increasing cell viability to slow down aging.³⁵

Coconut Amino-Acid Complex Soothes Sensitive Skin

The combination of coconut amino acids and minerals (potassium and magnesium) has been shown to improve the skin's moisture barrier and modulate the UV-induced inflammatory response in epidermal keratinocytes and dermal fibroblasts.³⁶ This anti-inflammatory action helps soothe sensitive and irritated skin.

One research team found that coconut amino acid complex reduced the sensation of discomfort from lactic acid in humans with hypersensitive skin. They observed that coconut amino-acid complex decreased the stinging intensity of lactic acid by **46%** immediately after topical application, and by **90%** after one minute.³⁶

Summary

Our skin is under attack from external forces like ultraviolet radiation that create damaging free radicals and oxidative stress, leaving behind a path of wrinkles, age spots, and mutations.

Research shows that topical compounds—including melatonin, ectoin, acetyl tetrapeptide-22, and coconut amino-acid complex—work through distinct and complementary mechanisms to offset the harmful effects of sunlight and enhance nightly repair of damaged skin to enable a younger-looking appearance. ●

Gary Goldfaden, MD, is a clinical dermatologist and lifetime member of the American Academy of Dermatology. He is the founder of Academy Dermatology in Hollywood, FL, and Cosmesis Skin Care.

Dr. Goldfaden is a member of Life Extension®'s Medical Advisory Board. All Cosmesis products are available online.

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

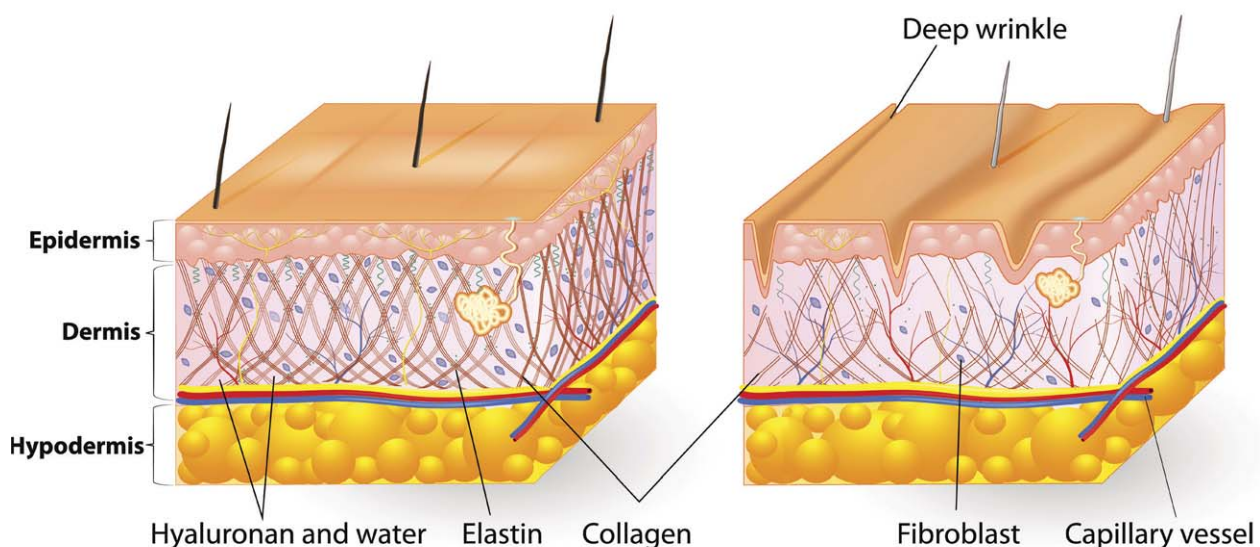
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Who Needs Digestive Enzymes?

In **1983**, a well-informed **Life Extension®** member recommended a **digestive enzyme** formula that had been around for many decades.

We published an article about this enzyme product (N-Zymes®) and many of our readers reported reduced digestive discomforts when taking it before meals.

As we age, our digestive tract loses the ability to tolerate the effects of excess calories, especially the fried, fast foods that you see endlessly advertised.

We encourage our readers to consume Mediterranean-style diets and whole plant foods that are easy to digest AND better for our health.

Even when eating healthy, many people encounter some form of gastrointestinal upset that **digestive enzymes** can help ameliorate.

Over the years, more concentrated and broader-spectrum enzyme blends have become available as supplements.

This article describes the role that *enzymes* play in digestive health.

If you find yourself reaching for drugs such as Alka-Seltzer or Pepto-Bismol to relieve chronic digestive problems, you could have bigger health problems than you realize.

Those over-the-counter drugs might *temporarily* ease your symptoms, but they do nothing to target the potential underlying *causes* of the problem—and they don't improve the body's ability to digest food.

If digestion is incomplete, the body cannot extract all the nutrients in our food. Aside from causing bloating and gas, this can lead to inadequate uptake of critical nutrients—and even *malnutrition* among older adults.

Two of the main underlying causes of poor digestion are the age-related decline of **digestive enzymes** and **microbiome imbalances**.¹⁻⁵

It is essential to maintain a healthy balance of digestive enzymes to optimize healthy digestion and get the most nutrition out of your meals.

Digestive enzymes and probiotics can do what no commercial drug can: address the *underlying causes* of gastrointestinal distress and poor nutrient absorption.

In doing so, you can not only help prevent abdominal discomfort, but also ensure that you're getting the nutrients necessary for optimal health.

Enzymes and Digestion

Food provides us with nutrients that fuel life-sustaining energy.

This fuel, however, needs to be “refined” in order for the body to utilize it—and that's where digestion comes in.

During digestion, the body breaks down food, extracting the energy and nutrients it needs. An important part of this process is accomplished by the deconstructive activities performed by specialized **enzymes**.

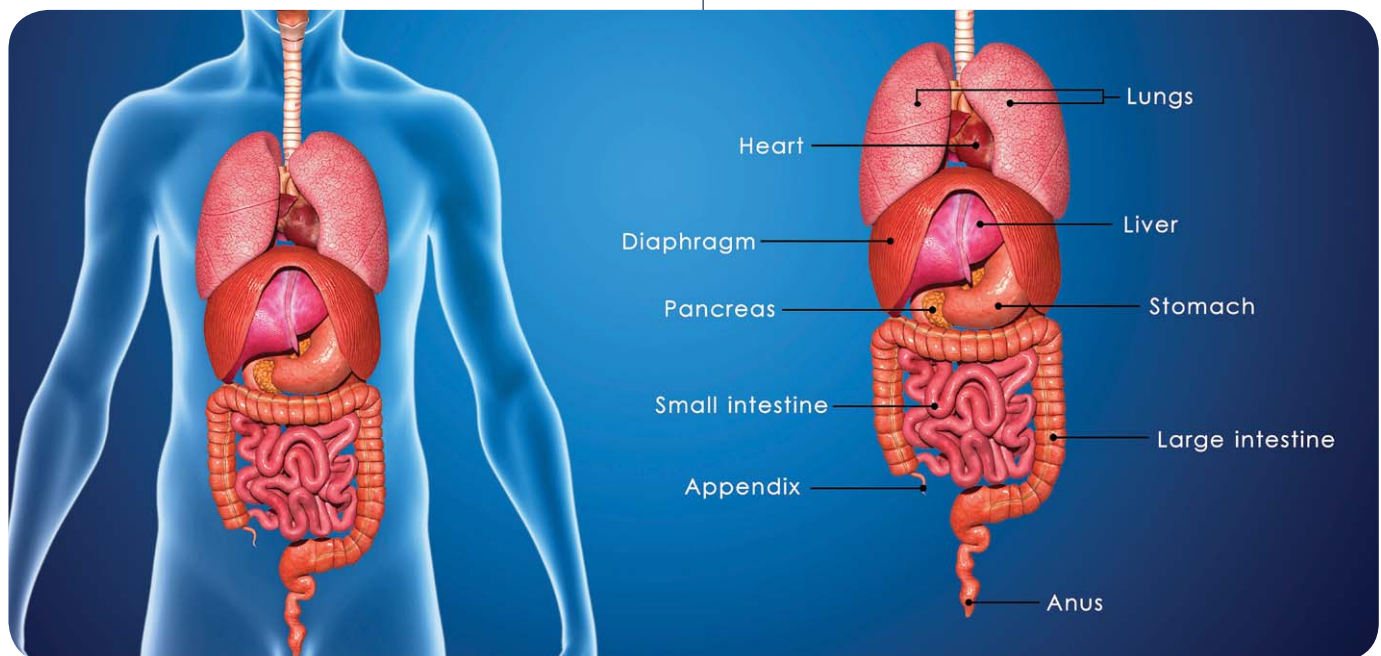
But, as we age, our body produces fewer of the **enzymes** necessary to properly break down food.⁶ Without these enzymes, undigested food passes into the colon, where it causes bloating, gas, diarrhea, and cramping.^{1,2} Worse, without the action of these powerful enzymes, our bodies can't *absorb* the nutrients we need for optimal health. In this way, poorly digested food contributes to the *malnutrition* that threatens older people who are already facing reduced appetite and changes in muscle and fat stores.^{6,7}

The increase in digestive discomfort and food intolerances is a clear indicator that our bodies just can't keep up. Fortunately, it's possible to **replace** the enzymes necessary for optimal health and digestion.

Supplementing With Digestive Enzymes

Adding enzymes to the diet is not a new idea. It's been over 70 years since scientists first noted that **supplementary enzymes** could restore rapid digestion of foods in the stomach.⁸

Since then, **human studies** have confirmed the beneficial effects from various types of digestive enzyme supplements.⁹⁻¹¹ For example, in a larger, placebo-controlled study, patients taking a digestive enzyme supplement reported fewer episodes of abdominal pain, nausea, vomiting, heartburn, bloating, flatulence, and appetite loss than those not taking the supplement.¹⁰





What You Need to Know

Enzymes Promote Optimal Digestion

- Many people today suffer from the symptoms of poor digestion, such as bloating and gas. What they may not realize is that this digestive insufficiency also compromises the absorption of key nutrients.
- Poor digestion is often caused by decreasing levels of digestive enzymes, as well as a chronic imbalance of beneficial organisms in the gastrointestinal tract.
- It is possible to address both of these underlying causes of gastrointestinal distress and poor nutrient absorption by properly supplementing with both digestive enzymes and the probiotic *B. coagulans*.

Each major food group has specific enzymes responsible for its breakdown. A deficiency in any one of these enzymes can lead to a wide range of common intestinal troubles.

For optimal digestion, it is important to consider supplementing with **digestive enzymes** that assist in the breakdown of all classes of food, including starch, proteins, fats, cellulose, and milk.

Protease

As we age, our pancreas produces less of the **protease** enzymes necessary for breaking down protein. This deficiency leaves protein molecules or fragments undigested, leading to a host of potentially toxic molecules.¹²⁻¹⁴ Worst of all, undigested protein has been associated with colon cancer.¹⁵

Fortunately, using *supplemental* proteases eases the body's burden of producing these complex enzymes entirely on its own. Research has shown that animals supplemented with proteases experienced enhanced digestion.¹⁶ In humans, supplementation with protease reduced the allergenic potential of meat products.¹⁷

In addition, protease supplementation may be useful in reducing the symptoms associated with gluten and casein intolerances.¹⁷

Lactase

Another food group that can become problematic with age is **dairy**.

Lactase, the enzyme responsible for breaking down milk sugar (called *lactose*), is often deficient in older people.¹⁸ This may lead to cramps, bloating, gas, and diarrhea after consuming milk products.¹⁹ The symptoms

are often so severe that victims suffer miserably before they figure out that dairy foods are the problem.

Cutting out dairy might prevent the unpleasant symptoms, but it can lead to *insufficient calcium intake*, which boosts the risk of osteoporosis and subsequent fractures.^{20,21}

Fortunately, you don't have to choose between your abdominal comfort and your bones. Supplementation with lactase reduces the severity of abdominal cramping, belching, flatulence, bloating, and diarrhea in individuals with lactase insufficiency.²²

Lactase provides specific support for proper dairy digestion, helping prevent after-meal discomfort—and ultimately improving overall nutritional status.

Lipase

Lipases are enzymes that break down the fat we eat into individual fatty acids and closely related substances. They also help the body absorb vital fat-soluble nutrients such as essential fatty acids and vitamins D, K, E, and A.^{9,23}

Without sufficient lipase, incompletely digested fats can pass through the GI tract, where they can produce greasy, fatty stools, and cramping. Even worse, since the body can't absorb undigested fats, a deficiency in lipase enzymes can also lead to malnutrition because it prevents the body from being able to absorb valuable fat-soluble vitamins.

Supplementing with lipase helps ensure that fats are properly digested. Pancreatic lipase enzymes have been used for years in people with *pancreatic insufficiency* (a condition in which the pancreas doesn't produce enough enzymes) to assist with digestion,²⁴ but we now know that they can be beneficial in healthy people as well.²⁵

In a study in which people ate high-fat food, patients who supplemented with pancreatic lipase enzymes experienced significant reductions in bloating, gas, and fullness compared to those taking a placebo.²⁵

Cellulase

High-fiber foods like broccoli, asparagus, and beans are notorious for causing excessive gas. These embarrassing symptoms keep many people from eating these foods—which also prevents them from obtaining their health benefits.

Fiber is vital for healthy digestion because it feeds beneficial organisms in the colon. These bacteria use fiber to produce beneficial short-chain fatty acids that play intriguing but critical roles in normal immune function, modulating genes associated with longevity, preventing cancer and metabolic syndrome, treating intestinal disease and maintaining colon health.²⁶⁻³²

The problem is that humans don't make enzymes that digest plant fiber (also called *cellulose*).

Fortunately, there's a way to get plenty of fiber and digest it well, which can help avoid the gas and bloating problems sometimes associated with a high-fiber diet—and once again, the answer is in supplemental

enzymes. The enzyme **cellulase** breaks down cellulose, the indigestible polysaccharide in dietary fiber.³³ This allows for smoother digestion of tough vegetable fiber.

Amylase

Amylase enzymes are responsible for digesting carbohydrates and starches.

A deficiency in amylases causes undigested carbohydrate molecules to pass on to the colon. There, gut organisms break them down, literally *fermenting* them to produce carbon dioxide and water, which leads to cramping, flatulence, and diarrhea.³⁴⁻³⁶

Having ample amylase enzymes promotes complete digestion of carbohydrates and starches, preventing the unpleasant effects of fermentation.

Bromelain

Bromelain, extracted from pineapple stem and fruit, contains powerful proteases (protein-digesting enzymes),³⁷ making this compound an effective digestive aid.

Its benefits were seen in a study of adults with chronic pancreatic insufficiency, a condition in which the pancreas doesn't produce enough digestive enzymes. Initially, these subjects were unable to fully digest and absorb fats and proteins. But supplementing with a pancreatic enzyme product that contained bromelain improved digestion and absorption of both protein and fat.³⁸





Probiotic Support for Digestion

Having ample digestive enzymes is only one piece of the digestion puzzle. The populations of bacteria in the gut are also integral components of the overall digestion process. If there is an imbalance in the gut microbiome, it can lead to gastrointestinal distress.³⁹

Supplementing with **probiotics** can help restore balance to the gut microbiome—which can help reduce uncomfortable abdominal symptoms and promote healthy intestinal function.^{40,41}

One strain has been found to be especially beneficial: the **MTCC 5856** strain of *Bacillus coagulans*. This particular strain is coated in a tough outer layer that resists digestion in the stomach and small intestine.^{41,42} As a result, it is delivered directly to the large intestine intact, where it can set up new colonies that can grow and flourish.⁴¹⁻⁴³

Multiple studies have shown that supplementing with *B. coagulans* benefits seemingly contradictory symptoms—constipation and diarrhea.

In a study of people with **chronic constipation**, **70%** of subjects had improvement in abdominal distension (that's when the abdomen swells because of gas or fluid)—and were able to have normal bowel movements after supplementing with *B. coagulans* for up to 10 days.⁴²

Its benefits in those with **irritable bowel syndrome** (IBS) are even more impressive. This condition can cause diarrhea and constipation, abdominal discomfort, gas, and bloating—and it is notoriously difficult to treat.

In a double-blind, placebo-controlled study, IBS patients took tablets containing **2 billion** spores of MTCC 5856 *B. coagulans* daily. The probiotic led to improvements on every score tested, including those assessing symptoms, abdominal discomfort, stool quality, and physicians' overall assessment. It also led to a significant decrease in clinical symptoms such as bloating, vomiting, diarrhea, abdominal pain, and stool frequency.⁴⁴

It takes an estimated four hours for this probiotic to take hold and start to grow in the intestine. But over time, it is gradually excreted from the body, which means it needs to be replenished with fresh supplementation.⁴⁰⁻⁴²

Summary

Incomplete digestion can prevent the body from extracting critical nutrients from food, threatening overall health and causing bloating, gas, and general discomfort.

Diminishing levels of digestive enzymes are the common cause of poor digestion. In addition, an imbalance in intestinal bacteria causes nutrient malabsorption, while also triggering inflammation and food sensitivities.

When taken orally before a meal, supplemental digestive enzymes, combined with the probiotic *B. coagulans*, boost the body's natural ability to break down food into its life-giving and healthful constituents while preventing gastrointestinal distress. ●

**If you have any questions on the scientific content
of this article, please call a Life Extension®
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Ginger

BY GARRY MESSICK

Although mainly associated in the West with sugary snacks such as gingerbread, ginger snaps, and ginger ale, ginger has been a staple of Eastern cuisine and traditional medicines for hundreds of years.

As used in foods and beverages, ginger is the root of a flowering plant that originated in Southern Asia, and was one of the first spices exported from that region to Europe.

Studies have established a number of significant health benefits that can be derived from ginger in the form of supplements and extracts. A few examples follow.

Cancer Prevention

Research has found that ginger fights certain types of cancer. A study found that ginger can help treat ovarian cancer by destroying cancer cells through apoptosis or programmed cell death.¹

Fights Obesity

Research suggests ginger, through a polyphenol it contains called gingerenone A, helps suppress obesity and inflammation of fat tissues.² In another study, ginger was considered alongside orlistat, a medication used for treating obesity. Results showed that, in rats fed a high-fat diet, ginger compared favorably against orlistat for reducing body weight and improving lipid profiles.³

Joint-Pain Relief

A human study showed ginger oil self-massaged into afflicted knees by osteoarthritis sufferers led to significant pain reduction.⁴ The study authors recommend this practice as a complementary method to standard medical treatment.

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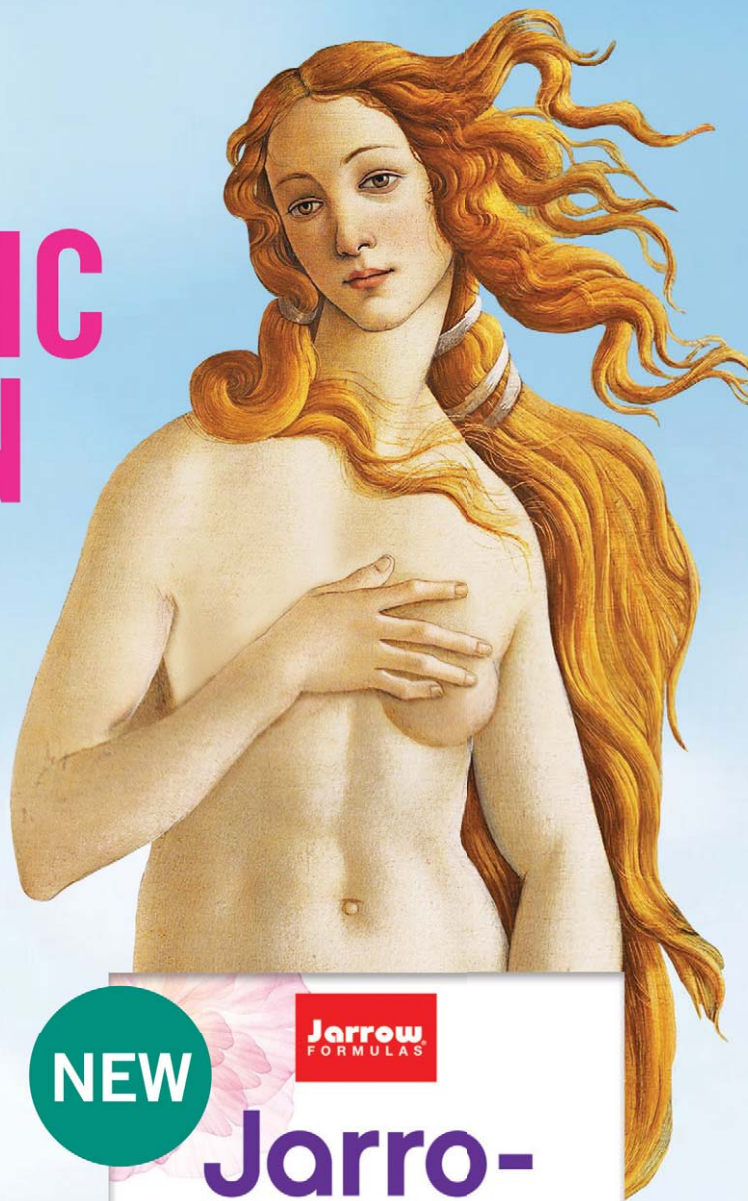
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Bread is Gold

BY GARRY MESSICK

Renowned Italian chef Massimo Bottura has long been concerned with issues of food waste, and is dedicated to the proposition that quality meals shouldn't be exclusively available to those who can afford to frequent expensive restaurants.

In 2015, he helped create the Refettorio Ambrosiano in Milan, where some of the world's top chefs cook for homeless and impoverished residents.

In the process, Bottura wanted to prove that "salvaged food, overripe or bruised and beyond expiration dates, as well as scraps and trimmings that otherwise would be thrown away were not only edible, but even delicious."

That experience led to Bottura's book, *Bread is Gold*, in which chefs who participated in the Refettorio Ambrosiano describe their experience of working on the project and provide some of the recipes that they employed.

Bottura emphasizes that you don't have to be a professional cook to make these dishes, many of which, such as the three collected on the following pages, focus on healthy ingredients such as extra virgin olive oil and various fruits and vegetables.

The chef asks his readers to think twice before throwing out food that may look a bit past its prime. "One-third of the food we produce globally is wasted every year, including nearly four trillion apples," he says. "If we don't do something about it now, the numbers will only get worse."



Panzanella

Serves 6

Put the onion slices in a bowl of cold water with a pinch of salt and leave to soak for 1 hour.

Place the tomatoes in a colander set over a bowl. Sprinkle with $\frac{1}{2}$ teaspoon salt and let drain.

Place the bread in a large bowl and moisten with the vinegar. Drain the onion and add to the bowl, along with the bell pepper and capers. Gently press the tomatoes with your hands to squeeze the juice into a small bowl. Reserve the juice and transfer the tomatoes to the bowl with the bread.

Add the garlic to the tomato juice, then whisk in the olive oil. Season to taste. Pour the dressing over the salad and toss thoroughly. Roughly tear half of the basil leaves and sprinkle on top. Let sit for 30 minutes to 1 hour.

Serve in bowls and garnish with the remaining basil leaves.

$\frac{1}{2}$ red onion, thinly sliced

Salt

8 plum tomatoes or other tomatoes of similar size, sliced

5 cherry tomatoes, sliced

7 oz (200 g) stale bread, torn into chunks

4 tablespoons white wine vinegar

1 yellow bell pepper, chopped

1 tablespoon capers

1 small garlic clove, minced

$\frac{1}{3}$ cup (90 ml) extra virgin olive oil

15 basil leaves

Photograph © Food Editore/Piermichele Borraccia

Reprinted from *Bread is Gold* (Phaidon 2017)
by Massimo Bottura

Spaghetti with Garlic, Olive Oil, and Chili Pepper

Serves 6

TOASTED BREADCRUMBS

2 tablespoons extra virgin olive oil
2 garlic cloves, crushed
7 oz (200 g) stale bread, coarsely crumbled (about 2 cups)

PASTA

$\frac{1}{3}$ cup (90 ml) extra virgin olive oil
3 garlic cloves, crushed
1 small fresh red chili
1 $\frac{1}{2}$ lb (700 g) spaghetti
Salt

MAKE THE TOASTED BREADCRUMBS

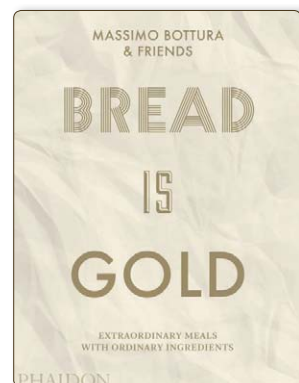
In a medium pan, warm the olive oil and garlic over low heat for 1 minute. Add the breadcrumbs and cook until crunchy and golden, about 2 minutes. Remove the garlic and set aside.

PREPARE THE PASTA

Bring a large pot of lightly salted water to a boil over medium heat.

Meanwhile, in a small saucepan, combine the olive oil, garlic and chili and heat over medium heat. Warm until the oil begins to sizzle and the garlic begins to turn golden brown, about 2 minutes. Remove from the heat and let sit. Remove the garlic and chili before tossing with the pasta.

Add the pasta to the boiling water and cook until al dente. Reserving some of the cooking liquid, drain the pasta well, and return to the cooking pot. Add the flavored oil and 2 tablespoons of the reserved cooking liquid and toss to coat. Garnish with the toasted breadcrumbs and serve immediately.



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Zucchini with Eggplant Puree

Serves 4

1 lb 2 oz (500g) eggplant (aubergine)
1 garlic clove
2 tablespoons extra virgin olive oil
Salt and freshly ground black pepper
8 plums, pitted and cut into medium pieces
2 tablespoons sherry vinegar
1 tablespoon salt-packed capers, rinsed
3 tablespoons blanched almonds, coarsely chopped
 $\frac{3}{4}$ oz (20 g) pancetta, diced
4 small zucchini (courgettes), halved lengthwise
2 tablespoons corn oil

Char the eggplant (aubergine) over the open flame of a stove burner all over until the skin is completely blackened. (If you don't have a gas stove, char under a hot broiler [grill].) Peel the skin. Transfer to a blender, add the garlic and olive oil, and process until smooth. Add a little water to loosen, if necessary. Pass through a fine-mesh sieve. Season to taste with salt and pepper and set aside.

In a medium bowl, combine the plums, vinegar, and capers and mix. Let marinate for 15 minutes.

Meanwhile, in a medium frying pan, cook the almonds and pancetta over medium heat until golden brown, about 6 minutes. Transfer to the plum mixture and stir to combine. Set aside.

Lightly salt the zucchini (courgettes) and set aside in a colander to drain for 10 minutes. Dry with paper towels.

In a medium frying pan, heat the corn oil over high heat. Add the zucchini cut side down, reduce the heat to medium-low, and cook for 5 minutes. Remove and transfer to paper towels to absorb any excess oil. Season to taste with salt and pepper.

To serve, place a spoonful of the eggplant puree on each plate and top with the zucchini. Garnish with the plum mixture.

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2. *Toxicol Appl Pharm.* 2001 Jul 15;174(2):146-52.
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Dr. Scott Hoffer

Outrunning Disease and Disability

BY JON VANZILE



DR. SCOTT HOFFER

For many years, Dr. Scott Hoffer thought he could literally outrun disease and sickness.

At age 23, while still a student in medical school, he was “overweight, out of shape, and frightened.” Hoping to improve his health, he bought his first pair of Puma running shoes—this was in the 1970s, during the height of the jogging craze—and hit the pavement in a serious way.

Over the next few years, as he graduated medical school, enlisted in the U.S. Army and was shipped overseas to serve in Germany, Hoffer ran almost compulsively. At one point in the military, he and two other soldiers competed in 22 marathons in a 19-month stretch, including a punishing ultra-marathon of 100 km that he ran in 14 hours and 22 minutes.

Why all the running? The answer is simple: he was scared.

The same year he bought that first pair of Pumas, both of his parents died within six months of chronic diseases. His father succumbed to heart disease and his mother to breast cancer.



“My parents died of cancer and atherosclerotic disease,” he said. “I was thinking I’ve got those genetics.”

But even in those years of intense running, Hoffer was already beginning to have doubts about the way medicine intersected with health and longevity, and medical school wasn’t helping much.

“During medical school, I began to see the limits of allopathic medicine,” he remembered. “My entire second year focused on the ‘pathophysiology of disease’ while my mind was focused on ‘staying well.’ I didn’t want to learn about the disease process. I wanted to learn about staying well, but that was absent in medical school.”

Dr. Hoffer’s Sentinel Moment

Hoffer returned to the United States in 1982. He came back with severe tendonitis in his Achilles tendon caused by excessive running, and hungry to discover a new way to approach longevity and disease prevention. Then two impor-

tant things happened that would change his life. First, he began a one-year program in psychosomatic medicine and really begin to dive into the mind/body connection as it related to health, which led him to work with anti-obesity programs in the army.

Second, he discovered **Life Extension®**.

“Discovering *Life Extension* was and has been a sentinel moment in my life,” he said. “I devoured every bit of information I could and realized that evidence-based, nutritional supplementation was a major void in my anti-aging and wellness pursuits. This kind of information really wasn’t out there back then.”

In 1985, with his thinking already shifting away from a purely allopathic, disease-focused approach to wellness, Hoffer decided to leave the military and transition to civilian medical practice. Long accustomed to the camaraderie and support of the army, this was a difficult transition—and it didn’t help that he ran into early and loud opposition to the way he wanted to practice medicine.

Dr. Hoffer’s Personal Supplement List

Discovering **Life Extension** decades ago was a key moment in Dr. Scott Hoffer’s life and career. Today, as a healthy 67-year-old, Hoffer continues to take **Life Extension** supplements to help protect against the diseases of aging and boost low levels of vital nutrients. Here is his list of supplements and **Life Extension** products:

- Conjugated Linoleic Acid
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- Triple Action Cruciferous
- Super Ubiquinol CoQ10
- Life Extension Two-Per-Day
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“Health, fitness, anti-aging medicine, and longevity had become a passion for me,” he said. “The more I learned, the more I wanted to learn and share with my medical colleagues and patients. My patients were somewhat wary, but most of my medical colleagues were repulsed. Some were hostile and quite challenging. Historically in medicine, those that think outside of the box are ridiculed and ostracized.”

Nevertheless, Hoffer persisted. He opened a psychiatric practice and began to put many of his ideas into practice. He bought a partnership in a gym where he lived. He started prescribing supplements like L-theanine, 5-HTP, DHEA, vitamin D, melatonin, SAM-e, and CoQ10. And he incorporated exercise, meditation, and relaxation training into his practice.

"I had one foot in allopathic medicine and one foot in alternative medicine," he said.

He also began testing patients' hormone levels. He was shocked to find that many middle-aged men who showed up complaining of depression were actually suffering from low testosterone and hypogonadism.

The Village Doctor

Throughout his long evolution, Hoffer continued to live a healthy lifestyle, practicing what he preached. In 2008, he relocated to The Villages in central Florida and set up a new practice. The Villages is an over-55 community with more than 50,000 residents. Set among beautiful rolling hills dotted with golf courses, The Villages prides itself on offering a huge array of activities to its residents, who are often seen zipping around their communities on golf carts. Naturally, these activities include lots of ways to exercise—something that Dr. Hoffer realized was novel for many of his new patients.

"A lot of people who move here are shell-shocked by access to the gyms and fitness centers," he said. "They've never used gyms before, and the gyms here have no personal trainers."

Once again looking to help, Hoffer became a certified personal trainer with a specialization in

older adults. He began offering personal training free of charge for residents.

"I've never put my shingle out to make money training people or made a nickel from it," he said. "But I go to the gym every day and help people learn how to work out."

As he's transitioned into caring for an older population, the 67-year-old Hoffer has continued to improve his focus on what works and what doesn't work for older people. One of his main messages for older people is that cross-training, which includes resistance training, is essential to fight age-related muscle loss. Called sarcopenia, age-related muscle loss is a serious condition that opens the door to a frightening array of health problems. As older people lose muscle, they become less stable and more prone to falls, which are a major source of broken hips and other debilitating injuries. Also, the loss of muscle mass has profound metabolic implications. As Hoffer points out, muscle is among the most metabolically active parts of the body.

"Ninety percent of people all make the same mistake," he said. "They have a health and fitness plan with 30 minutes of walking four days a week. They're healthier doing that than doing nothing, but it's not enough. Cross-training is important. People should try weight training, yoga, mindfulness, tai chi, bike riding. You might not be able to do everything, but you can do a lot."

Dr. Hoffer also counsels his patients to pay better attention to their nutrition and diet. In addition to the usual recommendation of cutting down sugar, Hoffer says he's obsessed with fiber. "I think people need at least 40 grams of fiber a day," he notes.

"The biggest nutritional problems I see are portion size and refined sugar," he says. "Any juice or soda is just packed with refined carbohydrates. I've been treating sugar like it's a toxin for the last 10 years, because sugar is poison."

While he doesn't advocate any particular diet, he says his own eating habits are closer to the Mediterranean diet, with a heavy focus on omega-3 fatty acids, fresh vegetables, and fiber. Three days a week, he's entirely vegetarian.

Supplements are also a crucial part of his healthy lifestyle. He started with vitamin C and vitamin E decades ago, but says he got limited results because he wasn't taking the right form. When he started reading *Life Extension Magazine*®, however, he learned more about supplementation and changed his approach.

One of the first things he did was to add resveratrol, a polyphenol with longevity properties.

Noting that up to **70%** of his patients are vitamin D deficient, he also takes vitamin D, and he recommends CoQ10 for anyone currently on statin medications, which are known to deplete it.

Even with decades of practice behind him, Hoffer says he's not done learning yet.

"I continue to devote as much time as I can to learning everything I can about health, exercise and anti-aging medicine," he said. "A lot has changed over the years and will continue to change. But when I have a patient come back and say thanks a lot, this is the best I've felt or slept in 20 years, it's very satisfying." ●

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Boswellia
Comfort Max™
Cytokine Suppress™ with EGCG
Serrafazyme
Specially-Coated Bromelain
Super Bio-Curcumin®
Zyflamend® Whole Body

Joint Support

Arthro-Immune Joint Support
ArthroMax® Advanced with UC-II® & AprèsFlex®
ArthroMax® with Theaflavins & AprèsFlex®
ArthroMax® Herbal Joint Formula
Bio-Collagen with Patented UC-II®
Fast-Acting Joint Formula
Glucosamine/Chondroitin Capsules
Krill Healthy Joint Formula
MSM (Methylsulfonylmethane)

Kidney & Bladder Support

Cran-Max® Cranberry Whole Fruit Concentrate
Optimized Cran-Max® with Ellirose™
Uric Acid Control
Water-Soluble Pumpkin Seed Extract

Liver Health & Detoxification

Anti-Alcohol with HepatoProtection Complex
Calcium D-Glucarate
Chlorella
Chlorophyllin
European Milk Thistle
Glutathione, Cysteine & C
HepatoPro
Liver Efficiency Formula
N-Acetyl-L-Cysteine
PectaSol-C®
Silymarin
SODzyme® with GliSODin® & Wolfberry

Longevity & Wellness

Alpha-Lipoic Acid
AppleWise Polyphenol Extract
Berry Complete
Blueberry Extract
Blueberry Extract with Pomegranate
DNA Protection Formula
Enhanced Berry Complete with Acai

GEROPROTECT™ Ageless Cell™
 GEROPROTECT™ Longevity A.I.™
 Grapeseed Extract with
 Resveratrol & Pterostilbene
 Mediterranean Whole Food Blend
 Mega Green Tea Extract (decaffeinated)
 Mega Green Tea Extract (lightly caffeinated)
 Optimized Fucoidan with Maritech® 926
 Optimized Resveratrol
 pTeroPure®
 Pycnogenol® French Maritime
 Pine Bark Extract
 Resveratrol with Pterostilbene
 RNA (Ribonucleic Acid)
 Super R-Lipoic Acid
 X-R Shield

Men's Health

Mega Lycopene Extract
 PalmettoGuard® Saw Palmetto with
 Beta-Sitosterol
 PalmettoGuard® Saw Palmetto/Nettle Root
 Formula with Beta-Sitosterol
 Pomi-T®
 Prelox® Enhanced Sex for Men
 Super MiraForte with Standardized Lignans
 Triple Strength ProstaPollen™
 Ultra Prostate Formula

Minerals

Boron
 Extend-Release Magnesium
 Ionic Selenium
 Iron Protein Plus
 Magnesium (Citrate)
 Magnesium Caps
 Only Trace Minerals
 Optimized Chromium with Crominex® 3+
 Sea-Iodine™
 Se-Methyl L-Selenocysteine
 Vanadyl Sulfate
 Zinc Caps

Miscellaneous

Potassium Iodide
 Solarshield® Sunglasses

Mood & Stress Management

Advanced Cortisol Balance
 Enhanced Stress Relief
 5 HTP
 L-Theanine
 SAME (S-Adenosyl-Methionine)

Multivitamins

Children's Formula Life Extension Mix™
 Comprehensive Nutrient Packs ADVANCED
 Life Extension Mix™ Capsules without Copper
 Life Extension Mix™ Capsules
 Life Extension Mix™ Powder without Copper
 Life Extension Mix™ Powder
 Life Extension Mix™ Tablets with Extra Niacin
 Life Extension Mix™ Tablets without Copper
 Life Extension Mix™ Tablets
 Once-Daily Health Booster
 One-Per-Day Tablets
 Two-Per-Day Capsules
 Two-Per-Day Tablets

Personal Care

Anti-Aging Rejuvenating Scalp Serum
 Biosil
 Dr. Proctor's Advanced Hair Formula
 Dr. Proctor's Shampoo
 European Leg Solution Featuring Certified
 Diosmin 95
 Hair, Skin & Nail Rejuvenation Formula
 w/VERISOL®
 Hair Suppress Formula
 Life Extension Toothpaste
 Venotone
 Xyliwhite Mouthwash

Pet Care

Cat Mix
 Dog Mix

Probiotics

Bifido GI Balance
 FLORASSIST® Balance
 FLORASSIST® GI with Phage Technology
 FLORASSIST® Heart Health
 FLORASSIST® Immune Health
 FLORASSIST® Mood
 FLORASSIST® Oral Hygiene
 FLORASSIST® Prebiotic
 FLORASSIST® Throat Health
 Jarro-Dophilus® for Women
 Theralac® Probiotics
 TruFlora® Probiotics

Skin Care

Advanced Anti-Glycation Peptide Serum
 Advanced Growth Factor Serum
 Advanced Lightening Cream
 Advanced Peptide Hand Therapy
 Advanced Triple Peptide Serum
 Advanced Under Eye Serum with Stem Cells
 Amber Self MicroDermAbrasion
 Anti-Aging Face Oil
 Anti-Aging Mask
 Anti-Aging Rejuvenating Face Cream
 Anti-Aging Rejuvenating Scalp Serum
 Anti-Glycation Serum with
 Blueberry & Pomegranate Extracts
 Antioxidant Facial Mist Hydrator
 Anti-Redness & Adult Blemish Lotion
 Collagen Boosting Peptide Serum
 DNA Repair Cream
 Environmental Support Serum
 Essential Plant Lipids Reparative Serum
 Eye Lift Cream
 Face Rejuvenating Anti-Oxidant Cream
 Healing Formula
 Healing Vitamin K Cream
 Hyaluronic Facial Moisturizer
 Hyaluronic Oil-Free Facial Moisturizer
 Hydrating Anti-Oxidant Facial Mist
 Hydroderm
 Lifting & Tightening Complex
 Melatonin Advanced Peptide Cream
 Melatonin Cream
 Mild Facial Cleanser
 Multi Stem Cell Skin Tightening Complex
 Neck Rejuvenating Anti-Oxidant Cream
 Rejuvenex® Body Lotion
 Rejuvenex® Factor Firming Serum
 Resveratrol Anti-Oxidant Serum
 Shade Factor™
 Shade Factor™ Sunscreen Lotion
 Shade Factor™ Sunscreen Spray
 Skin Care Collection Anti-Aging Serum
 Skin Care Collection Body Lotion
 Skin Care Collection Day Cream
 Skin Care Collection Night Cream
 Skin Firming Complex
 Skin Lightening Serum
 Skin Restoring Phytoceramides with Lipowheat®
 Skin Stem Cell Serum
 Skin Tone Equalizer
 Stem Cell Cream with Alpine Rose
 Tightening & Firming Neck Cream
 Triple-Action Vitamin C Cream
 Ultimate MicroDermabrasion
 Ultra Eyelash Booster
 Ultra Lip Plumper
 Ultra Rejuvenex®
 Ultra RejuveNight®
 Ultra Wrinkle Relaxer
 Under Eye Refining Serum
 Under Eye Rescue Cream
 Vitamin C Serum
 Vitamin D Lotion
 Vitamin E-ssential Cream
 Youth Serum

Sleep

Bioactive Milk Peptides
 Enhanced Sleep with Melatonin
 Enhanced Sleep without Melatonin
 Fast-Acting Liquid Melatonin
 Glycine
 L-Tryptophan
 Melatonin
 Optimized Tryptophan Plus
 Quiet Sleep Melatonin

Sports Performance

Creatine Capsules
 Creatine Whey Glutamine Powder
 (Vanilla Flavor)
 New Zealand Whey Protein Concentrate
 (Natural Chocolate and Vanilla Flavor)
 Tart Cherry with CherryPure®
 Plant Protein Complete & Amino Acid Complex
 Whey Protein Isolate
 (Chocolate and Vanilla Flavor)

Vitamins

Ascorbyl Palmitate
 Benfotiamine with Thiamine
 Beta-Carotene
 BioActive Complete B-Complex
 Biotin
 Buffered Vitamin C Powder
 Fast-C® with Dihydroquercetin
 Gamma E Mixed Tocopherol Enhanced
 with Sesame Lignans
 Gamma E Mixed Tocopherol/Tocotrienols
 High Potency Optimized Folate
 Inositol Caps
 Liquid Emulsified Vitamin D3
 Liquid Vitamin D3
 Low-Dose Vitamin K2
 Methylcobalamin
 MK-7
 No Flush Niacin
 Optimized Folate (L-Methylfolate)
 Pantothenic Acid (Vitamin B-5)
 Pyridoxal 5'-Phosphate Caps
 Super Absorbable Tocotrienols
 Super K with Advanced K2 Complex
 Super Vitamin E
 Vitamin B12
 Vitamin B6
 Vitamin C with Dihydroquercetin
 Vitamin D3 with Sea-Iodine™
 Vitamin D3
 Vitamins D and K with Sea-Iodine™

Weight Management

7-Keto® DHEA Metabolite
 Advanced Anti-Adipocyte Formula
 Advanced Appetite Suppress
 AMPK Metabolic Activator
 CalReduce Selective Fat Binder
 DHEA Complete
 Garcinia HCA
 HCAActive™ Garcinia Cambogia Extract
 Integra-Lean®
 Mediterranean Trim with Sinetrol™-XPur
 Optimized Irvingia with Phase 3™ Calorie
 Control Complex
 Optimized Saffron with Satiereal®
 Super Citrimax®
 Super CLA Blend with Sesame Lignans
 Waist-Line Control™

Women's Health

Enhanced Sex for Women 50+
 Breast Health Formula
 Femmenessence MacaPause®
 Estrogen for Women
 Progesta-Care®
 Super-Absorbable Soy Isoflavones
 Ultra Soy Extract

		YOUR PRICE					
ITEM No.	PRODUCT	Retail Each \$	1 Unit Each	4 Unit Each	10 Unit Each	QTY	Total
A							
01524	ACETYL-L-CARNITINE • 500 mg, 100 veg. caps	34.00	25.50	22.50			
01974	ACETYL-L-CARNITINE ARGINATE • 90 veg. caps	38.00	28.50	26.00			
01628	ADRENAL ENERGY FORMULA • 60 veg. caps	24.00	18.00	16.50			
01630	ADRENAL ENERGY FORMULA • 120 veg. caps	46.00	34.50	31.50			
01807	ADVANCED APPETITE SUPPRESS • 60 veg. caps	38.00	28.50	25.50			
01828	ADVANCED LIPID CONTROL • 60 veg. caps	30.00	22.50	20.25			
00681	AHCC® • 500 mg, 30 caps	59.98	44.99				
24404	AHCC® (KINOKO® PLATINUM) • 750 mg, 60 veg. caps	84.95	63.71				
29727	AHCC® (KINOKO® GOLD) • 500 mg, 60 veg. caps	74.95	52.47				
00457	ALPHA-LIPOIC ACID W/BIOTIN • 250 mg, 60 caps	37.00	27.75	24.00			
02207	AMPK METABOLIC ACTIVATOR • 30 veg. tabs	38.00	28.50	24.00			
01509	ANTI-ADIPOCYTE FORMULA W/MERATRIM® & INTEGRA LEAN® (Advanced) • 60 veg. caps	39.00	29.25	27.00			
02140	ANTI-ALCOHOL w/HEPATOPRO COMPLEX • 60 caps	22.00	16.50	15.00			
01625	APPLEWISE 600 mg, 30 veg. caps	21.00	15.75	14.25			
01039	ARGININE/ORNITHINE • 500/250, 100 caps	17.99	13.49				
00038	ARGININE/ORNITHINE POWDER • 150 grams	22.95	17.21	14.25			
01624	(L)-ARGININE CAPS • 700 mg, 200 veg. caps	26.50	19.88	17.44			
02004	ARTERIAL PROTECT • 30 veg. caps	44.00	33.00	29.00			
01617	ARTHROMAX® W/THEAFLAVINS & APRÈSFLEX® 120 veg. caps	44.00	33.00	30.00			
01618	ARTHROMAX® ADVANCED W/UC-II® & APRÈSFLEX® 60 caps	36.00	27.00	24.00			
02108	ARTHROMAX® HERBAL JOINT FORMULA • 60 veg. caps	40.00	30.00	27.00			
01404	ARTHRO-IMMUNE JOINT SUPPORT • 60 veg. caps	32.00	24.00	21.00			
00919	ARTICHOKE LEAF EXTRACT • 500 mg, 180 veg. caps	30.00	22.50	21.00			
01533	ASCORBYL PALMITATE • 500 mg, 100 veg. caps	22.50	16.88	15.00			
00888	ASHWAGANDHA EXTRACT (Optimized) • 60 veg. caps	10.00	7.50	6.75			
01805	ASIAN ENERGY BOOST • 90 veg. caps	24.00	18.00	16.50			
01066	ASPIRIN • 81 mg, 300 enteric coated tablets	6.00	4.50	4.00			
01923	ASTAXANTHIN WITH PHOSPHOLIPIDS • 4 mg, 30 softgels	16.00	12.00	10.50			
B							
01945	B-COMPLEX (Bio-Active Complete) • 60 veg. caps	12.00	9.00	8.00			
00920	BENFOTIAMINE W/ THIAMINE • 100 mg, 120 veg. caps	19.95	14.96	13.95			
00925	BENFOTIAMINE (Mega) • 250 mg, 120 veg. caps	30.00	22.50	20.25			
01206	BERRY COMPLETE • 30 veg. caps	21.00	15.75	14.00			
01496	BERRY COMPLETE (Enhanced) • 60 veg. caps	29.00	21.75	19.50			
00664	BETA-CAROTENE • 25,000 IU, 100 softgels	11.50	8.63				
01622	BIFIDO GI BALANCE • 60 veg. caps	20.00	15.00	13.50			
01873	BILBERRY EXTRACT • 100 mg, 90 veg. caps	36.00	27.00	24.00			
01512	BIOACTIVE MILK PEPTIDES • 30 caps	18.00	13.50	12.00			
01631	BIO-COLLAGEN W/PATENTED UC-II® • 40 mg, 60 small caps	36.00	27.00	24.00			
*01006	BIOSIL™ • 5 mg, 30 veg. caps	19.99	15.99				
*01007	BIOSIL™ • 1 fl oz	31.99	25.59				
00102	BIOTIN • 600 mcg, 100 caps	7.50	5.63	4.88			
SUBTOTAL OF COLUMN 1							

ITEM No.	PRODUCT	YOUR PRICE				QTY	Total
		Retail Each \$	1 Unit Each	4 Unit Each	10 Unit Each		
01709	BLACK CUMIN SEED OIL • 60 softgels	16.00	12.00	10.50			
01710	BLACK CUMIN SEED OIL W/BIO-CURCUMIN® • 60 softgels	32.00	24.00	22.50			
01008	BLAST™ • 600 grams of powder	26.97	20.23				
02025	BLOOD PRESSURE (Dual Action) • 60 veg. tabs	44.00	33.00	28.00			
70000	BLOOD PRESSURE MONITOR (ACCUFIT™) • med/lg cuff	79.99	49.99				
70004	BLOOD PRESSURE MONITOR • Digital wrist cuff	69.95	52.46				
02024	BLOOD PRESSURE (Triple Action AM/PM) • 60 veg. tabs	44.00	33.00	28.00			
01214	BLUEBERRY EXTRACT • 60 veg. caps	22.50	16.88	15.00			
01438	BLUEBERRY EXTRACT W/ POMEGRANATE • 60 veg. caps	30.00	22.50	20.25			
01506	BONE FORMULA (DR. STRUM'S INTENSIVE) • 300 caps	56.00	42.00	37.50			
01726	BONE RESTORE • 120 caps	22.00	16.50	14.25			
02123	BONE RESTORE • Chocolate, Sugar-Free • 60 chewable tabs	22.00	16.50	14.25			
01727	BONE RESTORE W/VITAMIN K2 • 120 caps	24.00	18.00	16.50			
01725	BONE STRENGTH FORMULA W/KOACT® • 120 caps	45.00	33.75	30.00			
00313	BONE-UP® • 240 caps	28.95	21.71	20.41			
01661	BORON • 3 mg, 100 veg. caps	5.95	4.46	3.94			
00202	BOSWELLA • 100 caps	38.00	28.50	22.50			
00984	BP MANAGEMENT (Optimal) • 60 tablets	44.00	33.00	30.00			
01802	BRAIN SHIELD® GASTRODIN • 300 mg, 60 veg. caps	33.00	24.75	22.50			
01253	BRANCHED CHAIN AMINO ACIDS • 90 caps	19.50	14.63	12.75			
01942	BREAST HEALTH FORMULA • 60 caps	34.00	25.50	22.50			
00893	BRITE EYES III • 2 vials, 5 ml each	34.00	25.50	24.00			
01203	BROMELAIN (Specially-coated) 500 mg, 60 enteric coated tablets	21.00	15.75	14.25			
C							
01963	CALCIUM CITRATE W/VITAMIN D • 200 veg. caps	18.00	13.50	12.50			
01651	CALCIUM D-GLUCARATE • 200 mg, 60 veg. caps	18.00	13.50	11.25			
01823	CALREDUCE SELECTIVE FAT BINDER 120 mint chewable tablets	45.00	33.75	28.50			
01700	CARDIO PEAK™ w/STANDARDIZED HAWTHORN & ARJUNA 120 veg. caps	36.00	27.00	24.00			
02018	CARNITINE (Optimized) • 60 veg. caps	30.00	22.50	20.00			
01532	L-CARNITINE • 500 mg, 30 veg. caps	15.00	11.25	9.90			
01829	CARNOSINE • 500 mg, 60 veg. caps	36.00	27.00	24.00			
02020	CARNOSINE (Super) • 500 mg, 60 veg. caps	40.00	30.00	27.00			
01932	CAT MIX • 100 grams powder	14.00	10.50	8.25			
02199	CHILDREN'S FORMULA LIFE EXTENSION MIX™ 120 chewable tablets	25.00	18.75	17.00			
00550	CHLORELLA • 500 mg, 200 tablets	23.98	17.99				
01571	CHLOROPHYLLIN • 100 mg, 100 veg. caps	24.00	18.00	15.00			
01359	CHO-LESS™ • 90 capsules	35.00	26.25				
01910	CHOL-SUPPORT™ • 60 liquid veg. caps	48.00	36.00	32.00			
01504	CHROMIUM W/CROMINEX® 3+ (Optimized) 500 mcg, 60 veg. caps	9.00	6.75	6.00			
01503	CINSULIN® W/INSEA2® AND CROMINEX® 3+ • 90 veg. caps	38.00	28.50	25.50			
01906	CISTANCHE (Standardized) • 30 veg. caps	20.00	15.00	12.00			
01818	CITRIMAX® (Super) • 180 veg. caps	40.00	30.00	28.50			
SUBTOTAL OF COLUMN 2							

ITEM No.	PRODUCT	YOUR PRICE				QTY	Total
		Retail Each \$	1 Unit Each	4 Unit Each	10 Unit Each		
00818	CLA BLEND W/SESAME LIGNANS (Super) • 120 softgels	36.00	27.00	24.75	19.75		
02103	COCOAMIND™ • 14 packets	24.00	18.00	16.00			
01896	COGNITEX® W/BRAIN SHIELD® • 90 softgels	60.00	45.00	39.00	36.00		
01897	COGNITEX® W/PREGNENOLONE & BRAIN SHIELD® 90 softgels	62.00	46.50	39.75	37.50		
01421	COGNITEX® BASICS • 60 softgels	38.00	28.50	26.25	24.00		
01659	COGNIZIN® CDP-CHOLINE CAPS • 250 mg, 60 veg. caps	36.00	27.00	25.50			
02202	COMFORTMAX™ • 30 day supply	44.00	33.00	29.00			
01945	COMPLETE B-COMPLEX (BioActive) • 60 veg. caps	12.00	9.00	8.00			
02298	COMPREHENSIVE NUTRIENT PACKS ADVANCED • 30 packs	90.00	67.50	61.50			
01949	COQ10 w/d-LIMONENE (Super-Absorbable) • 50 mg, 60 softgels	25.00	18.75	16.50	15.00		
01948	COQ10 w/d-LIMONENE (Super-Absorbable) 100 mg, 100 softgels	46.00	34.50	28.00	26.25		
01951	COQ10 w/d-LIMONENE (Super-Absorbable) 100 mg, 60 softgels	30.00	22.50	20.00			
01929	COQ10 (Super Ubiquinol) • 100 mg, 60 softgels	56.00	42.00	36.00	33.00		
01733	COQ10 w/PQQ (Super Ubiquinol) • 100 mg, 30 softgels	50.00	37.50	30.00	27.00		
01437	COQ10 w/ENH MITOCHONDRIAL SUPPORT™ (Super Ubiquinol) • 100 mg, 30 softgels	33.00	24.75	22.00			
01426	COQ10 w/ENH MITOCHONDRIAL SUPPORT™ (Super Ubiquinol) • 100 mg, 60 softgels	62.00	46.50	39.00	36.00		
01425	COQ10 w/ENH MITOCHONDRIAL SUPPORT™ (Super Ubiquinol) • 50 mg, 100 softgels	58.00	43.50	34.50	31.50		
01427	COQ10 w/ENH MITOCHONDRIAL SUPPORT™ (Super Ubiquinol) • 50 mg, 30 softgels	20.00	15.00	12.00			
01431	COQ10 w/ENH MITOCHONDRIAL SUPPORT™ (Super Ubiquinol) • 200 mg, 30 softgels	62.00	46.50	39.00	36.00		
02012	CORTISOL BALANCE (Advanced) • 30 veg. caps	45.00	33.75	30.00			
00862	CRAN-MAX® • 500 mg, 60 veg. caps	17.50	13.13	11.25			
01424	CRAN-MAX® WITH ELLIROSE™ (Optimized) • 60 veg. caps	18.00	13.50	12.00			
01529	CREATINE CAPSULES • 120 veg. caps	10.95	8.21	6.94			
01746	CREATINE WHEY GLUTAMINE POWDER • 454 grams (vanilla)	30.00	22.50	19.50			
00467	CURCUMIN® (Super Bio) • 400 mg, 30 veg. caps	20.00	15.00	14.00			
00407	CURCUMIN® (Super Bio) • 400 mg, 60 veg. caps	38.00	28.50	26.25			
01924	CURCUMIN® W/GINGER & TURMERONES (Advanced Bio) 30 softgels	30.00	22.50	20.25			
01804	CYTOKINE SUPPRESS™ W/EGCG • 30 veg. caps	30.00	22.50	20.25			
COSMESIS							
80157	ADVANCED ANTI-GLYCATION PEPTIDE SERUM • 1 fl. oz	53.00	39.75	34.50			
80165	ADVANCED GROWTH FACTOR SERUM • 1 fl. oz	65.00	48.75	42.75			
80154	ADVANCED LIGHTENING CREAM • 1 oz	65.00	48.75	42.75			
80155	ADVANCED PEPTIDE HAND THERAPY • 4 oz	46.00	34.50	29.25			
80152	ADVANCED TRIPLE PEPTIDE SERUM • 1 fl. oz	65.00	48.75	42.75			
80140	ADVANCED UNDER EYE SERUM W/STEM CELLS • .33 fl. oz	49.00	36.75	31.50			
80139	AMBER SELF MICRODERMABRASION • 2 oz	49.00	36.75	31.50			
80158	ANTI-AGING FACE OIL • 1 fl. oz	59.00	44.25	39.00			
80118	ANTI-AGING MASK • 2 oz	72.00	54.00	47.52			
80151	ANTI-AGING REJUVENATING FACE CREAM • 2 oz	65.00	48.75	42.75			
80153	ANTI-AGING REJUVENATING SCALP SERUM • 2 fl. oz	46.00	34.50	29.25			
SUBTOTAL OF COLUMN 3							

RECEIVE 25% OFF THE RETAIL PRICE OF ALL PRODUCTS

ITEM No.	PRODUCT	YOUR PRICE				QTY	Total
		Retail Each \$	1 Unit Each	4 Unit Each	10 Unit Each		
80134	ANTI-GLYCATION SERUM W/BLEUBERRY & POMEGRANATE EXTRACTS • 1 fl. oz	33.00	24.75	23.51			
80133	ANTIOXIDANT FACIAL MIST HYDRATOR • 2 fl. oz	32.00	24.00	22.80			
80105	ANTI-REDNESS & ADULT BLEMISH LOTION • 1 oz	74.50	55.88	49.17			
80156	COLLAGEN BOOSTING PEPTIDE SERUM • 1 fl. oz	59.00	44.25	39.00			
80141	DNA REPAIR CREAM • 1 oz	49.00	36.75	31.50			
80167	ENVIRONMENTAL SUPPORT SERUM • 1 fl. oz	59.00	44.25	39.00			
80108	ESSENTIAL PLANT LIPIDS REPARATIVE SERUM • 1 fl. oz	74.95	56.21	49.46			
80163	EYE LIFT CREAM • 0.5 fl. oz	59.00	44.25	39.00			
80123	FACE REJUVENATING ANTIOXIDANT CREAM • 2 oz	69.50	52.13	45.87			
80137	HEALING FORMULA ALL-IN-ONE CREAM • 1 oz	53.00	39.75	34.07			
80102	HEALING VITAMIN K CREAM • 1 oz	79.50	59.63	52.47			
80109	HYALURONIC FACIAL MOISTURIZER • 1 oz	58.00	43.50	38.28			
80110	HYALURONIC OIL-FREE FACIAL MOISTURIZER • 1 oz	58.00	43.50	38.28			
80138	HYDRATING ANTIOXIDANT FACE MIST • 4 fl. oz	39.95	29.96	28.50			
80103	LIFTING & TIGHTENING COMPLEX • 1 oz	74.50	55.88	49.17			
80168	MELATONIN ADVANCED PEPTIDE CREAM • 1 oz	38.00	28.50	26.00			
80135	MELATONIN CREAM • 1 oz	33.00	24.75	20.33			
80114	MILD FACIAL CLEANSER • 8 fl. oz	59.00	44.25	38.94			
80159	MULTI STEM CELL SKIN TIGHTENING COMPLEX • 1 fl. oz	59.00	44.25	39.00			
80122	NECK REJUVENATING ANTIOXIDANT CREAM • 2 oz	64.00	48.00	42.24			
80150	RENEWING EYE CREAM • 1/2 oz	65.00	48.75	42.75			
80142	RESVERATROL ANTI-OXIDANT SERUM • 1 fl. oz	46.00	34.50	29.25			
80166	SKIN FIRMING COMPLEX • 1 fl. oz (2 units \$34.50)	53.00	39.75				
80112	SKIN LIGHTENING SERUM • 1/2 fl. oz	85.00	63.75	56.10			
80130	SKIN STEM CELL SERUM • 1 fl. oz	74.00	55.50	51.75			
80164	SKIN TONE EQUALIZER • 0.4 fl oz	59.00	44.25	39.00			
80143	STEM CELL CREAM W/ALPINE ROSE • 1 oz	66.00	49.50	43.50			
80148	TIGHTENING & FIRMING NECK CREAM • 2 oz	39.00	29.25	26.25			
80161	TRIPLE ACTION VITAMIN C CREAM • 1 oz jar	59.00	44.25	39.00			
80162	ULTIMATE MICRODERMABRASION • 8 fl. oz	39.00	29.25	26.25			
80160	ULTRA EYELASH BOOSTER • 0.25 oz (2 units \$39)	59.00	44.25				
80116	ULTRA LIP PLUMPER • 1/3 oz	64.00	48.00	42.24			
80101	ULTRA WRINKLE RELAXER • 1 oz	89.95	67.46	59.82			
80113	UNDER EYE REFINING SERUM • 1/2 fl. oz	74.50	55.88	49.17			
80104	UNDER EYE RESCUE CREAM • 1/2 oz	74.50	55.88	49.17			
80129	VITAMIN C SERUM • 1 fl. oz	85.00	63.75	56.10			
80136	VITAMIN D LOTION • 4 oz	36.00	27.00	25.25			
80145	VITAMIN E-ESSENTIAL CREAM • 1 oz	28.00	21.00	19.50			
80149	YOUTH SERUM • 1 oz	65.00	48.75	42.75			
D							
00658	7-KETO® DHEA METABOLITE • 25 mg, 100 caps	28.00	21.00	18.00			
01479	7-KETO® DHEA METABOLITE • 100 mg, 60 veg. caps	40.00	30.00	27.00			
01640	DHA (Vegetarian) • 30 veg. softgels	20.00	15.00	13.50			
00607	DHEA • 25 mg, 100 tablets (Dissolve in mouth)	14.00	10.50	8.81			
01478	DHEA COMPLETE • 60 veg. caps	48.00	36.00	32.40			
SUBTOTAL OF COLUMN 4							

ITEM No.	PRODUCT	Retail Each \$	YOUR PRICE			QTY	Total
			1 Unit Each	4 Unit Each	10 Unit Each		
00335	DHEA • 25 mg, 100 caps	16.00	12.00	11.00			
00454	DHEA • 15 mg, 100 caps	14.00	10.50	9.00			
00882	DHEA • 50 mg, 60 caps	19.00	14.25	12.75			
01689	DHEA • 100 mg, 60 veg. caps	24.00	18.00	16.50			
02021	DIGESTIVE ENZYMES (Enhanced Super) • 60 veg. caps	22.00	16.50	15.00			
02022	DIGESTIVE ENZYMES w/PROBIOTICS (Enhanced Super)•60 veg. caps	28.00	21.00	18.00			
01671	D, L-PHENYLALANINE • 500 mg, 100 veg. caps	18.75	14.06	12.00			
01540	DMAE BITARTRATE • 150 mg, 200 veg. caps	18.00	13.50	11.25			
02270	DNA PROTECTION FORMULA • 30 veg. caps	20.00	15.00	13.50			
01931	DOG MIX • 100 grams powder	18.00	13.50	11.25			
02006	DOPA-MIND™ • 60 veg. tabs	44.00	33.00	28.00			
00321	DR. PROCTOR'S ADVANCED HAIR FORMULA • 2 oz	39.95	29.96	24.00			
00320	DR. PROCTOR'S HAIR SHAMPOO • 8 oz	24.95	18.71	16.50			
E							
01997	ENDOTHELIAL DEFENSE™ w/POMEGRANATE COMPLETE AND CORDIART™ • 60 softgels	68.00	51.00	46.50			
00997	ENDOTHELIAL DEFENSE™ w/GLISODIN® • 60 veg. caps	54.00	40.50	36.00			
02200	EPA/DHA (Clearly) • 120 softgels	30.00	22.50	20.00			
02009	ESOPHACOL™ • 120 chewable tablets	20.00	15.00	13.50			
01737	ESOPHAGEAL GUARDIAN (Berry flavor) • 60 chewable tablets	36.00	27.00	24.00			
01894	ESTROGEN FOR WOMEN • 30 veg. tabs	30.00	22.50	20.00			
01042	EUROPEAN LEG SOLUTION DIOSMIN 95 600 mg, 30 veg. tabs	20.00	15.00	13.50			
01706	EXTRAORDINARY ENZYMES • 60 caps	26.00	19.50	18.00			
02008	(CALIFORNIA ESTATE) EXTRA VIRGIN OLIVE OIL • 500 ml (16.9 fl. oz)	33.00	24.75	22.50			
01514	EYE PRESSURE SUPPORT W/MIRTOGENOL® • 30 veg. caps	38.00	28.50	25.50			
F							
00965	FAST-ACTING JOINT FORMULA • 30 caps	39.00	29.25	27.00			
01717	FAST-C® W/DIHYDROQUERCETIN • 120 veg. tabs	26.00	19.50	18.00			
01064	FEMMENESSENCE MACAPAUSE® • 120 veg. caps	34.99	26.24				
02125	FLORASSIST® GI w/PHAGE TECHNOLOGY•30 liquid veg. caps	33.00	24.75	22.50			
01821	FLORASSIST® HEART HEALTH • 60 veg. caps	32.00	24.00	21.00			
02124	FLORASSIST® IMMUNE HEALTH • 30 veg. caps	26.00	19.50	18.00			
02120	FLORASSIST® ORAL HYGIENE • 30 lozenges	20.00	15.00	13.00			
01825	FLORASSIST® BALANCE • 30 liquid veg. caps	32.00	24.00	21.00			
02000	FLORASSIST® MOOD • 60 caps	33.00	24.75	22.50			
02203	FLORASSIST® PREBIOTIC • Natural Strawberry, 60 chewable tabs	20.00	15.00	13.00			
01920	FLORASSIST® THROAT HEALTH • 30 lozenges	20.00	15.00	13.50			
01913	FOLATE HIGH POTENCY (Optimized) • 5,000 mcg, 30 veg. tablets	18.00	13.50	12.00			
01939	FOLATE (Optimized) • 1,000 mcg, 100 veg. tablets	15.00	11.25	10.00			
01842	FOLATE + VITAMIN B12 (BioActive) • 90 veg. caps	12.00	9.00	8.00			
01544	FORSKOLIN • 10 mg, 60 veg. caps	16.00	12.00	10.50			
01513	FUCOIDAN W/MARITECH® 926 (Optimized) • 60 veg. caps	36.00	27.00	24.75			
G							
02070	GAMMA E MIXED TOCOPHEROL/TOCOTRIENOLS • 60 softgels	40.00	30.00	27.00			
02075	GAMMA E MIXED TOCOPHEROL w/ENHANCED SESAME LIGNANS • 60 softgels	32.00	24.00	21.75			
SUBTOTAL OF COLUMN 5							

ITEM No.	PRODUCT	Retail Each \$	YOUR PRICE			QTY	Total
			1 Unit Each	4 Unit Each	10 Unit Each		
01394	GARLIC (Optimized) • 200 veg. caps	24.95	18.71	15.75			
02100	GASTRO-EASE™ • 60 veg. caps	44.00	33.00	30.00			
02119	GEROPROTECT™ AGELESS CELL™ • 30 softgels	40.00	30.00	27.00			
02133	GEROPROTECT™ LONGEVITY A.I.™ • 30 softgels	56.00	42.00	38.00			
01122	GINGER FORCE® • 60 liquid caps	34.95	26.21				
01658	GINKGO BILOBA CERTIFIED EXTRACT™ 120 mg, 365 veg. caps	50.00	37.50	33.00			
00756	GLA WITH SESAME LIGNANS (Mega) • 60 softgels	19.50	14.63	13.50			
00345	(L-) GLUTAMINE CAPSULES • 500 mg, 100 veg. caps	14.95	11.21	10.13			
00141	(L-) GLUTAMINE POWDER • 100 grams	22.00	16.50	15.00			
00522	GLUCOSAMINE/CHONDROITIN CAPSULES • 100 caps	38.00	28.50	24.00			
01541	GLUTATHIONE, CYSTEINE & C • 100 veg. caps	22.00	16.50	15.00			
02122	GLYCEMIC GUARD™ • 30 veg. caps	42.00	31.50	28.00			
01669	GLYCINE • 1,000 mg, 100 veg. caps	12.00	9.00	8.10			
01411	GRAPE SEED EXTRACT W/RESVERATROL & PTEROSTILBENE 100 mg, 60 veg. caps	36.00	27.00	25.50			
01620	GREEN COFFEE EXTRACT COFFEEGENIC® 400 mg, 90 veg. caps	32.00	24.00	21.00			
00953	GREEN TEA EXTRACT (Mega)•lightly caffeinated, 100 veg. caps	30.00	22.50	18.00			
00954	GREEN TEA EXTRACT (Mega)•decaffeinated, 100 veg. caps	30.00	22.50	18.00			
H							
01074	5 HTP • 100 mg, 60 caps	27.95	20.96				
02002	HAIR, SKIN & NAIL REJUVENATION FORM W/VERISOL® 90 tabs	32.00	24.00	22.00			
01738	HCA (Garcinia) • 90 veg. caps	17.00	12.75	11.25			
29754	HCACTIVE™ GARCINIA CAMBOGIA EXTRACT • 90 caps	30.00	22.50				
01393	HEPATOPRO • 900 mg, 60 softgels	50.00	37.50	34.50			
02121	HOMOCYSTEINE RESIST • 60 veg. caps	26.00	19.50	17.50			
01527	HUPERZINE A • 200 mcg, 60 veg. caps	40.00	30.00	27.00			
00661	HYDRODERM® • 1 oz	79.95	59.96	49.00			
I							
01704	IMMUNE MODULATOR W/TINOFEND® • 60 veg. caps	17.00	12.75	11.25			
00955	IMMUNE PROTECT W/PARACTIN® • 30 veg. caps	29.50	22.13	19.91			
02005	IMMUNE SENESCENCE PROTECTION FORMULA™ • 60 veg. tabs	40.00	30.00	27.00			
01674	INOSITOL CAPSULES • 1,000 mg, 360 veg. caps	62.00	46.50	43.50			
01292	INTEGRA-LEAN® AFRICAN MANGO IRVINGIA 150 mg, 60 veg. caps	28.00	21.00	18.00			
30731	IONIC SELENIUM • 300 mg, 2 fl. oz	13.69	10.27				
01677	IRON PROTEIN PLUS • 300 mg, 100 caps	28.00	21.00	19.50			
01492	IRVINGIA W/PHASE 3™ CALORIE CONTROL COMPLEX (Optimized African Mango)• 120 veg. caps	56.00	42.00	36.00			
J, K, L							
52142	JARRO-DOPHILUS® PROBIOTIC FOR WOMEN 30 enteric-coated veg. caps	27.95	20.96				
00056	JARRO-DOPHILUS EPS® • 60 veg. caps	23.95	17.96				
02034	K W/ADVANCED K2 COMPLEX (Super) • 90 softgels	30.00	22.50	20.25			
01600	KRILL HEALTHY JOINT FORMULA • 30 softgels	32.00	24.00	21.75			
01050	KRILL OIL (Jarrow)• 60 softgels	33.95	25.46				
SUBTOTAL OF COLUMN 6							

ITEM No.	PRODUCT	Retail Each \$	YOUR PRICE			QTY	Total
			1 Unit Each	4 Unit Each	10 Unit Each		
00316	KYOLIC® GARLIC FORMULA 102 • 200 veg. caps	27.45	20.59				
00789	KYOLIC® RESERVE • 600 mg, 120 caps	28.95	21.71				
01681	LACTOFERRIN • 60 caps	44.00	33.00	30.00			
00020	LECITHIN • 16 oz granules	18.00	13.50	12.00			
02255	LIFE EXTENSION MIX™ • 240 tablets	74.00	55.50	48.00	42.00		
02257	LIFE EXTENSION MIX™ W/EXTRA NIACIN • 240 tablets	74.00	55.50	48.00	42.00		
02254	LIFE EXTENSION MIX™ • 360 caps	78.00	58.50	50.00	44.00		
02256	LIFE EXTENSION MIX™ POWDER • 12.70 oz	72.00	54.00	46.00	40.00		
02265	LIFE EXTENSION MIX™ • 240 tablets w/o copper	74.00	55.50	48.00	42.00		
02264	LIFE EXTENSION MIX™ • 360 caps w/o copper	78.00	58.50	50.00	44.00		
01608	LIVER EFFICIENCY FORMULA • 30 veg. caps	18.00	13.50	12.00			
01639	5-LOX INHIBITOR W/APRÈSFLEX® • 100 mg, 60 veg. caps	22.00	16.50	15.00			
01678	L-LYSINE • 620 mg, 100 veg. caps	9.00	6.75	6.00			
00455	LYCOPENE (Mega) • 15 mg, 90 softgels	35.00	26.25	22.50			
M							
01992	MACUGUARD® OCULAR SUPPORT w/SAFFRON • 60 softgels	25.00	18.75	17.50			
01993	MACUGUARD® OCULAR SUPPORT w/SAFFRON & ASTAXANTHIN • 60 softgels	44.00	33.00	30.00			
01459	MAGNESIUM CAPS • 500 mg, 100 veg. caps	12.00	9.00	7.50			
01682	MAGNESIUM (CITRATE) • 160 mg, 100 veg. caps	13.00	9.75	8.50			
02107	(EXTEND-RELEASE) MAGNESIUM • 60 veg. caps	13.00	9.75	8.75			
01908	MEDITERRANEAN TRIM WITH SINETROL™-XPUR 60 veg. caps	18.00	13.50	12.00			
02109	MEDITERRANEAN WHOLE FOOD BLEND • 90 veg. caps	44.00	33.00	30.00			
01668	MELATONIN • 300 mcg, 100 veg. caps	7.00	5.25	4.50			
01083	MELATONIN • 500 mcg, 200 veg. caps	18.00	13.50	12.00			
00329	MELATONIN • 1 mg, 60 caps	5.00	3.75	3.47			
00330	MELATONIN • 3 mg, 60 veg. caps	8.00	6.00	5.16			
00331	MELATONIN • 10 mg, 60 veg. caps	28.00	21.00	18.00			
00332	MELATONIN • 3 mg, 60 veg. lozenges	8.00	6.00	5.16			
01734	MELATONIN (Fast-Acting Liquid) • 2 fl. oz (Citrus-Vanilla)	12.00	9.00	8.25			
01787	MELATONIN TIMED RELEASE • 300 mcg, 100 veg. tabs	12.00	9.00	8.25			
01788	MELATONIN TIMED RELEASE • 750 mcg, 60 veg. tablets	8.00	6.00	5.25			
01786	MELATONIN TIMED RELEASE • 3 mg, 60 veg. tabs	12.00	9.00	8.25			
02101	MEMORY PROTECT • 36 day supply	24.00	18.00	16.00			
01536	METHYLCOBALAMIN • 1 mg, 60 veg. lozenges (vanilla)	9.95	7.46	6.00			
01537	METHYLCOBALAMIN • 5 mg, 60 veg. lozenges (vanilla)	32.00	24.00	18.75	17.25		
00709	MIGRA-EEZE™ (Butterbur) • 60 softgels	33.00	24.75	22.00			
01522	MILK THISTLE (European) • 60 veg. caps	34.00	25.50	22.50			
01922	MILK THISTLE (European) • 60 softgels	28.00	21.00	18.75			
01925	MILK THISTLE (European) • 120 softgels	44.00	33.00	30.00			
01940	MIRAFORTE w/STANDARDIZED LIGNANS (Super) • 120 veg caps	62.00	46.50	42.00			
01869	MITOCHONDRIAL BASICS w/PQQ • 30 caps	40.00	30.00	27.00			
01868	MITOCHONDRIAL ENERGY OPTIMIZER w/PQQ •120 caps	68.00	51.00	45.00			
00065	MK-7 • 90 mcg, 60 softgels	28.00	21.00	18.75			
00451	MSM (Methylsulfonylmethane) • 1,000 mg, 100 caps	14.00	10.50	8.96			
SUBTOTAL OF COLUMN 7							

RECEIVE 25% OFF THE RETAIL PRICE OF ALL PRODUCTS

ITEM No.	PRODUCT	Retail Each \$	YOUR PRICE				QTY	Total
			1 Unit Each	4 Unit Each	10 Unit Each			
N								
01534	N-ACETYL-L-CYSTEINE • 600 mg, 60 veg. caps	14.00	10.50	9.25				
01904	NAD+ CELL REGENERATOR™ • 100 mg, 30 veg. caps	22.00	call for pricing					
02144	NAD+ CELL REGENERATOR™ NICOTINAMIDE RIBOSIDE 250 mg, 30 veg. caps	42.00	call for pricing					
02148	NAD+ CELL REGENERATOR™ W/RESVERATROL (Optimized) 30 veg. caps	48.00	call for pricing					
01603	NEURO-MAG® MAGNESIUM L-THREONATE • 90 veg. caps	40.00	30.00	27.00				
02032	NEURO-MAG® MAGNESIUM L-THREONATE 93.35 grams • Tropical Punch Flavor	38.00	28.50	26.00				
01990	NITROVASC w/CORDIART™ • 30 veg. caps	18.00	13.50	12.00				
01903	NK CELL ACTIVATOR™ • 30 veg. tablets	45.00	33.75	31.50				
00373	NO FLUSH NIACIN • 800 mg, 100 caps	19.00	14.25	12.75				
O								
01824	OLIVE LEAF VASCULAR SUPPORT w/CELERY SEED EXTRACT (Advanced) • 60 veg. caps	36.00	27.00	24.00				
01937	OMEGA-3 (EPA/DHA) • 120 softgels	20.00	15.00	13.50				
01988	OMEGA-3 PLUS EPA/DHA w/SESAME LIGNANS, OLIVE EXTRACT, KRILL & ASTAXANTHIN (SUPER)• 120 softgels	45.00	33.75	31.50	24.75			
01983	OMEGA-3 EPA/DHA w/SESAME LIGNANS & OLIVE EXTRACT (Super) • 60 softgels	18.00	13.50	12.00	9.38			
01982	OMEGA-3 EPA/DHA w/SESAME LIGNANS & OLIVE EXTRACT (Super) • 120 softgels	32.00	24.00	21.00	17.05			
01984	OMEGA-3 EPA/DHA w/SESAME LIGNANS & OLIVE EXTRACT (Super) • 120 enteric coated softgels	34.00	25.50	23.25	18.00			
01985	OMEGA-3 EPA/DHA w/SESAME LIGNANS & OLIVE EXTRACT (Super) • 60 enteric coated softgels	20.00	15.00	13.50	10.50			
01986	OMEGA-3 EPA/DHA w/SESAME LIGNANS & OLIVE EXTRACT (Super) • 240 small softgels	32.00	24.00	21.00	17.25			
02092	ONCE-DAILY HEALTH BOOSTER • 30 softgels	30.00	22.50	20.00				
02091	ONCE-DAILY HEALTH BOOSTER • 60 softgels	54.00	40.50	38.00				
02213	ONE-PER-DAY • 60 tablets	23.00	17.25	16.00				
01328	ONLY TRACE MINERALS • 90 veg. caps	15.00	11.25	9.38				
P								
01789	PALMETTOGUARD® SAW PALMETTO W/BETA-SITOSTEROL 30 softgels	15.00	11.25	10.50	9.00			
01790	PALMETTOGUARD® SAW PALMETTO/ NETTLE ROOT W/BETA-SITOSTEROL • 60 softgels	28.00	21.00	19.50	18.00			
*00342	PECTA SOL-C® MODIFIED CITRUS PECTIN • 454 grams powder	113.95	96.86					
*01080	PECTA SOL-C® MODIFIED CITRUS PECTIN • 270 veg. caps	82.95	70.51					
01811	PEONY IMMUNE • 60 veg. caps	36.00	27.00	24.00				
*00673	PGX® PLUS MULBERRY (WellBetX®) • 180 veg. caps	34.95	26.21					
01953	POMEGRANATE COMPLETE • 30 softgels	24.00	18.00	15.75				
00956	POMEGRANATE FRUIT EXTRACT • 30 veg. caps	19.50	14.63	13.16				
-01837	POMI-T® • 60 veg. caps	38.00	28.50	26.00				
00577	POTASSIUM IODIDE • 130 mg, 14 tabs	6.95	5.21	3.94				
01500	PQQ CAPS • 10 mg, 30 veg. caps	18.00	13.50	11.00	10.00			
01647	PQQ CAPS • 20 mg, 30 veg. caps	32.00	24.00	18.00	17.00			
00302	PREGNENOLONE • 50 mg, 100 caps	26.00	19.50	16.50				
00700	PREGNENOLONE • 100 mg, 100 caps	30.00	22.50	20.25				
*01373	PRELOX® ENHANCED SEX FOR MEN • 60 tablets	52.00	39.00	36.00				
SUBTOTAL OF COLUMN 8								

ITEM No.	PRODUCT	Retail Each \$	YOUR PRICE			QTY	Total
			1 Unit Each	4 Unit Each	10 Unit Each		
00525	PROBOOST™ THYMIC PROTEIN A • 30 packets	66.60	49.95				
01441	PROGESTA-CARE® • 4 oz cream	36.39	27.29	25.72			
02029	PROSTATE FORMULA (Ultra) • 60 softgels	38.00	28.50	26.25	24.00		
01909	PROSTAPOLLEN™ (Triple strength) • 30 softgels	28.00	21.00	18.75			
01742	PROTEIN-ISOLATE (Whey) Vanilla • 403 grams	30.00	22.50	19.50			
01743	PROTEIN-ISOLATE (Whey) Chocolate • 437 grams	30.00	22.50	19.50			
01770	PROTEIN CONCENTRATE (New Zealand Whey) Vanilla 500 grams	30.00	22.50	19.95			
01771	PROTEIN CONCENTRATE (New Zealand Whey) Chocolate 640 grams	30.00	22.50	19.95			
02127	PROTEIN (PLANT) COMPLETE & AMINO ACID COMPLEX 15.87 oz	34.00	25.50	23.00			
01812	PROVINAL® PURIFIED OMEGA-7 • 30 softgels	27.00	20.25	18.00			
01676	PS CAPS (Phosphatidylserine) • 100 mg, 100 veg. caps	54.00	40.50	36.00			
01508	PTEROPURE® Pterostilbene • 50 mg, 60 veg. caps	32.00	24.00	22.50			
01209	PUMPKIN SEED EXTRACT (Water-soluble) • 60 veg. caps	20.00	15.00	13.50			
01637	PYCNOGENOL® FRENCH MARITIME PINE BARK EXTRACT 100 mg, 60 veg. caps	64.00	48.00	45.00			
01217	PYRIDOXAL 5'-PHOSPHATE • 100 mg, 60 veg. caps	22.00	16.50	14.85			
Q, R							
01309	QUERCETIN (Optimized) • 250 mg, 60 veg. caps	22.00	16.50	15.00			
01030	RED YEAST RICE (Bluebonnet) • 600 mg, 60 veg. caps	18.08	13.56				
00605	REGIMINT • 60 enteric-coated caps	19.95	14.96	14.00			
01708	REISHI EXTRACT MUSHROOM COMPLEX • 60 veg. caps	30.00	22.50	20.25			
01448	REJUVENEX® BODY LOTION • 6 fl. oz	24.00	18.00	14.85	12.75		
01621	REJUVENEX® FACTOR FIRING SERUM • 1.7 oz	65.00	48.75	37.50			
01220	REJUVENEX® (ULTRA) • 2 oz	52.00	39.00	33.00	29.25		
00676	REJUVENIGHT® (ULTRA) • 2 oz	39.95	29.96	27.00			
01410	RESVERATROL W/PTEROSTILBENE • 100 mg, 60 veg. caps	36.00	27.00	24.00			
02030	RESVERATROL (Optimized) • 60 veg. caps	46.00	34.50	31.00			
00889	RHODIOLA EXTRACT • 250 mg, 60 veg. caps	14.00	10.50	9.00			
01900	RIBOGEN™ FRENCH OAK WOOD EXTRACT 200 mg, 30 veg. caps	36.00	27.00	24.75			
00972	(D) RIBOSE POWDER • 150 grams	27.50	20.63	18.56			
01473	(D) RIBOSE TABLETS • 100 veg. tabs	32.00	24.00	21.00			
02169	RAINFOREST BLEND GROUND COFFEE • 12 oz. bag	13.00	9.75				
02173	RAINFOREST BLEND GROUND COFFEE Natural Mocha • 12 oz. bag	15.00	11.25				
02172	RAINFOREST BLEND GROUND COFFEE Natural Vanilla • 12 oz. bag	15.00	11.25				
02171	RAINFOREST BLEND WHOLE BEAN COFFEE 12 oz. bag	13.00	9.75				
02170	RAINFOREST BLEND DECAFFEINATED ROAST GROUND COFFEE 12 oz. bag	14.00	10.50				
01208	R-LIPOIC ACID (Super) • 240 mg, 60 veg. caps	49.00	36.75	33.75			
00070	RNA CAPSULES • 500 mg, 100 caps	17.95	13.46	12.12			
S							
01432	SAFFRON W/SATIEREAL® (Optimized) • 60 veg. caps	36.00	27.00	24.00			
01935	SAMe (S-ADENOSYL-METHIONINE) 200 mg, 30 enteric coated tablets	25.00	18.75	16.50			
SUBTOTAL OF COLUMN 9							

ITEM No.	PRODUCT	Retail Each \$	YOUR PRICE			QTY	Total
			1 Unit Each	4 Unit Each	10 Unit Each		
01933	SAMe (S-ADENOSYL-METHIONINE) 400 mg, 30 enteric coated tablets	36.00	27.00	24.00			
01934	SAMe (S-ADENOSYL-METHIONINE) 400 mg, 60 enteric coated tablets	66.00	49.50	45.00			
01740	SEA-IODINE™ • 1,000 mcg, 60 veg. caps	8.00	6.00	5.40			
01879	SE-METHYL L-SELENOCYSTEINE • 200 mcg, 90 veg. caps	11.00	8.25	7.50			
00318	SERRAFLAZYME • 100 tablets	18.00	13.50	12.00			
01626	SEX FOR WOMEN 50+ (Enhanced) • 90 veg. caps	59.00	44.25	34.00			
01938	SHADE FACTOR™ • 120 veg. caps	44.00	33.00	30.00			
02110	SHADE FACTOR™ SUNSCREEN LOTION • 4 fl. oz	20.00	15.00	13.00			
02118	SHADE FACTOR™ SUNSCREEN SPRAY • 6 fl. oz	22.00	16.50	14.25			
01884	SILYMARIN • 100 mg, 90 veg. caps	14.00	10.50	9.50			
02129	SKIN CARE COLLECTION ANTI-AGING SERUM • 1.75 fl. oz	60.00	45.00	37.50			
02132	SKIN CARE COLLECTION BODY LOTION • 6 oz	28.00	21.00	18.00			
02130	SKIN CARE COLLECTION DAY CREAM • 1.65 oz	50.00	37.50	33.00			
02131	SKIN CARE COLLECTION NIGHT CREAM • 1.65 oz	39.00	29.25	27.00			
01596	SKIN RESTORING PHYTOCERAMIDES w/LIPOWHEAT® 30 liquid veg. caps	25.00	18.75	17.25			
01444	SLEEP (Quiet) • 60 veg. caps	13.00	9.75	7.50			
01445	SLEEP MELATONIN (Quiet) • 5 mg, 60 veg. caps	18.00	13.50	12.00			
01551	SLEEP w/ MELATONIN (Enhanced) • 30 caps	22.00	16.50	15.00			
01511	SLEEP W/O MELATONIN (Enhanced) • 30 caps	20.00	15.00	13.50			
00961	SODZYME® w/GLISODIN® & WOLFBERRY • 90 veg. caps	28.00	21.00	18.00			
00657	SOLARSHIELD® SUNGLASSES • Smoke color	12.99	9.74	8.63			
01097	SOY EXTRACT (ULTRA) • 150 veg. caps	76.00	57.00	50.00			
01649	SOY ISOFLAVONES (SUPER ABSORBABLE) • 60 veg. caps	28.00	21.00	18.75			
00432	STEVIA™ (Better) • 100 packets, 1 gram each	9.95	7.46				
00438	STEVIA™ ORGANIC LIQUID SWEETENER (Better) • 2 oz	11.00	8.25				
00987	STRESS RELIEF (Enhanced) • 30 veg. caps	28.00	21.00	18.00			
01476	STRONTIUM • 750 mg, 90 veg. caps	20.00	15.00	13.50			
01778	SUPER SELENIUM COMPLEX • 200 mcg, 100 veg. caps	14.00	10.50	9.00	8.25		
T							
02023	TART CHERRY W/CHERRYPURE® 60 veg. caps	20.00	15.00	14.00			
01827	TAURINE • 1,000 mg, 90 veg. caps	13.00	9.75	9.00			
02205	TEA CRYSTALS (Kenyan Green) • 14 stick packs	12.00	9.00	8.00			
02206	TEA CRYSTALS (Kenyan Purple) • 14 stick packs	18.00	13.50	12.00			
01918	TEAR SUPPORT w/MAQUIBRIGHT® • 60 mg, 30 veg. caps	18.00	13.50	12.00			
00133	L-TAURINE POWDER • 300 grams	20.00	15.00	12.66			
*13685	TEN MUSHROOM FORMULA® • 120 veg. caps	41.95	35.66				
01304	THEAFLAVIN STANDARDIZED EXTRACT • 30 veg. caps	18.00	13.50	12.00			
01683	(L) THEANINE • 100 mg, 60 veg. caps	24.00	18.00	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	8.25			
01859	TMG • 500 mg, 60 liquid veg. caps	13.00	9.75	9.00			
01400	TOCOTRIENOLS (Super-absorbable) • 60 softgels	30.00	22.50	21.00			
01278	TOOTHPASTE • 4 oz (Mint) tube	9.50	7.13	6.50			
SUBTOTAL OF COLUMN 10							

ITEM No.	PRODUCT	Retail Each \$	YOUR PRICE			QTY	Total
			1 Unit Each	4 Unit Each	10 Unit Each		
01917	TRANQUIL TRACT™ • 60 veg. caps	52.00	39.00	34.50			
01468	TRIPLE ACTION CRUCIFEROUS VEGETABLE EXTRACT 60 veg. caps	24.00	18.00	16.50			
01469	TRIPLE ACTION CRUCIFEROUS VEGETABLE EXTRACT w/RESVERATROL • 60 veg. caps	32.00	24.00	22.20			
02003	TRIPLE ACTION THYROID • 60 veg. caps	36.00	27.00	24.00			
01803	TRI SUGAR SHIELD® • 60 veg. caps	36.00	27.00	24.00			
01386	TRUFIBER™ • 180 grams	32.95	24.71				
01389	TRUFLOA® PROBIOTICS • 32 veg. caps	42.95	32.21				
01722	L-TRYPTOPHAN • 500 mg, 90 veg. caps	33.00	24.75	22.50			
01721	TRYPTOPHAN PLUS (Optimized) • 90 veg. caps	32.00	24.00	21.75			
02216	TWO-PER-DAY • 60 tablets	12.00	9.00	7.50			
02215	TWO-PER-DAY • 120 tablets	21.00	15.75	14.00			
02217	TWO-PER-DAY • 60 caps	12.00	9.00	8.00			
02214	TWO-PER-DAY • 120 caps	24.00	18.00	16.00			
00326	L-TYROSINE • 500 mg, 100 tablets	13.50	10.13				
U, V							
01921	URIC ACID CONTROL • 60 veg. caps	24.00	18.00	16.50			
00213	VANADYL SULFATE • 7.5 mg, 100 veg. tablets	15.00	11.25	9.38			
02102	VENOFLOW™ • 30 veg. caps	52.00	39.00	36.00			
00408	VENOTONE • 60 caps	18.95	14.21	12.00			
01327	VINPOCETINE • 10 mg, 100 veg. tablets	18.00	13.50	10.50			
00372	VITAMIN B3 NIACIN • 500 mg, 100 caps	7.65	5.74	4.99			
02028	VITAMIN B5 • 500 mg, 100 veg. caps (Pantothenic Acid)	14.00	10.50	9.50			
01535	VITAMIN B6 • 250 mg, 100 veg. caps	12.50	9.38	8.25			
00361	VITAMIN B12 • 500 mcg, 100 lozenges	8.75	6.56	5.44			
01634	VITAMIN C w/DIHYDROQUERCETIN 1,000 mg, 60 veg. tablets	10.00	7.50	6.75			
00927	VITAMIN C w/DIHYDROQUERCETIN 1,000 mg, 250 veg. tablets	30.00	22.50	20.00			
00084	VITAMIN C POWDER (BUFFERED) • 454 grams	28.00	21.00	19.00			
01736	VITAMIN C-MAGNESIUM CRYSTALS (EFFERVESCENT) 180 grams	20.00	15.00	13.50			
01732	VITAMIN D3 • 2,000 IU, 1 fl. oz, Mint flavor	28.00	21.00	18.75			
01753	VITAMIN D3 • 1,000 IU, 90 softgels	7.00	5.25	4.50			
01751	VITAMIN D3 • 1,000 IU, 250 softgels	12.50	9.38	8.44			
01713	VITAMIN D3 • 5,000 IU, 60 softgels	10.00	7.50	6.50			
01718	VITAMIN D3 • 7,000 IU, 60 softgels	14.00	10.50	9.45			
01758	VITAMIN D3 W/SEA-IODINE™ • 5,000 IU, 60 caps	14.00	10.50	9.38			
00864	VITAMIN D3 LIQUID • 2,000 IU, 1 fl. oz	28.00	21.00	18.75			
02040	VITAMINS D AND K W/SEA-IODINE™ • 60 caps	24.00	18.00	16.50			
01863	VITAMIN E (Super) • 400 IU, 90 softgels	28.00	21.00	19.50	18.00		
01936	VITAMIN K2 (Low dose) • 45 mcg, 90 softgels	18.00	13.50	12.00			
W							
01902	WAIST-LINE CONTROL™ • 120 veg. caps	42.00	31.50	28.50			
X, Y							
01919	X-R SHIELD • 90 veg. caps	15.00	11.25	9.75			
00409	XYLIWHITE™ MOUTHWASH • 16 oz	10.00	7.50				
SUBTOTAL OF COLUMN 11							

ITEM No.	PRODUCT	Retail Each \$	YOUR PRICE			QTY	Total
			1 Unit Each	4 Unit Each	10 Unit Each		
Z							
01813	ZINC HIGH POTENCY • 50 mg, 90 veg. caps	9.00	6.75	4.50			
01561	ZINC LOZENGES • 60 veg. lozenges	9.00	6.75	6.00			
01961	ZINC LOZENGES (Enhanced) • 30 veg. lozenges	12.00	9.00	6.00			
01051	ZYFLAMEND® WHOLE BODY • 120 liquid veg. caps	72.95	54.71				
BOOKS							
33998	THE RIGHT TO TRY by Darcy Olsen • 2016	26.99	20.24				
33875	DOCTORED: THE DISILLUSIONMENT OF AN AMERICAN PHYSICIAN • by Sandeep Jauhar • 2015	26.00	19.50				
33874	MISSING MICROBES • by Martin J. Blaser, MD • 2014	28.00	21.00				
33873	EATING ON THE WILD SIDE • by Jo Robinson • 2014	16.00	12.00				
DPT05	DISEASE PREVENTION AND TREATMENT, FIFTH EDITION (Hardcover) • 2014	69.95	39.95	36.00			
33865	THE RESTORATION OF THE HUMAN BODY [IN 7 PARTS] by Sergey A. Dzugas, MD, PhD • 2014	29.95	22.46				
33862	I'M TOO YOUNG FOR THIS • by Suzanne Somers • 2013	26.00	19.50				
33835	PHARMOCRACY • by William Faloan • 2011	24.00	9.60	8.00			
33838	YOUR GUIDE TO HEALTHY SKIN THE NATURAL WAY by Gary Goldfaden, MD • 2012	26.00	15.00				
33815	KNOCKOUT • by Suzanne Somers • 2009	25.99	17.00				
34132	TWO'S COMPANY: FIFTY YEAR ROMANCE by Suzanne Somers • 2017	26.00	19.50				
SUBTOTAL OF COLUMN 12							

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Chew tablets before swallowing. Keep out of reach of children. Do not exceed recommended dose.



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.



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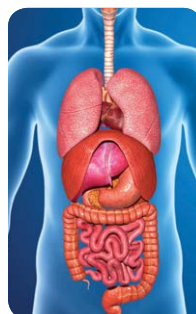
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