Unprecedented Breakthrough!

Scientists Reverse Aging of Human Cells

Genetic Engineering Transports Cells Back to Beginning of Life

Critical Importance of Annual Blood Testing

New Way to Manage Menopause

Antioxidant Powerhouse Effects of Berries

REWINDING THE “CLOCK” OF CELLULAR AGING
The Ultimate Two-Per-Day Tablet

The most comprehensive nutrient formula in the world is Life Extension Mix. Some Foundation members, however, prefer to take their nutrients separately and need only a basic multi-nutrient supplement to fill the missing gaps. For many years, these members had to rely on commercial “one-a-day” supplements that provide very low potencies.

In response to requests for a science-based multi-nutrient, a special formula was compounded to provide the greatest potencies that can fit into two tablets. When compared to conventional “one-a-day” products, Life Extension Two-Per-Day contains up to 50 times more potency!

The box on this page reveals how much more potent the Two-Per-Day formula is compared to the leading commercial multi-vitamin. Few consumers realize that commercial supplements often contain the cheapest form of nutrients that don’t provide optimal benefits. For example, the 30 IU of synthetic vitamin E contained in Centrum® may provide relatively little vitamin E to the bloodstream. Studies show that synthetic vitamin E is distributed throughout the body only about half as much as natural vitamin E.1-5 The 200 IU of natural vitamin E contained in Two-Per-Day thus provides about 13 times more vitamin E activity than does Centrum®.

The following table compares the daily dosage of key nutrients included in both the Life Extension Two-Per-Day Tablet and Centrum®’s Daily Tablet:

<table>
<thead>
<tr>
<th>Sample Ingredient Comparison</th>
<th>LIFE EXTENSION TWO-PER-DAY</th>
<th>Centrum®</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vitamin C</td>
<td>500 mg</td>
<td>60 mg</td>
</tr>
<tr>
<td>Vitamin E</td>
<td>200 IU (natural)</td>
<td>30 IU (synthetic)</td>
</tr>
<tr>
<td>Folic acid</td>
<td>800 mcg</td>
<td>400 mcg</td>
</tr>
<tr>
<td>Vitamin B12</td>
<td>300 mcg</td>
<td>6 mcg</td>
</tr>
<tr>
<td>Vitamin B6</td>
<td>75 mg</td>
<td>2 mg</td>
</tr>
<tr>
<td>Zinc</td>
<td>30 mg</td>
<td>11 mg</td>
</tr>
<tr>
<td>Selenium</td>
<td>200 mcg</td>
<td>55 mcg</td>
</tr>
<tr>
<td>Lutein</td>
<td>5 mg</td>
<td>(none)*</td>
</tr>
<tr>
<td>Lycopene</td>
<td>2 mg</td>
<td>(none)*</td>
</tr>
<tr>
<td>Vitamin B1</td>
<td>75 mg</td>
<td>1.5 mg</td>
</tr>
<tr>
<td>Vitamin B2</td>
<td>50 mg</td>
<td>1.7 mg</td>
</tr>
<tr>
<td>Niacin (as niacinamide)</td>
<td>50 mg</td>
<td>20 mg</td>
</tr>
<tr>
<td>Pantothenic acid</td>
<td>100 mg</td>
<td>10 mg</td>
</tr>
<tr>
<td>Biotin</td>
<td>300 mcg</td>
<td>30 mcg</td>
</tr>
<tr>
<td>Boron</td>
<td>300 mcg</td>
<td>75 mcg</td>
</tr>
<tr>
<td>Chromium</td>
<td>200 mcg</td>
<td>35 mcg</td>
</tr>
<tr>
<td>Molybdenum</td>
<td>100 mcg</td>
<td>45 mcg</td>
</tr>
<tr>
<td>Magnesium</td>
<td>100 mg</td>
<td>50 mg</td>
</tr>
<tr>
<td>Manganese</td>
<td>2 mg</td>
<td>2.3 mg</td>
</tr>
<tr>
<td>Iodine</td>
<td>150 mcg</td>
<td>150 mcg</td>
</tr>
<tr>
<td>Potassium</td>
<td>25 mg</td>
<td>80 mg</td>
</tr>
<tr>
<td>Vitamin A (preformed)</td>
<td>500 IU</td>
<td>1,015 IU</td>
</tr>
<tr>
<td>Vitamin A (as beta-carotene)</td>
<td>4,500 IU</td>
<td>2,485 IU</td>
</tr>
<tr>
<td>Vitamin D</td>
<td>2,000 IU</td>
<td>400 IU</td>
</tr>
<tr>
<td>Choline Bitartrate</td>
<td>20 mg</td>
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<tr>
<td>Inositol</td>
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<td>(none)</td>
</tr>
<tr>
<td>PABA</td>
<td>30 mg</td>
<td>(none)</td>
</tr>
<tr>
<td>Calcium</td>
<td>12 mg</td>
<td>200 mg</td>
</tr>
</tbody>
</table>

These statements have not been evaluated by the Food and Drug Administration. These products are not intended to diagnose, treat, cure, or prevent any disease.

References

* Centrum® no longer contains significant amounts of lycopene nor lutein.

Life Extension Two-Per-Day Tablets provide much higher potencies of key nutrients and represent a better value than many commercial brands.

A bottle of 120 Life Extension Two-Per-Day Tablets retails for $18.95. If a member buys four bottles, the price is reduced to $12.75 per bottle. (The retail price for 180 tablets of Centrum® is around $14.)

To order Life Extension Two-Per-Day Tablets, call 1-800-544-4440 or visit www.LifeExtension.com

Contains soybeans, rice, and corn.
36 THE SECRET BEHIND AÇAI’S ANTIOXIDANT POWER
Touted commercially as an antioxidant powerhouse, only recently has açaí gained compelling scientific validation. Compounds isolated in freeze-dried açaí extract have been shown to enter human cells and neutralize free radicals at very low doses. Find out how these and other findings confirm berry polyphenols’ unrivalled capacity to blunt free radical damage and thwart degenerative disease.

26 A REVOLUTION IN NATURAL MENOPAUSE RELIEF
Conventional medicine has failed women facing menopause. Synthetic hormone replacement therapy’s deadly risks—including breast cancer, heart attack, and stroke—leave them with few safe options. Researchers have discovered a unique adaptogen that can relieve most menopausal symptoms by operating at the neurological level.

72 TOPICAL VITAMIN D PROTECTS AGING SKIN
While most people are aware of vitamin D’s importance to overall health, few know of its essential role in skin health. As you age your skin loses 75% of its ability to make vitamin D. The many ways vitamin D protects your skin are explained, along with the promise of topical application to help preserve its youthful appearance.

50 WHY FDA-APPROVED DRUGS FAIL TO PREVENT HEART ATTACK
Recent headlines about a cholesterol-lowering drug demonstrate how medical apathy generates enormous confusion over which drugs actually work. Outdated guidelines for measuring risk factors in the blood are a big part of the problem. Fortunately, Life Extension® members find out what optimal levels of cardiac risk markers are before they suffer a heart attack.

7 AS WE SEE IT—Epidemic Testosterone Deficiency
An analysis of blood tests of male Life Extension members reveals alarming rates of testosterone deficiency. Aside from waning sexual performance, depression, and diminished strength, low testosterone has been definitively linked to men’s risk of death from all causes. Fortunately, men don’t have to guess their testosterone status. Comprehensive blood testing reveals the level of free testosterone so that aging men can restore it to youthful ranges.

IN THE NEWS 17
Green tea may combat eye disease; chocolate reduces heart disease risk; DHA destroys neuroblastoma cells; soy protective against lung cancer; and more.

PROFILE 87
Is testosterone therapy right for you? Is it dangerous? Does it really work? Armed with years of experience, Dr. Abraham Morgentaler of Harvard Medical School clears the air, detailing testosterone’s profoundly positive impact on men’s health and quality of life.
Personal Consultation with
Blood Testing and Analysis
The Most Complete Line of Life Extension Supplements
AND MUCH MORE!

Features to look for in the Life Extension Forum:
• Easy registration process
• Enhanced search engine
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• Multiple languages
• Email reply notification and Forum subscriptions
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• “Emoticons” in Forum postings
• Improved member profiles
• Quick message posting
• Printer-friendly
• AND MUCH MORE!

Log on to http://forum.lef.org/ and join the Life Extension Forum today!
Curcumin and other turmeric constituents are impressing scientists around the world with their remarkable health benefits, such as suppressing inflammatory factors, fighting free radicals, and promoting healthy DNA function. The problem is that curcumin is poorly absorbed into the bloodstream.

**Super Bio-Curcumin**® has been shown to **absorb up to seven times better** than conventional curcumin. This patent-pending formula thus represents the most cost-effective way to supplement with this critical nutrient.¹,²

The remarkable absorption studies charted to the left reveal that just one 400 mg capsule a day of this turmeric compound can provide curcumin blood levels equivalent to ingesting 2,500–2,800 mg of commercial curcumin supplements.

Not only does this novel turmeric formulation provide far greater peak blood levels, but the curcumin also remains in the bloodstream almost **twice as long** compared with conventional supplements.

What’s more, this enhanced absorption delivery complex provides other beneficial turmeric compounds in addition to standardized curcumin.

Life Extension®’s **Super Bio-Curcumin**® contains the patent-pending BCM-95® turmeric compound. A bottle containing 60 **Super Bio-Curcumin**® with BCM-95® capsules retails for $30. If a member buys four bottles, the price is reduced to just **$19.88** per bottle. Each bottle will last most members two months.
Gustavo Tovar Baez, MD, operates the Life Extension Clinic in Caracas, Venezuela. He is the first physician in Caracas to specialize in anti-aging medicine.

Sam Baxas, MD, head of the Baxamed Medical Center for Youth Restoratation in Basel, Switzerland, has developed cell therapy and growth hormone therapies for various diseases, including Parkinson’s disease and arthritis.

Ricardo Bernales, MD, is a board-certified pediatrician and general practitioner in Chicago, IL, focusing on allergies, bronchial asthma, and immunodeficiency.

Thomas F. Crais, MD, FACS, is a board-certified plastic surgeon, was medical director of the microsurgical research and training lab at Southern Baptist Hospital in New Orleans, LA, and currently practices in Sun Valley, ID.

John Crisler, DO, is an anesthesiologist and president of The All Things Male Center for Men’s Health in Lansing, MI. Dr. Crisler is a distinguished leader in the field of anti-aging medicine for his new, advanced testosterone replacement therapy protocols that have changed the way physicians all over the world treat their patients.

William Davis, MD, is Medical Director of Milwaukee Heart Scan and developer of the web-based initiative, Track Your Plaque, the only heart disease prevention program that uses the new CT heart scans to detect, track, and control coronary plaque.

Martin Dayton, MD, DO, practices at the Sunny Isles Medical Center in North Miami Beach, FL. His focus is on nutrition, aging, chelation therapy, holistic medicine, and oxidative medicine.

Serger A. Dzugan, MD, PhD, was formerly chief of cardiovascular surgery at the Donetsk Regional Medical Center in Donetsk, Ukraine. Dr. Dzugan’s current primary interests are anti-aging and biological therapy for cancer, cholesterol, and hormonal disorders.

Carmen Fusco, MS, RN, CNS, is a research scientist and clinical nutritionist in New York City who has lectured and written numerous articles on the biochemical approach to the prevention of aging and degenerative diseases.

Norman R. Gay, MD, is proprietor of the Bahamas Anti-Aging Medical Institute in Nassau, Bahamas. A former member of the Bahamian Parliament, he served as Minister of Health and Minister of Youth and Sports. He is a three-time chairman of the Executive Committee of the PanAmerican Health Organization in Washington, DC.

Mitchell J. Ghen, DO, PhD, holds a doctorate in holistic healing and anti-aging, and serves on the faculty of Medicine at the Benemerta Universidad Autonoma De Puebla, Mexico, as a Professor of Cellular Hemapoetic Studies. He is the author of The Ghen and Rains Guide to Compounding Pharmaceuticals and The Advanced Guide to Longevity Medicine.

Gary Goldfaden, MD, is a clinical dermatologist and a lifetime member of the American Academy of Dermatology. He is the founder of Academy Dermatology of Hollywood, FL, and COSMESIS Skin Care. He specializes in natural approaches to aging and rejuvenation of the skin.

Miguelangelo Gonzalez, MD, is a certified plastic and reconstructive surgeon at the Miguelangelo Plastic Surgery Clinic, Cabo San Lucas.

Garry F. Gordon, MD, DO, is a Payson, AZ-based researcher of alternative approaches to medical problems that are unresponsive to traditional therapy. He is president of the International College of Advanced Longevity Medicine.

Richard Heifetz, MD, is a board-certified anesthesiologist in Santa Rosa, CA, specializing in the delivery of anesthesia for office-based plastic/cosmetic surgery, chelation therapy, and pain management.

Roberto Marasi, MD, is a psychiatrist in Brescia and in Piacenza, Italy. He is involved in anti-aging strategies and weight management. His interests include the prevention of cardiovascular and metabolic diseases and the relationship between nutrition, inflammation, oxidative stress, aging, and degenerative diseases.

Maurice D. Marholin, DDC, DO, is a licensed osteopathic physician and chiropractor. He completed a NIH Fellowship in Nutrition at UAB. Board certified in Family Medicine with a CNS in Nutrition. He is currently the Medical Director at Leon County Jail. He is responsible for 1,100-1,200 inmates’ medical needs.

Philip Lee Miller, MD, is founder and medical director of the Los Gatos Longevity Institute in Los Gatos, CA. His practice is dedicated to anti-aging medicine, focusing on bioidentical natural hormone replacement, nutritional medicine, complex lipid disorders, and stress management. He is a diploma of the American Board on Anti-Aging Medicine.

Michele G. Morrow, DO, FAAFP, is a board-certified family physician who merges mainstream and alternative medicine using functional medicine concepts, nutrition, and natural approaches. Dr. Morrow is an accomplished clinician, medical researcher, author, and lecturer.

Herbert Pardell, DO, FAAIM, practices internal medicine at the Emerald Hills Medical Center in Hollywood, FL, and specializes in anti-aging, chelation, hormone replacement, and complementary medicine. He is a medical director of the Life Extension Foundation.

Lambert Titus K. Parker, MD, practices internal medicine at the Integrative Longevity Institute of Virginia in Virginia Beach, VA.

Ross Pelton, RPh, PhD, CCN, is director of nutrition and anti-aging research for Intramedicine, Inc. He has authored six books and teaches continuing education courses for health professionals on a wide variety of health topics.

Patrick Quillin, PhD, RD, CNS, is a clinical nutritionist in Carlsbad, CA, and formerly served as vice president of nutrition for Cancer Treatment Centers of America, where he was a consultant to the National Institutes of Health. He has written 15 books on health, including Beating Cancer with Nutrition.

Allan Rashford, MD graduated the University of Iowa Medical School and did his internship, residency and fellowship in Pulmonary Medicine in New York City. Upon completing medical training, he became Chief of Medicine at St. Francis Hospital in South Carolina, and was later named President of the Charleston Medical Society.

Marc R. Rose, MD, practices ophthalmology in Los Angeles, CA, and is president of the Rose Eye Medical Group. He is on the staffs of Pacific Alliance Medical Center, Los Angeles, and other area hospitals.

Michael R. Rose, MD, is a board-certified ophthalmologist with the Rose Eye Medical Group in Los Angeles, CA, on the staffs of the University of Southern California and UCLA.

Ron Rothenberg, MD, is a full clinical professor at the University of California San Diego School of Medicine, and founder of California HealthSpan Institute in San Diego, CA. Dr. Rothenberg is an internationally recognized clinician, researcher, lecturer, and educator in preventive and anti-aging medicine.

Roman Rozencwaig, MD, is a pioneer in research on melatonin and aging. He practices in Montreal, Canada, as research associate at Montreal General Hospital, Department of Medicine, McGill University.

Carol Ann Ryser, MD, FAAP, is medical director of Health Centers of America in Kansas City, MO, and focuses on pediatrics and mental health.

Michael D. Seidman, MD, is the regional coordinator of otolaryngology-head and neck surgery for the Bloomfield satellite of Henry Ford Health System (HFHS), Detroit, MI, co-director of the Trinitus Center, and co-chair of the Complementary/Alternative Medicine Initiative for HFHS.

Ronald L. Shuler, BS, DDS, CCN, LN, is involved in immunoncology for the prevention and treatment of cancer, human growth hormone secretagogues, and osteoporosis.

Herbert R. Slavin, MD, is medical director of the Institute of Advanced Medicine in Lauderhill, FL, specializing in anti-aging medicine, disease prevention, chelation therapy, and natural hormone replacement therapy.

R. Arnold Smith, MD, is a clinical radiation oncologist who specializes in using immunotherapy to enhance the safety and efficacy of conventional cancer therapies.

Stephen L. Smith, MD, Richland, WA, focuses on treating allergies, and is a member of the American Society for Lasers in Medicine and Surgery.

Stephen Strum, MD, is a medical oncologist specializing in the treatment of prostate cancer. He is co-founder and past medical director of the Prostate Cancer Research Institute. Currently, he directs a program for prostate cancer patients in Ashland, OR.

Javier Torres, MD, is a member of the American Academy of Physical Medicine and Rehabilitation, and is on the medical staffs of Sunrise Hospital, Desert Springs Hospital, Valley Hospital, and Mountain View Hospital, all in Las Vegas, NV.

Paul Wand, MD, Fort Lauderdale, FL, is a clinical neurologist with special expertise in treating and reversing diabetic peripheral neuropathy and brain injuries from various causes.

Charles E. Williamson, MD, Boca Raton, FL, focuses on anti-aging, longevity, and pain management.

Jonathan V. Wright, MD, is medical director of the Tahoma Clinic in Renton, WA, and a board member of the Vitamin C Foundation and the American Preventive Medical Association, among many other groups.
Richard Kratz, MD, DSc, is a clinical professor of ophthalmology at the University of California, Irvine, and the University of Southern California (Los Angeles). Dr. Kratz pioneered the cataract-removal technique called phacoemulsification and developed intraocular lenses to replace the crystalline lens. He is currently involved in projects relating to glaucoma, cataract extraction, and facilitating eyesight for the totally blind.

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

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

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

Robert Pastore, PhD, CNS is a clinical nutritionist practicing in New York City. Due to his thorough nature and focus on organic chemistry and biochemistry, his colleagues have termed his practice forensic nutrition. He is a member of Harvard Medical School Postgraduate Association, the American College of Nutrition, New York Academy of Sciences, and the American Association of Pharmaceutical Scientists.

Stephen B. Strum, MD, is a medical oncologist who has specialized in prostate cancer treatment since 1983. He is co-founder and past medical director of the Prostate Cancer Research Institute. Currently, he directs a practice for prostate cancer patients in Ashland, OR.

Jonathan Treasure, AHG, MNIMH, is a British medical herbalist at the Centre for Natural Healing in Ashland, OR. Originally a medical sciences graduate from Cambridge University, he studied herbal medicine at the UK School of Phytotherapy. His clinical specialty is integrative botanical medicine for cancer, and his principal research interest is herb-drug interactions.

Jonathan V. Wright, MD, is medical director of the Tahoma Clinic in Renton, WA. He received his MD from the University of Michigan and has taught natural biochemical medical treatments since 1983. Dr. Wright pioneered the use of bioidentical estrogens and DHEA in daily medical practice. He has authored 11 books and publishes Nutrition and Healing, a monthly newsletter with a worldwide circulation of more than 100,000.
ow levels of testosterone have been implicated in a host of life-threatening health problems. Maintaining normal testosterone levels is one of the most important steps you can take to regain your health and improve your performance.

If you’re over 40, odds are you’re already starting to feel the debilitating effects of low testosterone. Research shows that by the time they are 60 years old, men typically produce 60% less testosterone than they did at age 20.1 With this drastic reduction comes several well-documented problems—from the blues and cognitive impairment to reduced sex drive and abdominal weight gain. Normal testosterone has been associated with maintaining a healthy cardiovascular system.2

RESTORING HEALTH AND SEXUAL VIGOR

Life Extension®’s Super MiraForte contains high potencies of chrysin and nettle root—plant extracts that naturally reduce the aromatization (conversion) of testosterone to estrogen to enhance free testosterone levels.3 Bioperine® is included to facilitate the absorption of chrysin (a natural flavonoid) into the bloodstream.

Muira puama is a rainforest herb classified in the Brazilian Pharmacopeia as an aphrodisiac. In a trial of men with decreased libido and other sexual issues, 62% of those taking muira puama reported positive results in regard to libido, while 51% of those with a common sexual problem felt that the herb was helpful.4 A second trial examined men with decreased libido and found that 85% of the test subjects taking muira puama enjoyed an enhanced libido, 90% had improved sexual function, and 100% of test subjects experienced an increase in intercourse frequency.5

To augment these protective effects, a standardized lignan extract from Norwegian spruce is included in Super MiraForte. These lignans convert to enterolactone in the intestine that is then rapidly absorbed into the bloodstream where it provides significant biological effects.6 Enterolactone has demonstrated anti-estrogen and anti-DHT effects that are of particular importance for the aging prostate gland.7-9

The suggested daily dose of four capsules of Super MiraForte contains potencies of the following nutrients:

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Potency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chrysin</td>
<td>1500 mg</td>
</tr>
<tr>
<td>Bioperine®</td>
<td>15 mg</td>
</tr>
<tr>
<td>Muira puama</td>
<td>850 mg</td>
</tr>
<tr>
<td>Nettle root</td>
<td>283 mg</td>
</tr>
<tr>
<td>Ginger root</td>
<td>50 mg</td>
</tr>
<tr>
<td>Chelated elemental zinc</td>
<td>15 mg</td>
</tr>
<tr>
<td>Maca</td>
<td>320 mg</td>
</tr>
<tr>
<td>HMRlignan™ Norway</td>
<td>33.4 mg</td>
</tr>
<tr>
<td>Spruce lignan extract</td>
<td></td>
</tr>
</tbody>
</table>

The retail price for a bottle of 120 capsules of Super MiraForte with Standardized Lignans is $62. If a member buys four bottles, the price is reduced to just $42 a bottle.

Caution: If you are taking any medication, use only under physician supervision. Men with existing prostate cancer may not be able to use this product. Elevations in free testosterone can unmask an occult (hidden) prostate cancer. Anyone with this concern should have a baseline PSA prior to using this product and a follow-up PSA test 60 days later. If a significant elevation of PSA is found, discontinue this product and advise physician. Do not take more than 15 mg per day of Bioperine®.

References

Bioperine® is a registered trademark of Sabinsa Corp.
HMRlignan™ is a trademark used under sublicense from Linnea SA.

Life Extension® is a registered trademark of Life Extension Products, Inc.

These statements have not been evaluated by the Food and Drug Administration. These products are not intended to diagnose, treat, cure, or prevent any disease.
Aging is accompanied by reduced levels of hormones required to sustain life.

As testosterone levels decline in men, their risk of dying markedly increases.\(^1\)\(^-\)\(^3\)

Heart disease,\(^4\)\(^-\)\(^8\) osteoporosis,\(^9\)\(^-\)\(^11\) and muscle wasting\(^12\)\(^-\)\(^14\) are strongly linked to testosterone deficiency, as are chronic inflammatory\(^15\)\(^,\)\(^16\) and neurodegenerative disorders.\(^17\)\(^,\)\(^18\) Most doctors are surprised to learn that men with low testosterone show an increased incidence of prostate cancer.\(^19\)\(^-\)\(^25\)

Long before life prematurely ends, testosterone deficit can manifest in the form of psychological disturbances such as depression,\(^26\)\(^-\)\(^29\) reduced sexual desire,\(^30\)\(^-\)\(^33\) and a loss of sense of well being.\(^29\)\(^,\)\(^34\)

We at Life Extension\(^\text{®}\) have long urged male members to have their testosterone blood levels tested. A pooled analysis of 7,619 free testosterone blood tests has uncovered an epidemic of testosterone deficits in male Life Extension members.

The encouraging news is that restoring testosterone to youthful ranges can easily be accomplished at minimal cost.
Table 1 on this page shows how much free testosterone levels decrease with age. Men aged 70 and higher have free testosterone blood levels of only 8.9 pg/mL (Table 1).

As I will explain next, even these disappointingly low numbers are still better than the average population. That’s because many Life Extension members take steps to maintain higher free testosterone levels.

### Shocking Percentages of Testosterone Deficiency

I have reviewed hundreds of testosterone blood tests and consistently observed less than optimal levels. When I saw the mean findings from free testosterone blood tests of Life Extension members, I was not totally surprised.

As Table 2 on this page reveals, only 4.2% of men had high optimal free testosterone levels. Another 9.6% of the men were in the mid-range of 15 to 22 pg/mL.

A startling 86% of the men had less than 15 pg/mL of free testosterone, placing them at high risk for virtually every age-related disease.

These findings, obtained from pooled blood test results of 7,619 men, provide an intriguing opportunity to rescue the collapsing health system this country faces. If men start paying as much attention to their testosterone blood levels as they do cholesterol, the incidence of degenerative disease will plummet!

### How Testosterone Protects Against Heart Attacks

Most people know that higher blood levels of HDL protect against atherosclerosis and subsequent heart attack. What few understand is the critical role that testosterone plays in enabling HDL to remove built-up cholesterol away from the arterial wall.

HDL removes cholesterol from the arterial wall and returns it to the liver for safe disposal via a process known as reverse cholesterol transport. Testosterone enhances HDL-induced reverse cholesterol transport from the arterial wall.37 That is one of testosterone’s unique and life saving anti-atherosclerotic effects.

### What are Optimal Free Testosterone Levels?

The number of men who suffer testosterone deficiency is so high that laboratory reference ranges accept ridiculously low levels as “normal.”

We at Life Extension suggest that men maintain their free testosterone in the range of 20 to 25 pg/mL of blood.35 Others with expertise in this area believe free testosterone as low as 15 pg/mL is adequate.36

Conventional blood labs, on the other hand, say aging men are alright with as little as 6.6 pg/mL of free testosterone in their blood—an absurdly low level!

Mainstream medicine’s ignorance regarding the need to maintain free testosterone in the higher ranges is a significant cause of premature disability and death in aging men.

(Note: Free testosterone is the biologically active form of this hormone measured in the blood. Total testosterone blood levels are not as reliable an indicator of an aging man’s testosterone status as free testosterone.)

### Life Extension Members Not Immune From Testosterone Deficit

Most people are in a state of denial as to how long nature intends us to live. A 30 to 40 year old man is often shocked when his blood test results uncover strikingly low free testosterone levels.

In our analysis of male members aged 40-49 years, the mean free testosterone blood level was only 12.4 pg/mL. Those aged 30-39 years did not fare that much better, with mean free testosterone levels of only 12.8 pg/mL.

---

**TABLE 1.**

<table>
<thead>
<tr>
<th>Age Groups</th>
<th>Free Testosterone (pg/mL)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
</tr>
<tr>
<td>30 to 39</td>
<td>12.84</td>
</tr>
<tr>
<td>40 to 49</td>
<td>12.42</td>
</tr>
<tr>
<td>50 to 59</td>
<td>11.38</td>
</tr>
<tr>
<td>60 to 69</td>
<td>10.71</td>
</tr>
<tr>
<td>70 Plus</td>
<td>8.89</td>
</tr>
<tr>
<td>All Groups</td>
<td>10.66</td>
</tr>
</tbody>
</table>

**TABLE 2.**

<table>
<thead>
<tr>
<th>Age Groups</th>
<th>&lt;15 pg/mL</th>
<th>15-22 pg/mL</th>
<th>&gt;22 pg/mL</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 to 39</td>
<td>2.3%</td>
<td>0.6%</td>
<td>0.2%</td>
<td>3.1%</td>
</tr>
<tr>
<td>40 to 49</td>
<td>8.9%</td>
<td>1.8%</td>
<td>0.6%</td>
<td>11.3%</td>
</tr>
<tr>
<td>50 to 59</td>
<td>22.0%</td>
<td>3.2%</td>
<td>1.1%</td>
<td>26.3%</td>
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<tr>
<td>60 to 69</td>
<td>28.5%</td>
<td>2.9%</td>
<td>1.5%</td>
<td>32.9%</td>
</tr>
<tr>
<td>70 Plus</td>
<td>24.5%</td>
<td>1.1%</td>
<td>0.8%</td>
<td>26.4%</td>
</tr>
<tr>
<td>All Groups</td>
<td>86.3%</td>
<td>9.6%</td>
<td>4.2%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>
Under optimal circumstances, HDL efficiently removes cholesterol from arterial walls and then transports it (via reverse cholesterol transport) to the liver for elimination (mostly through the bile duct into the intestines). When there is a deficiency of testosterone, HDL is less efficient in removing debris from the arterial wall and the liver is less efficient in breaking down cholesterol-laden HDL from the bloodstream.

Armed with this knowledge, you can now see past the charade perpetrated by the medical establishment that still questions the value of testosterone supplementation.

Numerous well-controlled human studies show that higher testosterone levels play a critical role in maintaining healthy blood flow throughout the body by accelerating reverse cholesterol transport—thereby helping to prevent atherosclerosis.44,45

Low Testosterone Sharply Increases Coronary Artery Disease Risk

The relationship between low testosterone and increased coronary artery disease incidence has been the featured topic of several covers of *Life Extension Magazine*® over the past two decades.

One study evaluated men under age 45 who presented with coronary artery disease compared with an age-matched control group. The findings revealed that even moderately reduced free testosterone blood levels (below 17.3 pg/mL of blood) in these younger men resulted in a 3.3-fold greater risk of developing premature coronary artery disease compared with men who had values above 17.3 pg/mL.46
low HDL blood test readings in the danger zone (less than 40-50 mg/dL). Is it any wonder that despite aggressive use of statin drugs and other advances in cardiac medicine, heart attack and stroke are still today’s leading killers?

Fear of prostate cancer is the leading reason why aging men have shied away from restoring their free testosterone to youthful ranges. To dispel this concern, Life Extension long ago analyzed every published study and found there is no basis for asserting that testosterone causes prostate cancer.

Our observations from the thousands of blood tests we perform each year for members confirm this. What we found is that men with low testosterone appear to be more likely to contract prostate cancer.

In the landmark book, Testosterone for Life (McGraw-Hill, 2008), Harvard professor Abraham Morgentaler thoroughly discredited the notion that testosterone causes prostate cancer.

What came as a bombshell to the medical establishment was the compilation by Dr. Morgentaler of scientific facts showing that men with low testosterone levels have an increased percentage of prostate cancer-positive biopsies.

To further help dispel the myth that higher testosterone levels increase PSA levels (and presumably prostate cancer risk), the two charts on the next page compiled from our blood test analysis clearly show that as free testosterone levels decline in aging men, their PSA levels sharply increase.
Low-cost and Convenient Blood Testing

The high prices that commercial labs charge for comprehensive blood testing precludes most people from having them done.

Life Extension breaks down these price barriers by offering complete Male or Female Blood Test Panels at the lowest prices anywhere. Once a year, we discount the popular Male and Female Blood Test Panels down to only $199—about 80% less than what commercial labs charge. The next page describes the many tests included in these Male and Female Panels.

Instead of having to make a doctor’s appointment, we send you a requisition form and list of drawing stations in your area where you can go at your convenience.

The Blood Test Super Sale ends June 7, 2010, so please order your requisition kit soon to take advantage of these extra discounted prices. You can have your blood drawn anytime after receiving your requisition kit.

The results of your blood tests are mailed directly to you. If you have any questions, you are welcome to call our health advisor helpline.

Annual blood testing is the single most effective method of detecting abnormalities that can be corrected before they lead to serious illness or death. A call to 1-800-208-3444 is all you have to do to order these comprehensive tests at extra discounted prices.

For longer life,

William Faloon
References


(References continue on following page.)
MALE AND FEMALE BLOOD TEST PANELS

Unlike commercial blood tests that evaluate only a narrow range of risk factors, Life Extension’s **Male and Female Blood Test Panels** measure a wide range of blood markers that predispose people to common age-related diseases. Just look at the huge numbers of parameters included in the **Male and Female Blood Test Panels**:

<table>
<thead>
<tr>
<th>MALE PANEL</th>
<th>FEMALE PANEL</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LIPID PROFILE</strong></td>
<td><strong>LIPID PROFILE</strong></td>
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<tr>
<td>Total Cholesterol</td>
<td>Total Cholesterol</td>
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<tr>
<td>LDL (low-density lipoprotein) calculated</td>
<td>LDL (low-density lipoprotein) calculated</td>
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<td>HDL (high-density lipoprotein)</td>
<td>HDL (high-density lipoprotein)</td>
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<tr>
<td>Triglycerides</td>
<td>Triglycerides</td>
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<tr>
<td><strong>CARDIAC MARKERS</strong></td>
<td><strong>CARDIAC MARKERS</strong></td>
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<tr>
<td>C-Reactive Protein (high sensitivity)</td>
<td>C-Reactive Protein (high sensitivity)</td>
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<td>Homocysteine</td>
<td>Homocysteine</td>
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<tr>
<td><strong>HORMONES</strong></td>
<td><strong>HORMONES</strong></td>
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<tr>
<td>DHEA-S</td>
<td>Progesterone</td>
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<tr>
<td>Free Testosterone</td>
<td>DHEA-S</td>
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<tr>
<td>Total Testosterone</td>
<td>Free and Total Testosterone</td>
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<tr>
<td>Estradiol (an estrogen)</td>
<td>Estradiol (an estrogen)</td>
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<td>*TSH (thyroid function)</td>
<td>*TSH (thyroid function)</td>
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<tr>
<td><strong>METABOLIC PROFILE</strong></td>
<td><strong>METABOLIC PROFILE</strong></td>
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<td>Glucose</td>
<td>Glucose</td>
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<tr>
<td>Kidney function tests: creatinine, BUN, uric acid, BUN/creatinine ratio</td>
<td>Kidney function tests: creatinine, BUN, uric acid, BUN/creatinine ratio</td>
</tr>
<tr>
<td>Liver function tests: AST, ALT, LDH, GGT, bilirubin, alkaline phosphatase</td>
<td>Liver function tests: AST, ALT, LDH, GGT, bilirubin, alkaline phosphatase</td>
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<tr>
<td>Blood minerals: calcium, potassium, phosphorus, sodium, chloride, iron</td>
<td>Blood minerals: calcium, potassium, phosphorus, sodium, chloride, iron</td>
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<tr>
<td>Blood proteins: albumin, globulin, total protein, albumin/globulin ratio</td>
<td>Blood proteins: albumin, globulin, total protein, albumin/globulin ratio</td>
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<tr>
<td><strong>COMPLETE BLOOD COUNT (CBC)</strong></td>
<td><strong>COMPLETE BLOOD COUNT (CBC)</strong></td>
</tr>
<tr>
<td>Red Blood Cell count including: hemoglobin, hematocrit, MCV, MCH, MCHC, RDW</td>
<td>Red Blood Cell count including: hemoglobin, hematocrit, MCV, MCH, MCHC, RDW</td>
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<tr>
<td>White Blood Cell count including: lymphocytes, monocytes, eosinophils, neutrophils, basophils</td>
<td>White Blood Cell count including: lymphocytes, monocytes, eosinophils, neutrophils, basophils</td>
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<tr>
<td>Platelet count</td>
<td>Platelet count</td>
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<tr>
<td><strong>CANCER MARKER</strong></td>
<td><strong>CANCER MARKER</strong></td>
</tr>
<tr>
<td>PSA (Prostate Specific Antigen)</td>
<td>PSA (Prostate Specific Antigen)</td>
</tr>
</tbody>
</table>

Non-member retail price: $400 • Everyday member price: $269

**Blood Test Super Sale member price: $199** • Enjoy these savings until June 7, 2010

To obtain these comprehensive **Male** or **Female** Panels at these **low prices**, call **1-800-208-3444 to order your requisition forms**.

Then—at your convenience—you can visit one of the blood-drawing facilities provided by LabCorp in your area.

*If you plan to use the results of these blood tests to assist in a medically supervised weight loss program, consider adding the Thyroid add-on panel for $36.

A TSH (thyroid stimulating hormone) test is now included in the comprehensive Male and Female Panels, but those with weight problems should know their precise levels of free T3 and free T4.
More studies have been published over the past four years supporting the health benefits of vitamin D than possibly any other compound. The good news for consumers is that vitamin D is a very low cost supplement. The objective of taking a vitamin D supplement is to achieve 25-hydroxyvitamin D blood levels of 50 ng/mL (and higher).

Life Extension’s® exclusive analysis of over 13,000 vitamin D blood tests reveals that the minimum intake for most aging people should be around 7,000 IU a day. Some individuals need 10,000 IU of vitamin D daily.

You can choose the right dose of vitamin D3 for you from the large selection of vitamin D3 supplements below. Remember to factor in that you may be getting 1,000-3,000 IU of vitamin D in multi-nutrient formulas you already take.

- **Vitamin D3 1,000 IU • 250 capsules**
  - Retail: $12.50
  - Four bottle Member Price: $8.44
  Commercial companies offered only 400 IU vitamin D products when Life Extension long ago introduced this 1,000 IU version. For most people, this 1000 IU potency is insufficient to attain optimal vitamin D blood levels. For smaller individuals who obtain 2,000-3,000 IU in their multi-nutrient formulas (and children), this potency of vitamin D may be suitable. Item# 00251
  Contains soybeans, corn, and rice.

- **Vitamin D3 1,000 IU with Sea-Iodine* 250 vegetarian capsules**
  - Retail: $22
  - Four bottle Member Price: $15
  Most people do not ingest enough vitamin D and iodine, especially those seeking to reduce their salt intake. Combining vitamin D3 and iodine into one capsule makes taking these two nutrients economical and convenient. Item# 01371
  Due to the source of the kelp, this product may contain fish and shellfish. Contains rice and corn.

- **Vitamin D3 5,000 IU • 60 capsules**
  - Retail: $11
  - Four bottle Member Price: $7.43
  For those obtaining 1,000-3,000 IU of vitamin D in their multi-nutrient formulas, this 5,000 IU potency is what most need to achieve optimal vitamin D blood levels. Item# 00713
  Contains rice.

- **Vitamin D3 5,000 IU with Sea-Iodine* 60 vegetarian capsules**
  - Retail: $14
  - Four bottle Member Price: $9.38
  Most people do not ingest enough vitamin D and iodine, especially those seeking to reduce their salt intake. Combining 5,000 IU of vitamin D3 and 1,000 mcg of iodine into one capsule makes taking these two nutrients economical and convenient. Item# 01372
  Due to the source of the kelp, this product may contain fish and shellfish. Contains rice and corn.

- **Vitamin D3 7,000 IU • 60 capsules**
  - Retail: $14
  - Four bottle Member Price: $9.45
  Some individuals (such as those weighing more than 180 pounds) may require higher potencies of vitamin D. When combined with 1,000-3,000 IU obtained from multi-nutrient formulas, this 7,000 IU vitamin D3 capsule should enable these individuals to attain 25-hydroxyvitamin D blood levels above the desired range of 50 ng/mL. Item# 01418
  Contains corn and rice.

- **Vitamin D3 Liquid Emulsion 2,000 IU • 1 ounce**
  - Retail: $28
  - Four bottle Member Price: $18.75
  For those rare individuals who have difficulty absorbing enough vitamin D3 from powdered capsules, this liquid emulsion of vitamin D can be used. Item# 0064
  Due to the source of the kelp, this product may contain fish and shellfish. Contains rice and corn.

To order any of these high-potency vitamin D3 supplements, call 1-800-544-4440 or visit www.LifeExtension.com
Scientists are realizing that skin needs to be protected against external factors such as sunlight, and also against internal damage caused by emotional stress. This is because our emotions, particularly stressful ones, release a wave of stress hormones such as cortisol that prematurely age the skin.

Fortunately, emerging research suggests that a natural herb called ashwagandha can protect and enhance psychological health as seen in a recent human trial. In this study, just 125 mg of a patented ashwagandha extract once a day led to a 14.5% reduction in cortisol levels in 98 chronically stressed individuals. This dose also resulted in a 13.2% increase in levels of the anti-aging hormone DHEA, which helps maintain the youthfulness of skin cells. Overall, the ashwagandha-treated subjects experienced up to 62% reduction in anxiety levels compared with virtually no change in the placebo group.

The impressive results from this trial have led to the incorporation of ashwagandha into a new skin-protection formula called Enhanced FernBlock® with Sendara™. As the name suggests, this formula also contains FernBlock®, the revolutionary oral supplement introduced by Life Extension® in July 2008 that acts as an internal sunscreen against damaging solar radiation.

FernBlock® is a natural extract derived from the fern plant Polypodium leucotomos. Extensive clinical studies document its ability to provide remarkable skin protection by inhibiting the absorption of harmful ultraviolet (UV) rays and quenching DNA-corrupting free radicals. FernBlock® also diminishes the consequences of excessive UV radiation by favorably altering a number of changes in skin cells that cause premature skin aging.

Enhanced FernBlock® with Sendara™ is complemented with a powerful antioxidant called Phyllanthus emblica. This natural extract blocks a chemical reaction that generates several types of skin-damaging free radicals, thus shielding the skin against the destruction of collagen and other dermal matrix proteins. An in vitro study using a patented extract of both ashwagandha and Phyllanthus emblica demonstrated an impressive 54% inhibition of collagen-degrading enzymes and an 86% inhibition of those that break down hyaluronic acid—the skin’s natural moisturizer.

The unique combination of natural ingredients in Enhanced FernBlock® with Sendara™ has been scientifically proven to help skin look and feel good from the inside out. This formula is designed to complement topical sunscreens for complete skin protection.

A bottle containing 30 vegetarian capsules of Enhanced FernBlock® with Sendara™ retails for $39. If a member buys four bottles, the cost is only $26.25 per bottle.

Contains corn and rice.

References

Patent Pending Sendara™ is a trademark of NutraGenesis LLC. FernBlock® is a registered trademark of Industrial Farmaceutica Cantabria, S.A.
Scientists have identified specific extracts from cruciferous vegetables—such as broccoli, cauliflower, cabbage and Brussels sprouts—that help maintain healthy hormone levels. Maintaining optimal hormone balance is essential to any anti-aging strategy. Triple Action Cruciferous Vegetable Extract combines these plant extracts into the most comprehensive food-based, plant compilation for cell protection yet.

\[
\text{I3C (indole-3-carbinol) and DIM (di-indolyl-methane) favorably modulate estrogen metabolism and induce liver detoxification enzymes to help neutralize potentially harmful estrogen metabolites and xenoestrogens (potentially toxic, estrogen-like environmental chemicals).}^{1-4}
\]

Extracts of broccoli, watercress, and rosemary provide glucosinolates, isothiocyanates, carnosic acid, and carnosol—bioactive compounds that have a multitude of favorable effects on estrogen metabolism and cell division.\(^5\)\(^8\) Apigenin, a powerful plant flavonoid found in plants such as parsley and celery, is also added to the formula to boost cell protection,\(^9\) while 25 mg of a natural source of benzyl isothiocyanate (BITC), are included to maintain cell health.\(^10\)

For those weighing less than 160 pounds, just one capsule a day provides optimal potencies. Those weighing over 160 pounds should consider taking two capsules a day. A 60-capsule bottle of Triple Action Cruciferous Vegetable Extract retails for $24. If a member buys four bottles, the price is reduced to only $16.50 per bottle.

Those who want to obtain the benefits of resveratrol can order Triple Action Cruciferous Vegetable Extract with Resveratrol. Each capsule provides 20 mg of resveratrol in addition to the vegetable extracts and retails for $32 per 60-capsule bottle. When a member buys four bottles, the price is reduced to only $22.20 per bottle.

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10. \(\text{Food Chem Toxicol. } 2008 \text{ Jul;46(7):2358-64.}\)

**TRIPLE ACTION CRUCIFEROUS VEGETABLE EXTRACT with Apigenin**

To order Triple Action Cruciferous Vegetable Extract, call 1-800-544-4440 or visit www.LifeExtension.com

Contains yeast and corn.

These statements have not been evaluated by the Food and Drug Administration. These products are not intended to diagnose, treat, cure, or prevent any disease.
Diminished levels of neurotransmitters and other brain compounds profoundly affect cognition and memory in aging adults. Cognitex was developed in 1982 to increase brain levels of acetylcholine — a neurotransmitter that enables neurons to communicate. Over the years, Cognitex has been improved with the addition of nutrients used in Europe to protect and enhance neurological function.

Cognitex with Pregnenolone & NeuroProtection Complex provides the following scientifically validated nutrients to provide broad-spectrum neurological support:

- **Uridine-5’-monophosphate (UMP)** is a phosphatide building block of RNA-DNA that is critical to optimal brain function and the health of neuronal cell membranes. Naturally found in the milk of nursing mothers, UMP is essential not only for the growth and development of infant brains, but also for healthy cognitive function in aging adults.

- **Sharp-PS® GOLD**, a rich phosphatidylserine compound bound to DHA, promotes already-normal neuronal cell membrane function and structure.

- **Alpha-glyceryl phosphoryl choline (A-GPC)** boosts acetylcholine, a critical neurotransmitter that declines with age.

- **Vinpocetine** enhances circulation and oxygenation to brain cells, improves neural electrical conductivity, and protects against neuron-destroying excitotoxicity.

- **Phospholipid-grape seed extract** bound together results in a compound that is better absorbed into the bloodstream where it improves blood vessel tone and elasticity, thus enhancing blood circulation and oxygen flow to the brain.

- **Wild blueberry extract** protects against free-radical damage in the brain and helps maintain fluid balances already within the normal range.

- **Sensoril® ashwagandha extract** helps alleviate mental fatigue by inhibiting an enzyme (acetylcholinesterase) that degrades acetylcholine in the aging brain.

- **Proprietary NeuroProtection Complex Blend** contains standardized extracts of hops, ginger, and rosemary — proven to help with inflammation.

Pregnenolone is a hormone that may be especially beneficial to the brain.

The retail price for 90 softgels of Cognitex (with or without pregnenolone) is $74 (item #00922) and $72 (item #00921), respectively. If a member orders four bottles of either version, the price per bottle is reduced to just $49.95 and $48, respectively.

**Caution:** Cognitex is also available without pregnenolone for those with existing steroid hormone-sensitive cancer. Perluxan® is used with permission. Sensoril® is protected under US Patents Nos. 6,153,198 and 6,713,092, and is a registered trademark of Natreon, Inc. Sharp-PS® GOLD is a registered trademark of Enzymotec Ltd.

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

Contains fish (wild herring, blue whiting), soybeans, and rice.

These statements have not been evaluated by the Food and Drug Administration. These products are not intended to diagnose, treat, cure, or prevent any disease.
IN THE NEWS

Green Tea Could Help Combat Diseases of the Eye

Green tea catechins are able to penetrate eye tissue, which may help protect against glaucoma and other eye diseases, according to Hong Kong researchers.

Chi Pui Pang of the Chinese University of Hong Kong and colleagues orally administered a green tea extract to rats and measured catechin and 8-epi-isoprostane (a marker of oxidative stress) levels in the animals’ eye tissues at varying time points up to 20 hours later. The team found varying distribution of catechins throughout the animals’ cornea, lens, retina, choroid-sclera, vitreous humor, and aqueous humor. A significant reduction in 8-epi-isoprostane rapidly followed green tea administration and was well maintained in all tissue and fluid examined with the exception of the choroid-sclera, demonstrating the antioxidant activity of catechins absorbed by these areas.*

“Our results indicate that green tea consumption could benefit the eye against oxidative stress,” the authors conclude.

—Dayna Dye


Editor’s note: Delivery of orally consumed nutrients to the eye can be less than optimal. This study reassures those who consume green tea and green tea supplements that tea catechins do penetrate eye tissue to exert their antioxidant benefits.

Eating More Chocolate Associated with Fewer Cardiovascular Events

An article published in the European Heart Journal reveals more good news for chocolate lovers: consuming as little as a square of chocolate per day could help reduce the risk of hypertension and heart disease.*

Dr. Brian Buïjsee of the German Institute of Human Nutrition and his colleagues analyzed data from 19,357 participants in the Potsdam arm of the European Prospective Investigation into Cancer, which enrolled 27,548 middle aged men and women between 1994 and 1998. Subjects were followed for an average of 8 years.

Participants whose chocolate intake was among the highest 25% at an average of 7.5 grams per day had lower blood pressure and a 39% lower risk of experiencing heart attack or stroke compared to subjects whose intake was lowest at 1.7 grams per day.

The researchers attribute the benefits observed in this study to chocolate’s flavanol content.  

—Dayna Dye


Editor’s note: Life Extension members obtain concentrated cocoa polyphenols (from dark chocolate) in many of the supplements they take.
**IN THE NEWS**

**Multinutrient Supplementation Reduces Body Fat and Lipids in Obese Women**

An article published in the *International Journal of Obesity* reports a positive effect on fat loss and lipid lowering in obese women who consumed a daily multinutrient supplement.*

C. H. Sun and associates at Harbin Medical University randomized 96 women to receive a daily placebo, a calcium tablet, or a multivitamin and mineral supplement. After 26 weeks, women who received the multinutrient supplement had significantly lower body weight, body mass index, fat mass, respiratory quotient, and total and LDL cholesterol; and higher resting energy expenditure and HDL levels compared with placebo and baseline levels. Participants who received calcium alone had lower LDL and higher HDL levels than the placebo group at the trial’s conclusion.

“The findings of this study support the notion that besides calcium, obese individuals need other vitamins and minerals for balancing energy metabolism, controlling body weight and for improving lipid profiles,” the authors note.

—Dayna Dye


**DHA Destroys Neuroblastoma Cells**

A recent issue of the *FASEB Journal* reports the discovery of scientists at the Karolinska Institute of the ability of docosahexaenoic acid, or DHA, to kill neuroblastoma cells in vitro.*

Helena Gleissman, PhD and her colleagues tested the effect of DHA on cultured neuroblastoma cells and analyzed them for DHA’s metabolic byproducts. They found that while DHA itself destroyed the cancer cells, the fatty acid’s derivatives were even more effective at killing these cells.

The current study and previous research show that while DHA has been demonstrated to help protect neural cells from stress-induced apoptosis (programmed cell death), it also induces apoptosis in neuroblastoma cells. “We hope that this study can provide a deeper understanding of the actions of omega-3 fatty acids and their products in cancer cells, and why they can be of such high importance in treatment of the disease,” Dr. Gleissman commented.

—Dayna Dye

* *FASEB J.* 2010 Mar;24(3):906-15.

**Soluble Fiber Improves Immune Function**

An article in *Brain, Behavior, and Immunity* reports the finding of researchers at the University of Illinois that soluble fiber reduces inflammation and strengthens immune function.*

Gregory Freund and colleagues gave mice low fat diets containing insoluble fiber or soluble fiber from citrus pectin for 6 weeks, after which the animals received an injection of lipopolysaccharide, which elicits the effects of bacterial infection. “Two hours after lipopolysaccharide injection, the mice fed soluble fiber were only half as sick as the other group, and they recovered 50% sooner,” coauthor Christina Sherry reported. “And the differences between the groups continued to be pronounced all the way out to 24 hours. In only six weeks, these animals had profound, positive changes in their immune systems.”

“Soluble fiber changes the personality of immune cells—they go from being pro-inflammatory, angry cells to anti-inflammatory, healing cells that help us recover faster from infection,” Dr. Freund stated.

—Dayna Dye

* *Brain, Behav, Immun.* 2010 May.

**Editor’s Note:** Soluble fiber can be obtained by consuming oats, apples, barley, nuts, seeds, citrus fruits, strawberries, lentils, and carrots, or by using powdered supplements.
**Diets High in Fat Increase Risk of Macular Degeneration**

Decreased consumption of fat in one’s diet may help protect against the development of age-related macular degeneration (AMD), according to results of the Carotenoids in Age-Related Eye Disease Study.

For their research, the investigators followed nearly 2,000 women aged 50 to 79 as part of the larger Women’s Health Initiative Observational Study. Via the use of questionnaires and retinal photography, they concluded that women who consumed the highest levels of dietary polyunsaturated fats were approximately twice as likely to have AMD when compared to those who consumed the least. However, monounsaturated fatty acids were associated with a lower risk of AMD.*

“This research adds to the large body of evidence from other studies to suggest that high fat intake is associated with having AMD, but extends the evidence to include earlier stages of AMD,” researcher Niyati Parekh, PhD of New York University, told *Life Extension.*

Dr. Parekh further explained that despite their findings, they do not suggest distinguishing between different types of fat, as other factors may be involved. “The total level of fat intake was associated with higher odds for AMD, without distinction about ‘type’ of fat,” said Dr. Parekh. “In this sample, monounsaturated fats came largely from meat and milk rather than added fat. Therefore, we speculate that vitamins and minerals which accompanied these fats in food may explain lower risk for AMD in some women.”

—Marc Ellman, MD


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**Soy Protective Against Lung Cancer**

Soy consumption may help prevent lung cancer, based on findings of a large prospective study performed in Japan. For their study, researchers followed more than 75,000 men and women over an average of 11 years and found that those who consumed the highest quantities of isoflavones, which are obtained primarily from soy products, had the lowest chance of developing lung cancer during the study period.*

Interestingly, the researchers found that the association between increased soy and decreased lung cancer held true only for men who never smoked, but not in current or previous smokers. The findings were similar in women, although less significant. They measured soy consumption via a questionnaire inquiring about soy-rich products including miso soup, soymilk, fermented soybeans, and various forms of tofu. They admit that not specifically inquiring about isoflavone supplement use was a limitation of their study.

—Marc Ellman, MD


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**Vitamin C May Protect Against Glaucoma**

Vitamin C may be protective against normal-tension glaucoma, according to a Japanese study. Normal-tension glaucoma is a form of glaucoma where optic nerve damage continues despite relatively low intraocular pressures (as opposed to traditional glaucoma where the intraocular pressure is elevated). The researchers hypothesized that vitamin C may play a role in glaucoma due to its antioxidant properties and the fact that its concentration is 15 times higher in the aqueous fluid of the eye than it is in the blood.

For their study, the researchers at the glaucoma subspecialty clinic of Keio University Hospital measured blood levels of vitamins A, folic acid, C, E, and uric acid in 47 patients with newly-diagnosed normal-tension glaucoma. They found that vitamin C levels were significantly lower in normal-tension glaucoma patients than in healthy controls without glaucoma (4.6 μg/mL vs. 6.3 μg/mL). They also found that uric acid levels were higher in the glaucoma patients. The researchers did not find a statistical difference in levels of vitamins A, folic acid, or E.*

Based on their findings, the researchers suggest further study in alternative treatments for glaucoma. “Vitamin C supplementation may be an alternative therapy for normal-tension glaucoma,” lead researcher Kenya Yuki, MD, told *Life Extension.*

—Marc Ellman, MD

High Omega-3 Levels May Decrease Disease Risk

Very high intake of the omega-3 fatty acids EPA and DHA may decrease the risk of numerous chronic diseases, according to a study published in the American Journal of Clinical Nutrition.*

Scientists examined red blood cell (RBC) levels of EPA and DHA as a percentage of total fatty acids in relation to chronic disease risk markers in 357 Yup’ik Eskimos. EPA and DHA comprised an average of 2.8% and 6.8%, respectively, of total fatty acid content of RBCs in this group.

High RBC levels of EPA and DHA were associated with lower levels of triglycerides and C-reactive protein (CRP) and higher levels of high-density lipoprotein (HDL), signaling reduced risk of inflammation, heart disease, and type 2 diabetes.

The authors concluded that increasing omega-3 intake to levels much higher than those consumed by the general public may have profoundly beneficial effects on chronic disease risk.

—Elizabeth Wagner, ND


Editor’s Note: The Omega Score™ test available through Life Extension can help individuals monitor and maintain optimal blood levels of omega-3 fatty acids.

Vitamin C Inhibits New Blood Vessel Growth to Tumors

High levels of vitamin C in the blood may help fight cancer by preventing angiogenesis, the growth of new blood vessels necessary to feed growing tumors, according to a recent report.¹

Fighting angiogenesis is a target of cancer therapy. Unfortunately, many existing angiogenesis inhibitors have toxic side effects, prompting scientists to seek safer, natural alternatives.

Scientists analyzed the effects of high levels of vitamin C on angiogenesis in two assays: an ex vivo study using rat tissues and an in vivo study in mice. Both studies showed that high levels of vitamin C, obtainable through intravenous infusion, inhibited new blood vessel growth.

In the in vivo assay, vitamin C-treated tissue showed 30% less blood vessel growth than untreated tissue.¹

These findings complement previous research showing that high levels of vitamin C are selectively toxic to tumors in living animals.²

—Elizabeth Wagner, ND


Selenium May Decrease Diabetes Risk

Researchers at the University of Montpellier I recently conducted a study to determine whether increased blood levels of selenium may decrease a man’s risk of abnormal blood sugar metabolism, and possibly protect against diabetes.*

The study, led by Tasnime Akbaraly, followed 1,162 healthy French men and women for nine years. Over that time, they documented 70 new cases of dysglycemia in men and 57 cases in women. When the study began, the average selenium blood level for men was 1.08 micromoles per liter and 1.1 for women. Men with the highest selenium levels were 50% less likely to develop dysglycemia than men with the lowest average levels.

“The reason we observed a protective effect of selenium in men but not in women is not completely clear, but might be attributed to women being healthier at baseline, having better antioxidant status in general and possible differences in how men and women process selenium,” Akbaraly said.

—Jon Finkel

In his latest book, Sergey Dzugan, MD, PhD uncovers the failure of mainstream doctors to properly test and evaluate their patient's blood—and the horrendous consequence of needless diseases the aging population suffers as a result.

Dr. Dzugan was recently awarded the honorary title of Academician for Outstanding Achievement in Science by the International Academy of Creative Endeavors. Academician is the highest ranking a doctor can achieve in many countries. 

Your Blood Doesn’t Lie! is a tour de force of exciting scientific principles designed to “unlock your body’s natural healing ability.” In the words of Dr. George Rozakis, “this book is the first of its kind because it unifies the philosophy of what is loosely called antiaging medicine, alternative medicine, holistic medicine, and bioidentical hormone medicine. It unifies these fields under one principle, which we call the Dzugan Principle.”

The Dzugan principle is present throughout every chapter in the book. Its essence is that many of the health issues people face spring from errors of hormones and body chemistry. By reversing these errors through altering body chemistry, changing diet habits, ingesting the proper supplements, and many other strategies, physical optimization can be achieved.

The book is divided into two parts. Part one is titled “A Revolutionary Approach to Medicine and Healing.” This first half of the book is dedicated to explaining restorative medicine and why the current medical model for treating patients is inadequate. In addition, part one goes over the important weapons in the fight to maintain optimal health, including extraordinarily valuable information on bioidentical hormones and nutrients.

Part two focuses the Dzugan Principle on specific diseases and medical conditions. With stunning clarity, Dzugan writes about his strategy to combat cardiovascular disease, cholesterol, menopause, infertility, erectile dysfunction, migraines, arthritis, fibromyalgia, lupus, macular degeneration, psychological disorders, and even alcoholism, insomnia, and chronic stomach problems.

Between the covers of this book, you not only learn why the public is ill-advised about certain diseases, but why mainstream medicine continues to “put out health fires” rather than prevent them in the first place. Your Blood Doesn’t Lie! provides valuable information on preventing some of the major health scourges of modern society.

The cover price of Your Blood Doesn’t Lie! is $24.95. Member price is $17.47.
Since it was first isolated nearly 80 years ago, vitamin C has been deemed essential for life and for maintaining optimal health and well-being. Its potent antioxidant properties and critical role in facilitating essential biochemical reactions throughout the body have made vitamin C the world’s most widely consumed nutritional supplement.

Because humans do not manufacture vitamin C internally, it must be obtained through dietary sources or supplements. Few people realize, however, that vitamin C is a water-soluble nutrient that is quickly oxidized and excreted by the body, which limits its efficacy. Until now, those seeking to capture vitamin C’s optimal health benefits have had no choice but to consume it several times throughout the day.

Fortunately, a flavonoid antioxidant known as dihydroquercetin functions as a vitamin C “supercharger.” Studies demonstrate that dihydroquercetin acts to inhibit the oxidation of vitamin C, thereby helping to maintain its concentration and to recycle vitamin C throughout the body. This synergistic relationship between dihydroquercetin and vitamin C greatly enhances the efficacy of both molecules in the body’s organs and tissues.

Vitamin C with Dihydroquercetin was formulated for those seeking to obtain optimal efficacy and antioxidant protection from their vitamin C supplement. The suggested daily dose of one tablet of this formula supplies 1,000 mg of vitamin C (as ascorbic acid), along with 10 mg of Dihydroquercetin-3-rhamnoside, a highly bioavailable form of dihydroquercetin derived from grape leaf extract.

A bottle containing 250 tablets of Vitamin C with Dihydroquercetin retails for $25.50. If a member buys four bottles, the price is reduced to just $17.44 per bottle. Contains corn.

References:

To order VITAMIN C with Dihydroquercetin, call 1-800-544-4440 or visit www.LifeExtension.com
Life Extension® was the first to introduce coenzyme Q10 to the United States way back in 1983. Since then, we have consistently introduced more potent and better absorbable forms of this critical nutrient.

Super Ubiquinol CoQ10 with Enhanced Mitochondrial Support™ contains an organic compound called PrimaVie® shilajit that research shows doubles levels of CoQ10 in the mitochondria.1

Shilajit has been shown to help restore and sustain cellular energy. The latest studies reveal that when shilajit is combined with CoQ10, cellular energy gains substantially increase.

In a breakthrough preliminary study, the combination of CoQ10 and shilajit produced a 56% increase in cellular energy production in the brain—40% better than CoQ10 alone. In muscle there was a 144% increase, or 27% better than CoQ10 alone.2

Researchers have found that shilajit works to boost CoQ10’s beneficial effects by:

1. Stabilizing CoQ10 in its superior ubiquinol form, thereby prolonging its action at the cellular level.3,4

2. Facilitating more efficient delivery of CoQ10 into the mitochondria, resulting in greater cellular energy output.5-9

Scientific analysis shows that shilajit itself is rich in essential compounds that promote mitochondrial metabolism. Part of shilajit’s beneficial effects derives from its ability to help the mitochondria convert fats and sugars into adenosine triphosphate, or ATP—the body’s main source of energy.5-9

Super Ubiquinol CoQ10 with Enhanced Mitochondrial Support™

Combining ubiquinol CoQ10 with shilajit generates a powerful synergy that supports more youthful cellular energy production than CoQ10 alone.2,4,5

The retail price for 60 100-mg softgels of Super Ubiquinol CoQ10 with Enhanced Mitochondrial Support™ is $62. If a member buys four bottles, the price is reduced to $42 per bottle. Item #01426

The retail price for 100 50-mg softgels of Super Ubiquinol CoQ10 with Enhanced Mitochondrial Support™ is $58. If a member buys four bottles, the price is reduced to $39.75 per bottle. Item #01425

To order Super Ubiquinol CoQ10 with Enhanced Mitochondrial Support™ call 1-800-544-4440 or visit www.LifeExtension.com

References:

These statements have not been evaluated by the Food and Drug Administration. These products are not intended to diagnose, treat, cure, or prevent any disease.
A New Way to Manage MENOPAUSE
Regain Hormonal Balance with a Cutting-edge Adaptogen
According to recent research, conventional medicine largely fails the estimated 60% of American women aged 40-65 who seek relief from menopausal symptoms each year.¹

The problem lies in an unconscionable lack of safe, effective options. Many women will no longer submit to standard hormone replacement therapy and risk the dangers of synthetic and horse-derived hormone drugs like Premarin® and Prempro®,. Doctors persist in prescribing these drugs even after the Women’s Health Initiative exposed their deadly side effects in 2002 and 2004.²,⁴

Many aging women are challenged with the safer option of bioidentical hormone therapy thanks to FDA-induced inflated prices, medical bias, and obstructionist government practices.

Fortunately, there remains a small but significant community of scientists committed to finding natural methods for optimal menopause management.

In a little-known advance, researchers recently uncovered a novel method to control the rapid hormonal fluctuations at the heart of menopausal suffering. They have documented potent anti-menopausal effects in a novel extract of maca root (Lepidium meyenii, also known as Lepidium peruvianum), a clinically proven adaptogen native to South America.⁵

In this article, the results of their findings are detailed. Using a highly refined, standardized form of maca, up to 87% of women reported positive improvements in relief of menopausal symptoms, including hot flashes, fatigue, night sweats, and mood swings.⁶

Additional research has documented maca’s ability to improve sexual desire and fertility and reduce menopause-induced stress and weight gain, along with beneficial effects on lipid levels and bone density.⁶,¹¹

Here you will discover how maca operates differently than other therapeutic regimens, in part by promoting optimal function of the hypothalamic-pituitary-adrenal (HPA) axis.¹²,¹³ This complex set of structures originating within the brain governs the endocrine (hormone) system, exerting favorable effects not only on aging ovaries, but on the thyroid and adrenal glands as well, to support improved hormonal balance, greater energy, and vitality in women going through menopause. The result is a cutting-edge, multimodal approach that may revolutionize menopause management in the future. > >
MACA: A NEW WAY TO MANAGE MENOPAUSE

A Scientifically Validated, Natural Alternative

Cultivated exclusively above 12,000 feet in the remote central highlands of the Andes, maca (*Lepidium meyenii*, also known as *L. peruvianum*) is a cruciferous plant whose fleshy bulb has been used since the pre-Columbian era as a fertility enhancer and aphrodisiac for both sexes. It is prized in traditional Peruvian medicine as an adaptogen with particular utility in easing the physical and emotional stresses of menopause. Modern-day scientific methods, as applied first in high-tech laboratories in Peru and now around the world, have revealed compelling biochemical features of the maca bulb that bear out its traditional therapeutic applications.

Containing over 53 distinct components, maca extracts have been found to have a multiplicity of biological activities in non-animal lab tests, including antimicrobial and pesticidal effects. Maca extracts also have mild antioxidant capabilities, and offer some protection against chemically induced liver cell damage.

However, the most exciting discovery surrounding maca extracts arises from extensive literature documenting its favorable effects on sexual function and response—and the growing body of scientific evidence on its effects during menopause.

In animal studies, maca is capable of reducing and in some cases entirely neutralizing variations in body chemistry induced by stress. In animal models, it eradicates stress-induced ulcers while preventing the adrenal gland enlargement that results from chronic stress. Acting across multiple biochemical pathways, maca also eliminates stress-induced decreases in free fatty acids in the blood and mitigates visible stress responses in animal studies.

In a remarkable study of healthy adult mice and rats, maca extract administered for 22 days led to a remarkable fourfold-plus increase in the number of episodes of successful sexual intercourse compared to controls. The number of females testing positive for the presence of sperm following intercourse also more than doubled. In male animals with erectile dysfunction, maca extract dramatically reduced the amount of time it took for them to achieve an erection after stimulation. The authors of the study concluded that maca had successfully enhanced sexual function and confirmed its aphrodisiac properties.

Maca also enhances fertility of female animals during their reproductive periods, as indicated by an increase in litter size in supplemented animals. Maca also induces estrogenic effects in animals whose ovaries have been removed to simulate menopause, including an increase in the weight and size of the uterus.
Many of maca’s dramatic effects on sexual function and sex hormones are augmented by impressive balancing and stabilizing effects on steroid hormones associated with stress, including the stress hormone cortisol and its endocrinological trigger, adrenocorticotropic hormone (ACTH), secreted by the adrenal gland.

A prolific team of Australian and Polish researchers have made great strides in mapping out maca’s complicated interactions with the ovarian, adrenal, and hypothalamic feedback response systems that regulate sexual function—and whose activities are adversely affected by menopause. In animal studies, this group has shown that maca in very high quantities is completely safe, while in more moderate doses it exerts profound adaptogenic effects by decreasing cortisol and ACTH levels significantly.12,13 In an animal model of menopause using a novel and proprietary maca extract, the team also found that maca possesses distinct antidepressant and sedative effects—without inducing any changes in cognitive function.13

Other researchers have replicated these compelling findings in animal models of menopause, demonstrating maca exhibits antidepressant activity, while specific forms of the plant have beneficial effects on learning as well.16 In a particularly impressive study, Peruvian scientists revealed that maca significantly ameliorated chemically-induced memory impairment in large part by blocking the enzyme acetylcholinesterase (AChE)—the same mechanism of action mobilized by prescription drugs for Alzheimer’s disease.21,22 In a related study, the same researchers demonstrated that maca significantly improved memory function in mice whose ovaries had been removed to mimic the hormonal effects of menopause, which often include memory impairment.23

Maca’s powerfully beneficial effect on menopausal changes may extend to other tissues as well. Most notably, in a pre-clinical model, maca mitigated weight gain and increased estrogen levels following onset of menopause, while preventing detrimental increases in blood lipid abnormalities.24 Blood markers of bone loss were also restored to levels found in pre-menopausal animals, suggesting that maca may also be effective in preventing post-menopausal osteoporosis. These results received further validation in a study indicating a favorable effect on bone mineral density and composition in a rat model of postmenopausal osteoporosis.17 Evidence is also emerging that compounds contained in maca prevent ultraviolet light-induced skin damage in rat studies—a key finding since post-menopausal women experience skin changes (including elevated cancer risk) resulting from ultraviolet exposure.25

What You Need to Know

• An estimated 60% of American women aged 40-65 seek relief from menopausal symptoms each year—many of whom are largely failed by mainstream medicine.

• Standard hormone replacement therapy, still touted as effective by many physicians, increases the risk of cardiovascular disease and breast cancer. Bioidentical hormone therapy remains largely unavailable and unaffordable to most women.

• Scientists seeking safe, natural alternatives to existing therapies have focused on adaptogens, plant-derived compounds that safely induce favorable alterations in energy, neutralize stress, and promote optimal health by increasing metabolism, stamina, sex drive, and healing ability—with few side effects.

• An adaptogen known as maca has been shown to provide multimodal relief from menopausal symptoms, including hot flashes, fatigue, night sweats, and mood swings.

• Maca operates differently than other natural interventions for menopause, promoting optimal function of the hypothalamic-pituitary-adrenal (HPA) axis that governs hormone levels in the body.

• Compelling data from animal and human studies demonstrate maca’s unique, multitargeted ability to balance shifting hormone levels during menopause.

• Maca induces favorable effects on blood lipid profiles and bone density markers, two parameters that decline drastically during menopause.

• Maca also helps to reduce the depression and anxiety that accompany menopause, and exerts beneficial effects on sexual desire and function.
Clinical Studies Confirm Benefits for Women

An international team based at Charles Sturt University in Australia has added substantially to these findings through extensive research in humans using an organic, standardized maca extract. Their first study, a pilot, placebo-controlled test among early postmenopausal women, showed encouraging results: there were significant changes in the “background” hormones that influence sex hormone secretion, resulting in increased estrogen and progesterone levels after 8 months of supplementation.26 These hormonal shifts were accompanied by substantially reduced feelings of discomfort associated with menopause.

These findings led to a randomized, placebo-controlled, multicenter trial completed by 124 early postmenopausal women aged 49 and up.11 In this study, women had to meet not only symptomatic but also biochemical criteria for enrollment: they had to exhibit low estrogen levels in addition to elevated levels of follicle-stimulating hormone (FSH). The rationale behind these criteria is simple: low estrogen and elevated FSH levels establish that ovarian function has indeed fallen below levels typical of the reproductive years, and defines the early postmenopausal period. Women ingested a total of 2,000 mg of maca daily or a placebo, for up to 4 months, and biochemical profiles as well as a standardized index of menopausal symptoms were followed.

The results were extraordinary. The maca extract stimulated production of estradiol while simultaneously suppressing FSH levels—a nearly unprecedented induction of hormonal balance.11 There was also a significant increase in beneficial high-density lipoprotein (HDL) in supplemented women—but not in controls. Most importantly from the women's own experiences, maca significantly reduced both the frequency and severity of individual menopausal symptoms, particularly hot flashes and night sweats.

These findings contributed to a significant decrease in the overall Kupperman Index, a standardized measure of menopausal symptom severity. The authors of the study found in maca “an attractive non-hormonal addition to the choices available to early-postmenopausal women in the form of a natural plant alternative to Hormone Replacement Therapy (HRT)—hence, reducing dependence on hormone therapy programs.”11

The same team added to this body of evidence through a separate, randomized controlled trial, this time studying two symptom scales for increased resolution and examining a much larger array of biochemical parameters that typically deteriorate in the post-menopausal period.27 Once again, they recorded a dramatic decrease in standardized symptom scores over the course of the study, with similarly impressive, favorable alterations in FSH and estradiol levels.

In addition, they documented a remarkable suppression of cortisol and ACTH, the hormones associated with stress, and an increase in serum iron concentrations. Bone density markers were also noticeably increased.27

Other researchers have replicated and extended these findings. There’s now solid evidence for maca’s benefits on psychological symptoms and measures of sexual dysfunction in postmenopausal women.28 Interestingly, the team conducting this study also observed reductions in anxiety and depression, along with improved sexual function unrelated to changes in
sex hormone levels, indicating a broader spectrum of multimodal benefit. Researchers at the Massachusetts General Hospital further revealed that maca extracts can alleviate sexual dysfunction in women taking selective serotonin reuptake inhibitor (SSRI) antidepressant medications, while increasing libido. A new way to manage menopause.

Summary

An estimated 60% of American women aged 40-65 seek relief from menopausal symptoms each year, and many of them fail to achieve adequate relief from the offerings of mainstream medicine. Standard hormone replacement therapy, still touted as effective by many physicians, increases the risk of cardiovascular disease and breast cancer. Bioidentical hormone therapy is not readily available and affordable for many women. Scientists seeking safe, natural alternatives to existing therapies have focused on adaptogens, plant-derived compounds that safely induce favorable alterations in energy, neutralize stress, and promote optimal health by increasing metabolism, stamina, sex drive, and healing ability with few side effects. An adaptogen known as maca has been shown to provide multimodal relief from menopausal symptoms, including hot flashes, fatigue, night sweats, and mood swings. Maca operates differently than other natural interventions for menopause, promoting optimal function of the hypothalamic-pituitary-adrenal axis that governs hormone levels in the body. Compelling data from animal and human studies demonstrate maca’s unique, multitargeted effects at balancing shifting hormone levels during menopause. Maca induces favorable effects on blood lipid profiles and bone density markers, two parameters that decline drastically during menopause. Maca also helps to reduce the depression and anxiety that accompany menopause, and has beneficial effects on sexual desire and function.

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

References


Normal aging results in surplus abdominal fat accumulation in most men and women. The visceral fat that grows around internal belly organs is the most dangerous from a vascular and inflammatory disease standpoint. While visceral fat is relatively responsive to moderate exercise, scientists have discovered that even the most disciplined individual may struggle with a different type of fat. Easily recognizable as belly flab or a persistent belly pouch, this subcutaneous belly fat sits directly under abdominal skin and lingers long after other excess pounds have been exercised away.

Trimming and toning belly fat becomes more difficult with age and yo-yo dieting, as this can stretch skin beyond its limits and lead to sagging belly skin.

A comprehensive program to reduce visceral fat was unveiled in Life Extension®.* A novel topical preparation has also been developed to help reduce the appearance of subcutaneous fat while firming loose abdominal skin.

Belly Slim & Tone is a unique blend of five active ingredients that slim to help create a well-defined silhouette and tone by helping skin become firmer and more elastic.

**TOPICAL SLIMMING INGREDIENTS**

Belly Slim & Tone contains two lipo-active extracts. The first is a marine extract called Sphacelaria scoparia, which is derived from a special alga called sea broom that has been studied for its ability to inhibit the growth of fat cells. The second extract is called Xantalgosil C® that contains a synergistic combination of organic silicon and a xanthic base (similar to the caffeine and theophylline found in green tea). Both of these extracts work in tandem to help address the unsightly appearance of belly fat endured by many people, producing results comparable to the effects of vigorous exercise. These novel ingredients are complemented with caffeine, which works locally to help reshape a more refined belly contour.

**TONING COMPONENTS**

Belly Slim & Tone also contains an extract derived from the green alga Chlorella vulgaris, which is rich in amino acids and proteins, and Regu®-Stretch, an active complex that helps the appearance of skin that has been stretched beyond its limits. Both of these specialized ingredients help skin look firmer and more toned. Increased skin firmness and elasticity is especially beneficial for improving the visual texture of loose skin.

All of the active ingredients in Belly Slim & Tone are encased within QuSome® liposomes, an advanced delivery technology that ensures optimal distribution of ingredients.

**RE-SCULPTING A NEW YOU**

Now you can get that trimmed and toned look with new Belly Slim & Tone. A 6-fl oz bottle of Belly Slim & Tone retails for $42. If a member buys four bottles, the cost is only $28.50 per bottle.

To order BELLY SLIM & TONE, call 1-800-544-4440 or visit www.LifeExtension.com

Dedicated research and development has produced a form of R-lipoic acid that is being hailed as the “next-generation” antioxidant powerhouse.

Life Extension’s Super R-Lipoic Acid has demonstrated superior bioavailability, stability, and potency for a variety of health benefits. This breakthrough converts the biologically active “R” form of lipoic acid to sodium-R-lipoic acid, which in a recent human study achieved 10–30 times higher peak blood levels than pure R-lipoic acid.1

Not only does this lipoic acid formulation reach higher peak blood levels, it also achieves them sooner, up to 12 times faster than R-lipoic acid, ensuring rapid uptake from the plasma into the tissues.1 A recent study showed that oral ingestion of Super R-Lipoic Acid reached peak plasma concentrations within just 10–20 minutes of supplementation.2

What’s more, unlike other forms of lipoic acid, Super R-Lipoic Acid is more stable in the body. The increased stability of this enhanced formulation is the reason for its greater absorption and bioavailability compared with R-lipoic acid.

References:

To order Super R-Lipoic Acid, call 1-800-544-4440 or visit www.LifeExtension.com

These statements have not been evaluated by the Food and Drug Administration. These products are not intended to diagnose, treat, cure, or prevent any disease.
A New Frontier in Natural Menopause Support

For years, aging women have faced an urgent need for more options in the management of menopausal symptoms. Those who advocated safer approaches were vindicated when clinical studies confirmed that synthetic estrogen-progestin drugs increase risk of breast cancer, stroke, and other diseases.1-3

In a major scientific advance, a 100% natural form of support is now available that helps menopausal women in an entirely new way.

**Femmenessence MacaPause**® contains a proprietary compound of maca root (*Lepidium peruvianum* Chacon) that has been shown to provide significant support to women undergoing menopause.4-6 Up to 87% reported improvement of menopausal discomforts in clinical trials, including:

- Better mood
- More energy
- Healthy body weight
- Fewer hot flashes
- Fewer night sweats
- Enhanced sexual experience
- Healthy hormone metabolism
- Support for bone health

What makes **Femmenessence MacaPause**® unique is Maca-GO™, a proprietary concentration of 4 distinct phenotypes of all-natural, organically certified maca. Unlike many other nutrients for menopause support, maca is an adaptogen.7 Scientists believe these plant-based energizers increase the activity of molecular “chaperones,” modulating response to stressors that affect cellular function and longevity.8 Randomized clinical trials show that these herbal extracts support energy, brain health, sexual experience, and reduce stress.9

The result is a cutting-edge approach that gives menopausal women a new, natural alternative. The suggested daily serving of 2,000 mg may help to decrease common complaints associated with menopause, either alone or in conjunction with other forms of natural female support.

A box containing 120 (500 mg) vegetarian capsules (30-day supply) of **Femmenessence MacaPause**® retails for $34.99. Life Extension® members pay just $26.24.

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**References**

Maca-GO™ is a registered trademark of Natural Health International.

**To order Femmenessence MacaPause®, call 1-800-544-4440 or visit www.LifeExtension.com**

These statements have not been evaluated by the Food and Drug Administration. These products are not intended to diagnose, treat, cure, or prevent any disease.
The Secret Behind
Açaí
Novel Scientific Validation for a Popular Berry

BY RONI ENLEN, MSC, CNS
Each day, every cell in the human body must withstand an estimated 10,000 individual assaults from externally introduced reactive oxygen species (ROS) or free radicals.\(^1\)

The progressive, system-wide destruction wrought by this continuous biochemical onslaught has been thoroughly documented in the scientific literature. In the older cells of aging animals, to take one example, researchers have found that one out of every three proteins is rendered dysfunctional by unchecked free radical damage.\(^2\)

In the search for optimal defense against free radicals, scientists have focused intensely on berry extracts. A growing body of scientific evidence shows that berry polyphenols’ antioxidant capacity powerfully targets numerous degenerative diseases, from cancer and atherosclerosis to impaired glucose control and blood lipid abnormalities.\(^3\)–\(^11\)

Touted commercially for years as a “superfood,” only recently has the açaí berry gained compelling scientific validation as an antioxidant powerhouse. Among the most recent findings:

- After consuming a blend of açaí polyphenols, researchers recorded a three-fold increase in antioxidant capacity in the blood of healthy human volunteers.\(^12\)
- Antioxidants found specifically in freeze-dried açaí extract have been shown to enter human cells in a fully functional form and effectively neutralize free radicals at very low doses.\(^13\)
- Similarly, freeze-dried açaí extract has demonstrated unrivalled scavenging capacity against two of the most damaging reactive oxygen species, the superoxide and peroxyl radicals.\(^14\)

In this article, you will learn how the antioxidant potency of açaí and other foods is assessed, using a measurement known as oxygen radical absorbance capacity, or ORAC.\(^15,16\) You will find out the most recent research indicating that the full polyphenolic profile of açaí affords optimal antioxidant protection. You will also gain insight into the specific health benefits of açaí and similarly potent fruits and vegetables—and their unrivalled power to combat free radical damage and the killer diseases of aging. > >
Assessing Antioxidant Potency

The standard index for determining the antioxidant value of various organic compounds is known as oxygen radical absorbance capacity, or ORAC.\(^{17-19}\)

Developed by scientists at the USDA Human Nutrition Research Center on Aging at Tufts, the ORAC test is considered one of the most sensitive and reliable methods for measuring the ability of antioxidants to absorb free radicals. While other analytic methodologies may be used, ORAC is often considered preferable because of its biological relevance to antioxidant action \textit{in vivo} (in living organisms).\(^{20}\) It measures both the degree and speed with which a certain food inhibits the action of an oxidizing agent, then integrates these two measurements into a single value, producing an accurate assessment of different types of antioxidants of different strengths.\(^{21,22}\)

The ORAC value of a given food is proportional to its polyphenol content. Fruits and vegetables with a higher ORAC value—or richer color—have been shown to suppress free radicals more effectively than lightly pigmented foods.\(^{21}\) Scientists at the US Department of Agriculture advise that we ingest foods equivalent to 3,000-5,000 ORAC units per day in order to maintain optimal antioxidant protection in bodily tissues and plasma\(^ {24,25}\)—a number that may be too low.

Unrivalled Free Radical Defense

The açai (\textit{Euterpe oleraceae} Mart.) is a species of palm tree indigenous to the area surrounding the Amazon in South America. Its berries resemble grapes

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### ORAC: Top-Ranked Antioxidant Foods

<table>
<thead>
<tr>
<th>Food</th>
<th>ORAC Units</th>
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<tbody>
<tr>
<td>Açai berries</td>
<td>18,400</td>
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<tr>
<td>Pomegranates</td>
<td>10,500</td>
</tr>
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<td>Blackberries</td>
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<td>Blueberries</td>
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<td>Strawberries</td>
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<tr>
<td>Oranges</td>
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<tr>
<td>Elderberry</td>
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<tr>
<td>Cherries</td>
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<td>Black Currant</td>
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<td>Red grapes</td>
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<td>Broccoli flowers</td>
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<tr>
<td>Kiwi fruit</td>
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<td>Beets</td>
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<tr>
<td>Red bell pepper</td>
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<td>Grapefruit, pink</td>
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<tr>
<td>Corn</td>
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<tr>
<td>Eggplant</td>
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The numerical values above indicate ORAC units per 100 grams (about 3.5 ounces).\(^ {26-29}\)
and ripen seasonally in similar fashion, progressing from green to a deep purple color. They have long served as a critical nutritional source for the native peoples of Central and South America. Modern scientific analysis revealed that the açaí berry’s complete polyphenolic profile boasts a formidable array of beneficial compounds, including polyunsaturated and monounsaturated fatty acids (11.1% and 60.2%, respectively), along with 19 health-promoting amino acids.

Celebrated in traditional cultures for its life-sustaining power, the magnitude of açaí’s antioxidant capability only recently emerged in scientific studies. Açaí powerfully counteracts several of the most destructive reactive oxygen species (ROS), or free radicals. In freeze-dried form, it has been shown to effectively inhibit the ROS superoxide in assays, and excels against the peroxyl radical in particular, with the highest reported total ORAC score of any fruit or vegetable. Açaí was also found to be active against the peroxynitrite and hydroxyl radicals in ORAC assays. It has also been identified recently as a potent COX-1 and COX-2 inhibitor, which may give it the ability to provide relief from pain and inflammation.

A study designed to evaluate total free radical scavenging capacity among various antioxidant foods revealed that when compared to common European fruit and vegetable juices, all the açaí samples studied ranked in the top class of peroxyl radical scavengers. The authors found the samples to be so high in antioxidant capacity that the numbers could only be estimated. Another study found that human plasma antioxidant activity is significantly increased after the consumption of açaí pulp and juice, observing individual increases in plasma antioxidant activity of up to 2.3-3-fold, respectively.

Its potent antioxidant properties and highly beneficial polyphenolic profile endow açaí with a singular ability to combat cellular aging and oxidative damage. The latest research reveals the potential for significant beneficial effects on longevity and incidence of chronic disease. A study on the life span and survival of Drosophila melanogaster flies found that dietary supplementation of 2% açaí increased the life span of females fed a high-fat diet by approximately 20%, compared to controls fed a high-fat diet without açaí. Açaí was noted to promote the activation of important stress-response pathways, alleviate the oxidative stress of aging, and protect against the negative effects of dietary fats.

Evidence is also building for açaí as a major cancer fighter. Polyphenolic mixtures of açaí pulp and oil extracts inhibited the proliferation of human colon cancer cells in the lab by up to 90.7% and a study...
on human leukemia cells found açaí polyphenols reduced cell proliferation from 56-86%.43 Açaí pulp was also found to be protective when administered to mice prior to the chemotherapeutic drug doxorubicin.44

Açaí is also emerging as a major cardiovascular protector.45 In one study, açaí extract induced long-lasting endothelium-dependent vasodilation (relaxing of the arterial wall) in the abdominal vascular tissue of rats.46 Supplementation with açaí berries has also been shown to reduce total and non-HDL cholesterol in animals with experimentally induced high cholesterol.47

Açaí's high antioxidant capacity also benefits brain function, with potential implications for the treatment of neurological disorders, including Alzheimer's disease and Parkinson's disease. Research has shown that pre-treatment of brain tissue from the cerebral cortex, cerebellum, and hippocampus with açaí decreased ROS-induced damage of lipids and proteins in all brain tissues tested.48

In addition to açaí, anthocyanins are distributed widely among nature’s most brightly colored fruits and vegetables.

**Blueberry**

Blueberries have been shown to enhance cognitive performance, and are abundant in polyphenols that can cross the blood-brain barrier and localize in regions critical to learning and memory.63 Blueberries protect the myocardium from ischemic damage and prevent post-myocardial infarction heart failure.64 They have also been found to improve insulin resistance and thus glucose control in pre-clinical models.65 Taken together with probiotics, they may help counteract colitis (inflammation of the large intestine).66

**Bilberry**

This relative of the blueberry may provide a frontline defense against cardiovascular disease. Researchers have found that bilberry significantly inhibits angiotensin-converting enzyme, or ACE, which contributes to hypertension by promoting dangerous narrowing of the arteries (vasoconstriction).67 Bilberries enhance short-term memory in animal models, suggesting they may have potential to help ward off Alzheimer’s disease.68 Like many anthocyanin-rich foods, bilberries also inhibit proliferation of breast cancer cells and induce apoptosis in animal models.69 They improve insulin sensitivity, helping to prevent diabetes.70 Bilberry extract helps to upregulate enzymes that defend against ocular oxidative stress as well, suggesting it may be beneficial for protecting the eyes against age-related disorders, like macular degeneration.71

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**Anthocyanins: Broad-Spectrum Disease Protection**

The most powerful antioxidant berries to emerge in recent studies contain a class of polyphenols (plant-based compounds) known as anthocyanins. These nutrients produce the deep red, blue, and purple pigments found throughout the plant kingdom.

Fruits and vegetables bearing these colors—blueberries, cranberries, pomegranates, black currants, beets, and açaí—are especially rich in anthocyanins. Although present only in minute quantities, they are readily absorbed into the blood upon ingestion, where they initiate a physiological response in the body that quells free radical activity.

The most up-to-date research indicates that anthocyanins confer a broad array of health benefits, including:

- inhibiting cancer cell growth and inducing apoptosis (programmed cell death) in several cancer cell lines49-52
- reducing the risk of cardiovascular disease53-55
- enhancing glucose tolerance and lipid profiles56,57
- improving eye function58,59
- limiting cellular oxidative DNA damage.60,61

An 8-week, randomized, placebo-controlled study published this year confirmed not only that they are highly bioavailable—they can also significantly increase levels of other beneficial polyphenols in the blood.62
Black Currant

Black currant boasts potent anti-viral activity\textsuperscript{72} and has been shown to relax the aorta by enhancing the synthesis of nitric oxide.\textsuperscript{73} Black currant also reduced the oxidative stress induced by exercise and may enhance immune responsiveness to pathogens.\textsuperscript{74} One study found that black currant extract improved volunteers’ ability to adapt to the symptoms of tired eyes.\textsuperscript{75} Black currant has also been shown to stop the growth of certain harmful bacteria.\textsuperscript{76}

Cranberry

Cranberries are probably best known for the support they provide the urinary tract, by inhibiting the adherence of \textit{E. coli} to the urethra and bladder.\textsuperscript{77} They’re also proven fighters of oxidative stress. An 8-week, double-blind, placebo-controlled trial involving 65 healthy women found that 1,200 \textit{mg} of cranberry extract per day prompted a significant decrease in serum levels of advanced oxidation protein products—a key measure of oxidative stress.\textsuperscript{78} Cranberries also display anti-proliferative activity against several types of cancer in vitro and in vivo, including gastric cancer\textsuperscript{79} and esophageal adenocarcinoma.\textsuperscript{80} They may also help to fend off ulcers by preventing \textit{Helicobacter pylori}, the bacterium which causes peptic ulcers, from adhering to the stomach lining.\textsuperscript{81,82}

Elderberry

Like black currant, elderberry is a natural anti-viral that shows promise in protecting against both seasonal and H1N1 swine influenza. Elderberry anthocyanins have been found to bind to H1N1 and block the ability of the virus to infect host cells. Researchers have favorably compared its activity to that of oseltamivir (Tamiflu\textsuperscript{83}). A randomized, double-blind, placebo-controlled study on a standardized elderberry product found that it reduced the duration of the flu symptoms to just 3-4 days.\textsuperscript{84} The study also showed it to be effective against 10 different strains of influenza. Elderberry also reduces lipid peroxides, neutralizes lipid peroxyl radicals, inhibits LDL oxidation,\textsuperscript{85} and offers significant protection to endothelial cells against oxidative stress.\textsuperscript{86}

Pomegranate

Pomegranate provides broad-spectrum benefits across many physiological systems. Extracts of pomegranate have shown promise in reducing the potential for metastasis in breast cancer.\textsuperscript{87} They initiate programmed cell death and inhibit the proliferation of...
prostate, lung, colon, and other cancers. The fruit has also been shown to reduce inflammation in colitis and suppress inflammation and joint damage in rheumatoid arthritis, not to mention its status as a known cardiovascular tonic.

**Other Beneficial Pigmented Plants**

A rich variety of additional brightly pigmented foods afford similar health benefits.

**Raspberries** protect against DNA damage in HT-29 colon cancer cells, and inhibit HT-115 colon cancer invasion, in vitro. In combination with other berry extracts, raspberry extracts have shown efficacy against oral, breast, and prostate cancers in the lab. The antioxidant capacity of **aronia** or chokeberries have yielded some of the highest ORAC values recorded, drinking the juice of these berries reduces exercise-induced oxidative damage to red blood cells and in one study, a cholesterol-lowering effect was observed in animals with experimentally induced high cholesterol. Aronia has also been found to decrease lipid peroxidation and oxidative stress.

**Grapes and grape seeds** have been shown to inhibit colon cancer cell invasion and decrease LDL oxidation and platelet aggregation, among other cardioprotective activities. Grapes have also been found to extend the life span of fruit flies, and may help combat Parkinson's and other neurodegenerative diseases.

**Strawberry** extracts have been shown to inhibit the growth of oral, colon, and prostate cancer cells, improve lipid profiles and peroxidation and lower the risk of coronary artery disease.

**Blackberries** have shown themselves to be extremely beneficial in the management of inflammation, suppressing pro-inflammatory cytokines in animal models. Blackberry extracts also show potential in inhibiting the growth of human colon cancer cells in the laboratory, suggesting a potential role in cancer prevention.

**Cherries** have been found to reduce blood lipid abnormalities and glucose intolerance and abdominal obesity in mice. **Tart cherries** have been found effective in suppressing inflammation-induced pain.

The benefits of anthocyanins are not limited to fruits: studies have shown that the black soybean shows promise in fighting colon cancer and insulin resistance, and promotes wound healing in skin cells and reduces inflammation in endothelial cells.

**Purple corn** possesses anti-mutagenic effects, reducing expression of genes involved in proliferation of tumor cells.

**Summary**

Each day, every cell in the human body withstands 10,000 individual strikes by free radicals, a leading factor in aging and degenerative disease onset. In the search for optimal defense against free radicals, scientists have focused intensely on berry extracts for their potent antioxidant capacity. Although promoted commercially for years as a nutritionally dense food, the deep purple **açai berry** has only recently gained compelling scientific validation. In a recent clinical study, a blend of complete açaí polyphenols increased antioxidant capacity three-fold in the blood of healthy human volunteers. Antioxidants found specifically in **freeze-dried açaí extract** have been shown to enter human cells in a fully functional form and effectively neutralize free radicals at very low doses. Freeze-dried açaí extract is also extraordinarily effective against the most damaging reactive oxygen species, the **superoxide** and peroxyl radicals. Scientific research suggests that together with similarly pigmented foods rich in anthocyanins (blueberries, black currant, and raspberries), açaí may serve as a frontline defense against multiple diseases of aging.

If you have any questions on the scientific content of this article, please call a Life Extension Health Advisor at 1-866-886-3027.

**References**


A huge percentage of men over age 50 suffer from prostate-induced discomforts.

Ultra Natural Prostate Formula contains the most scientifically substantiated nutrients to help protect the prostate gland and maintain its healthy function.

Included in the formula is a standardized European pumpkin seed oil extract rich in delta-7 sterols and fatty acids to support a healthy prostate. A supercritical CO₂ extraction technology supplies optimal amounts of these key phytoneutrients to complement the fatty acid composition of saw palmetto. It is sourced from a unique variety of pumpkin cultivated specifically to yield higher ratios of these compounds than pumpkins grown for commercial use.

The nine additional active ingredients in Ultra Natural Prostate Formula are:

- **Saw palmetto extract.** A number of normal biological events in aging men affect the prostate gland. Saw palmetto has been shown to interfere with DHT activity in the prostate, inhibit alpha-adrenergic receptor activity (to support normal urinary flow), and help control inflammatory actions in the prostate gland. A novel DeepExtract™ extraction technology ensures the most desirable and complete profile of saw palmetto available.

- **HMRLignan™** Norway spruce and ActiFlax™ flax lignan extracts. Standardized lignans from Norway spruce and flax seeds convert to enterolactone that is then absorbed into the bloodstream where it provides significant biological effects. Enterolactone has demonstrated anti-estrogen and anti-DHT effects that are of particular importance for the aging prostate gland.

- **5-LOXIN® boswellia extract.** Published studies show that normal aging and poor diet cause levels of a dangerous enzyme (5-lipoxygenase) to increase, which can affect prostate cells. 5-LOXIN® is a patented extract from the boswellia plant that has been shown to suppress 5-lipoxygenase in addition to other pro-inflammatory factors.

These statements have not been evaluated by the Food and Drug Administration. These products are not intended to diagnose, treat, cure, or prevent any disease.
Nettle root extract (Urtica dioica). Testosterone converts to estrogen at higher rates as men age. Prostate cells are sensitive to estrogen's growth stimulatory effects. Nettle root helps support prostate cells against excess estrogen levels.11

Pygeum. Normal aging results in levels of certain prostaglandins increasing in the prostate gland. Pygeum africanum extract helps suppress these prostaglandins, keeping the prostate gland placid and promoting prostate comfort.12

Beta-sitosterol. The most biologically active constituent of pygeum is beta-sitosterol. Beta-sitosterol from other plant sources is also included in this prostate support formula.13

Cernitin®. This European pollen extract has been shown to relax smooth muscle tone of the urethra, counteract DHT, and help regulate inflammatory reactions.14-17

Boron. In addition to helping protect bones, this mineral has been shown to slow elevation of prostate-specific antigen (PSA)—a benefit seeming to occur as a result of boron's positive effect on the presence of protein-degrading enzymes in the prostate gland.18,19

Lycopene. This carotenoid, associated with the tomato's red color, helps maintain healthy DNA gene function in prostate cells.20-24

The daily dose of two softgels of Ultra Natural Prostate Formula provides:

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<tr>
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<td>USPlus® Saw Palmetto (C0, DeepExtract™)</td>
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<td>5-LOXIN*</td>
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<td>Stinging nettle root extract (Urtica dioica)</td>
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<tr>
<td>Lycopene</td>
<td>10 mg</td>
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<tr>
<td>Phytosterol complex (standardized to 26.6% beta-sitosterol)</td>
<td>678 mg</td>
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<tr>
<td>HMRLignan™ Proprietary blend of Norway Spruce and ActiFlax™ Flax Lignan extracts</td>
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Ultra Natural Prostate Formula provides scientifically validated standardized plant extracts that have been shown to promote healthy prostate function. No other prostate protection formula provides such a broad array of nutrients to support the multiple factors involved in maintaining a healthy prostate gland.

The retail price for one bottle Ultra Natural Prostate Formula is $38. If a member buys four bottles, the price is reduced to $26.25 per bottle.

References
20. BJU Int. 2003 Sep;92(4);375-8; discussion 378.

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

These statements have not been evaluated by the Food and Drug Administration. These products are not intended to diagnose, treat, cure, or prevent any disease.
Despite abundant scientific validation, many people still do not take vital nutrients because they don’t want to swallow so many pills. This problem has been solved with a one-per-day softgel that includes multiple health-promoting nutrients in just one supplement. The Life Extension® Super Booster contains critical oil-based nutrients that cannot be incorporated into dry-powder based formulas like the Life Extension Mix™.

The Super Booster has been upgraded to provide higher doses of the most effective form of vitamin K known as menaquinone-7. Just one Super Booster softgel provides:

- **Gamma Tocopherol** If one consumes only alpha tocopherol, the critically important gamma tocopherol is displaced from cells within the body. While alpha tocopherol vitamin E inhibits lipid peroxidation, the gamma tocopherol form also quenches the dangerous peroxynitrite free radical. It is especially important for those who take vitamin E supplements to make sure they consume at least 200 mg a day of gamma tocopherol.

- **Sesame Lignans** Sesame lignans augment the antioxidant effects of both alpha- and gamma-tocopherol. In a human study conducted at Life Extension, gamma tocopherol plus sesame lignans was 25% more effective in suppressing measurements of free-radical damage than gamma tocopherol and tocotrienols.

- **Vitamin K2** Vitamin K1 from dietary plant sources is poorly absorbed and only a small fraction gets into the bloodstream. Vitamin K2 is absorbed much more efficiently. Scientific studies show K2 provides superior benefits for the bones, arteries, and other tissues. The MK-4 form of vitamin K2 is the most rapidly absorbed and is now routinely used in Japan to maintain healthy bone density. MK-4, however, only remains active in the blood for a few hours. The MK-7 form of K2, on the other hand, remains bioavailable to the human body over a sustained 24-hour period. Super Booster now provides more MK-7 than ever before — to keep calcium in the bone and out of the arteries.

- **Lycopene** Evidence suggests that people who ingest the carotenoid lycopene enjoy healthier prostate function. Lycopene also helps guard against LDL oxidation.

- **Lutein** The carotenoid lutein helps maintain healthy cell division, supports the macula of the eye, and protects the endothelial lining of the arteries.

- **Ginkgo** Hundreds of studies substantiate the multifaceted effects of Ginkgo biloba in promoting healthy circulatory and neurological function.

**Just one softgel of Super Booster supplies:**

- Gamma tocopherol .................................. 230 mg
- Ginkgo extract ...................................... 120 mg
- Chlorophyllin ........................................ 100 mg
- Vitamin K2 (as menaquinone-7) .......... 100 mcg
- Vitamin K2 (as menaquinone-4) ... 1000 mcg
- Vitamin K1 ........................................... 1000 mcg
- Sesame lignans ....................................... 20 mg
- Lycopene ............................................... 10 mg
- Lutein ..................................................... 2 mg
- Se-methylselenocysteine .................. 67 mcg
- L-Selemomethionine ......................... 67 mcg
- Sodium selenite ..................................... 67 mcg
- Vitamin B12 ......................................... 300 mcg
- Vitamin C ............................................... 90 mg
- Ascorbyl palmitate ............................... 50 mg
- Zinc ....................................................... 10 mg
- Mixed tocopherols ............................... 130 mg

- **Chlorophyllin** Scientific studies indicate that chlorophyllin may protect against environmentally induced damage to DNA.

- **Selenium** Some scientific evidence suggests that consumption of selenium may reduce the risk of certain forms of cancer. However, the FDA has determined that this evidence is limited and not conclusive. Selenium’s effects in boosting glutathione are well-established.

A bottle of 60 Super Booster softgels retails for $42. If a member buys four bottles, the price is reduced to just $28.50 per bottle. The Super Booster saves consumers huge dollars by combining a wide variety of costly nutrients into one daily softgel. If you add up the price of the individual ingredients contained in the Super Booster, you would spend two to three times more for this potency if taken separately.

To order Super Booster, call 1-800-544-4440 or visit www.LifeExtension.com

Caution: If you are taking anti-coagulant or anti-platelet medications, or have a bleeding disorder, consult your healthcare provider before taking this product. Individuals with in-born errors of copper metabolism (e.g. Wilson’s disease) should avoid daily, chronic use of this product. Lyc-O-Mato® is a registered trademark of LycoRed Natural Products Limited.
In 2008, Life Extension® introduced Berry Complete, a unique, high-potency blend of extracts from Nature’s most powerful free radical fighters. The antioxidant strength of just one capsule equaled more than 50% of the recommended five daily servings of fruits and vegetables.

Today, we introduce an even more powerful antioxidant formula. A single capsule of the new Enhanced Berry Complete with RZD™ Açaí delivers an antioxidant value equivalent to more than 100% of the recommended daily fruit and vegetable intake.

It is also the first antioxidant formula to use a cutting-edge extraction technology called Radiant Zone Drying™. This patented process delivers the most complete nutritional profile of the açaí berry—for a breakthrough in antioxidant defense.

ORAC: A Measure of Antioxidant Power

To measure the antioxidant strength of various foods, scientists use what is known as the ORAC index. While berries score higher than most fruits and vegetables, açaí boasts one of the highest ORAC values known to modern science.

Unfortunately, most commercial products containing açai do not reflect the full nutritional content of the fruit. Only a fraction of its phenolic content survives industrial processing, handling, and storage.

RZD™ extraction technology allows for optimal delivery of açai polyphenols, including highly beneficial anthocyanins, proanthocyanidins, and flavonoids, along with essential fatty acids and other vital compounds.

Enhanced Berry Complete with RZD™ Açaí gives you a convenient way to obtain a broad spectrum of seasonal, hard-to-find, highly perishable foods, for optimal antioxidant value.

A bottle containing 60 vegetarian capsules of Enhanced Berry Complete with RZD™ Açaí retails for $29. If a member buys four bottles, the cost is just $19.50 per bottle.

References

RZD™ Açaí and Radiant Zone Drying™ are trademarks of Columbia Phytotechnology, LLC. Contains soybeans. Contains corn.

To order Enhanced Berry Complete with RZD™ Açaí, call 1-800-544-4440 or visit www.LifeExtension.com
FDA-approved Drugs Fail to Prevent Heart Attack and Stroke
On March 18, 2010, headline news articles proclaimed that drugs used to lower blood pressure, triglycerides, and other vascular risk factors do not protect diabetics against heart attack or stroke.¹,²

The studies cited by media were badly flawed. That means the findings from these studies have no relationship to those who follow a comprehensive program to prevent and reverse the clinical course of type 2 diabetes.

It is important that you understand how poorly designed these studies were. Just imagine falling from a 70-story building. This of course will kill you. If the height is reduced by 25% (to 52 floors), you still die from the fall.

Researchers took a large group of type 2 diabetics and gave them a drug called Tricor® (fenofibrate) or a placebo. At the end of the study, median triglyceride levels fell 25.6% from 164 to 122 mg/dL in the fenofibrate group, and 10.0% from 160 to 144 mg/dL in the placebo group.¹

When no significant reductions in heart attack or stroke occurred, the media declared the therapies useless. The reality is that high-risk cardiac patients need to suppress triglycerides below 60-80 mg/dL to protect against vascular disease.³-⁹
As *Life Extension*® long ago stated, triglyceride blood levels above 100 mg/dL in healthy people are dangerous. Those with other cardiovascular risk factors (like diabetes) need to keep triglycerides below 60-80. Conventional doctors still believe antiquated reference ranges that claim triglyceride levels up to 149 are safe.

There are 17 independent risk factors that cause heart attack and stroke. In the flawed clinical trials on type 2 diabetics, researchers partially corrected only 5 (or fewer) of these 17 risk factors. Is it any wonder why conventional cardiology fails so many aging individuals?

The medical establishment refuses to utilize findings from the published scientific literature to protect their patients. That's why it is so important that *Life Extension* members have a comprehensive *Male* or *Female Blood Test Panel* every year.

These blood tests not only detect a wide range of cardiac risk factors, but they also can identify those in a pre-diabetic state.

More than 23 million Americans have type 2 diabetes today. The frightening projection from the *National Institutes of Health* is that at least 57 million Americans are in a “pre-diabetic” state, indicating they are at significant future risk of suffering deadly diabetic complications like kidney failure, blindness, peripheral nerve damage, heart disease, and stroke.10

If detected early, those with elevated blood sugar levels (but not overt diabetes) can reduce type 2 diabetes risk by 58% with lifestyle interventions.11 The drug *metformin* alone reduces diabetes risk by 31%.11 *Life Extension* members have access to a much wider range of natural approaches to further protect against type 2 diabetes.

Doctors have finally come to the realization of the critical need to prevent “pre-diabetes” from mushrooming into full-blown type 2 diabetes. Prevention begins with the comprehensive blood testing offered to *Life Extension* members at a fraction of the cost of commercial labs.
Once a year, Life Extension® discounts its already low blood test prices. Until June 7, 2010, members can order the Male or Female Blood Test Panel for only $199.

According to the February 11, 2010 New England Journal of Medicine:

“The lifetime risk of type 2 diabetes is now more than one in three in the general population.”

Comprehensive blood testing not only reveals if you are pre-diabetic (or diabetic), but the test results also identify certain risk factors that if corrected can prevent type 2 diabetes from developing.

Type 2 diabetes is not an acute illness. For many people, the disease festers in the body for seven to ten years before actual diagnosis. Studies have shown that type 2 diabetes can be prevented in at-risk people, which is the reason why early detection is so important before deadly complications like coronary artery disease result.

The regular member discounted price for the blood tests included in the Male or Female Panels is $269. If you order by June 7, 2010, the price is slashed to $199.

When you order these tests, a requisition form is sent listing blood drawing stations in your local area. Appointments are usually not necessary, meaning you can have your blood drawn at your convenience.

To order these blood tests by phone or if you have any questions, call 1-800-208-3444 (24 hours a day).

You can also order online by visiting www.lef.org/Blood.

Nutrients in Lieu of Drugs

The FDA-approved drug Tricor® is associated with a wide range of side effects, whereas fish oil provides multiple vascular benefits. Fish oil and other nutrients dramatically slash stubbornly high triglyceride levels. Comprehensive blood testing reveals whether the nutrients, hormones, and drugs you take are reducing vascular risk factors to optimal safe ranges.

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

FDA-approved Drugs Fail to Prevent Cardiovascular Events in Diabetics

- Recently published research indicates that drugs used to lower blood pressure, triglycerides, and other vascular risk factors do not protect diabetic individuals from heart attack or stroke. These results are misleading, since the studies were significantly flawed.

- For example, individuals with diabetes received a drug called Tricor®, which lowered their median triglyceride level by 25.6% (from 164 to 122 mg/dL). Life Extension has long advocated that those with high cardiovascular risk lower their triglycerides to 60-80 mg/dL.

- Another reason the studies failed is that there are 17 risk factors for cardiovascular disease. These flawed clinical trials only attempted to correct 5 or fewer of these risk factors.

- The most important step you can take to protect your current and future health is to undergo annual comprehensive blood testing to evaluate your risk of developing cardiovascular disease and type 2 diabetes. If testing reveals risk factors outside of healthy parameters, you can take early action to prevent these deadly diseases of aging.
References

Fight Back Against Aging!

Aging is Characterized by Inflammation, Glycation, and Mitochondrial Decay

The loss of cellular vitality is caused by a number of factors, including mitochondrial problems, glycation, and free-radical reactions. Life Extension® members have access to a state-of-the-art nutritional formula called Mitochondrial Energy Optimizer that helps protect delicate cellular structures and enables cells to perform life-sustaining metabolic processes.

Mitochondrial Energy Optimizer is designed to counteract age-related structural and functional changes by providing the following unique ingredients:

- **Carinosine** As humans age, proteins in their bodies become irreversibly damaged by glycation reactions. Glycation is the cross-linking of proteins and sugar to form non-functioning structures (Advanced Glycation End-Products or “AGEs”) in the body, which can lead to alterations of normal cell function. Carnosine is not only a powerful anti-glycating agent, but it also protects neurons against reactive and cytotoxic protein carbonyl species associated with normal aging.1-5

- **Luteolin** Systemic inflammation is involved in most undesirable consequences of aging. Culprits behind chronic inflammatory reactions are pro-inflammatory cytokines, such as interleukin-1 and tumor necrosis factor alpha. Luteolin is a super-potent plant extract that has been shown to modulate these dangerous inflammatory cytokines.6-11

- **Benfotiamine** Effectively modulates multiple destructive biochemical pathways, including AGES' formation pathway, which are induced by higher than desirable blood glucose levels. Human mortality studies indicate that ideal fasting glucose levels are between 74-85 mg/dL. Yet many aging people have fasting glucose above 90 mg/dL, which is less than optimal.12-14 Benfotiamine protects endothelial cell integrity from the effects of high glucose levels. In addition, benfotiamine exhibits direct antioxidative capacity and prevents induction of DNA damage.15

- **Pyridoxal 5'-Phosphate** Aging results in the formation of advanced glycation end-products throughout the body. Pyridoxal 5'-phosphate is the active form of vitamin B6 that has been shown to protect against both lipid and protein glycation reactions.16-19

- **R-Lipoic Acid** Destructive free-radical activity in the mitochondria plays a major role in the loss of cellular vitality. A microencapsulated Bio-Enhanced® R-lipoic acid facilitates youthful mitochondrial energy output while guarding against free radicals. Two forms of lipoic acid are sold on the supplement market, but R-lipoic acid is far more potent.20-23

- **Acetyl-L-Carnitine Arginate** The amino acid L-carnitine is required to transport fats into the mitochondria to be burned for cellular energy. Acetyl-L-carnitine arginate is a patented form of carnitine that also supports neurites in the brain.24

To order Mitochondrial Energy Optimizer, call 1-800-544-4440 or visit www.LifeExtension.com

Just four capsules of the Mitochondrial Energy Optimizer provide:

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Bio-Enhanced® is a registered trademark of GeroNova Research, Inc.

These statements have not been evaluated by the Food and Drug Administration. These products are not intended to diagnose, treat, cure, or prevent any disease.
Petition for Redress of Grievances

to

US Attorney General Eric Holder

FDA Food Czar Michael R. Taylor

The World Health Organization (WHO) has just recommended that drinking water contain 25-50 mg of magnesium per liter to prevent deaths from heart attack and stroke. (www.MgWater.com/download) American bottled water averages <5 mg of magnesium (Mg) per liter, while bottled water in the rest of the world averages about 20 mg of magnesium per liter.

The FDA and DOJ caused the Mg-deficient-water problem by destroying the American mineral water industry in the 1930’s, in the mistaken belief that “pure” water was good, and that mineral water was just impure water. **Now, it is up to the FDA and DOJ to correct their blunder, requiring the Mg content of bottled or canned beverages to be put in labels’ nutrition panels, and requiring that all bottled or canned beverages contain at least 25 mg of Mg per liter.**

Epidemiological studies indicate that millions of Americans may have died due to the FDA’s and DOJ’s destruction of the American mineral water industry. See:


Foods no longer contain as much magnesium as they did a century ago, due to increased food processing and possible soil depletion. Consumers have generally rejected magnesium-rich whole grain foods like brown rice and brown bread, in favor of magnesium-stripped white rice and white bread. Bottled beverages are the most practical way of delivering magnesium to consumers. Recent studies clearly confirm that water-borne Mg is far, far better in preventing cardiovascular pathologies than food-borne Mg.

Please Act NOW!

Health freedom advocate Paul Mason has paid to run this ad in *Reason, New Republic, National Review, Beverage Industry,* and *Beverage Spectrum* magazines. This ad space is being donated to Paul Mason by the Life Extension Foundation™.

The organizations supporting this ad are the Magnesium Online Library (www.MgWater.com) and Adobe Springs Water Co., LLC (408-897-3023).
Inflammatory conditions debilitate millions of adults, resulting in restricted mobility and reduced strength. Inflamed joints can lead to extensive damage to surrounding connective tissues, which causes the hands, feet, and arms to become painful, swollen and stiff.

While conventional methods can produce side effects, Arthro-Immune Joint Support from Life Extension® combines two clinically proven plant extracts into one powerful formula to help those suffering from inflammation.

**Andrographis paniculata** has received acclaim for its beneficial effect on inflammation. A Chilean study involved 60 adults who took either 150 mg andrographis extract a day or a placebo. Those taking the extract showed dramatic improvement of several outcomes, including fewer numbers of tender and/or swollen joints. For joints that remained tender and/or swollen, the intensity was lessened.

**Curcumin** is a compound that is universally recognized for its impressive antioxidant and fluid-regulating properties. In an as-yet-unpublished double-blind clinical trial, an enhanced absorbing curcumin was shown to have a beneficial effect on inflammation.

Life Extension’s Arthro-Immune Joint Support contains PARACTIN® Andrographis extract, which has been used in clinical, animal and in vitro studies that have demonstrated its efficacy in combating inflammation. It also contains BCM-95® Bio-Curcumin®, which is considered the gold standard curcumin, with bioavailability far superior to that of most curcumin extracts.

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**References:**
3. Chandran B, Chakkiath VK, Thomas SPO. A multicentre, randomized, controlled human clinical study to assess the efficacy and safety of Biocurcumax (BCM-95) compared to diclofenac sodium. Submitted for publication. 2009.

To order Arthro-Immune Joint Support, call 1-800-544-4440 or visit www.LifeExtension.com
Embryonic stem cells (ESCs), colored scanning electron micrograph. ESCs are pluripotent, that is they are able to differentiate into any cell type. The type of cell they mature into depends upon the biochemical signals received by the immature cells. This ability makes ESCs a potential source of cells to repair damaged tissue in diseases such as Parkinson’s and insulin-dependent diabetes. Magnification: x3000.
On Feb. 20, 2010, Gregory M. Fahy, PhD and Saul Kent interviewed Michael West, PhD, CEO of BioTime, Inc., about a new breakthrough published in the journal *Regenerative Medicine*. The paper reported the reversal of what Dr. West has called the “developmental aging” of adult human cells in the laboratory dish. Utilizing *genes* that grant our reproductive cells the potential for immortal growth, the researchers showed that it was possible to turn back the clock in human body cells, enabling the potential for young patient-specific cells of any kind for use in regenerative medicine. This research was funded in part by the Life Extension Foundation®. We asked Dr. West to elaborate on the details of his groundbreaking research, and to expound on the implications for the future of rejuvenative medicine. > >
Fahy: Before we get to the details of your paper on the reversal of developmental aging, let’s set the stage. Your discovery relates to the field of regenerative medicine. What do you mean by regenerative medicine and how does it differ from medicine as it exists today?

West: Well, the name “regenerative medicine” came from Bill Haseltine, then of Human Genome Sciences, one of the early leaders in genomics and DNA technology. Back in the 1990s, Bill learned that researchers in aging were making important progress on turning back the clock of aging in human cells through cloning, and then creating young cells that could potentially regenerate or repair all the tissues of the aged human body. And so, upon hearing of that realistic prospect, he christened the field “regenerative medicine” in the belief that it would one day become a major part of medical practice. So, based on its origins, I would define regenerative medicine as that collection of technologies that utilizes embryonic pluripotent stem cells and their derivatives to regenerate tissues in the body ravaged from disease, primarily degenerative disorders associated with aging.

Fahy: The implication of the term is that we’re actually going to be able to regenerate or re-grow parts of the aging body because of this ability to turn back the clock of cellular aging.

West: Yes. First, let’s talk about cellular aging. The problem with human biology is that the immortal reproductive cells that built you and me develop into differentiated cells within our bodies and as a result, lose the capacity to proliferate (divide) forever. So, the cells of the body are mortal, meaning they have a finite life span, and as our tissues age, or deteriorate from disease, our body has a finite capacity to regenerate and repair those tissues. As a result, we suffer progressive declines in function that lead to our death.

Fahy: So, are you saying that an inadequate ability to generate new cells in the aging body is linked to the body’s inability to repair itself as we grow older?

West: Every tissue is different, but that’s basically what I am saying. The goal of gerontology for many years has been to find the reason that our reproductive lineage continues to make babies generation after generation while the other cells in our body, called somatic cells, have a finite life span and are mortal, or, in other words, to discover the reason babies are born young. The answer is that we come from a lineage of cells that have been proliferating since the dawn of life on earth. The cells that made us have no dead ancestors. That recognition is causing a major shift in our thinking about aging, towards recognizing that aging may be more simple than we once thought. Although complex in the way it’s played out in thousands of genes and proteins, in reality, it may be that only a small number of central mechanisms cause the somatic cells in our body to age. So, the goal has been to discover a way of transferring the immortality of reproductive cells into the body in order to increase the potential life span of individual human beings.
**Fahy:** What gives the germ line immortality, or as you put it, why are babies born young?

**West:** Well, the first clue was published in 1986.1 Howard Cooke reported that specific regions of DNA at the ends of our chromosomes called telomeres are long and constant in length in our reproductive cells (sperm in particular in this case) with age, but shorten progressively in body cell types as we age.

That publication led me to realize that an old theory of aging by Alexey Olovnikov from Russia now has scientific support. Olovnikov’s theory was that the difference between our reproductive cells and our body cells is that the ends of the DNA strands shorten over time in somatic or body cells, but are maintained at a long length in reproductive cells.2

That shortening was considered by Olovnikov to be a clock of cellular aging, similar to the way the length of a fuse leading to a bomb can be a kind of clock—the longer it’s set, the longer it will burn before the bomb goes off. And, of course, the bomb going off here is the aging of somatic cells. Olovnikov proposed that there is an immortalizing enzyme that is shut off in body cell types, causing them to have a finite life span.

Back around 1990, I became convinced the telomere hypothesis was correct, and founded Geron, where we isolated and purified this immortalizing enzyme, which we called telomerase. In 1998 we demonstrated that the addition of telomerase to body cell types such as skin cells or cells from the retina involved in macular degeneration stopped these cells from aging.3

**Fahy:** What are adult stem cells?

**West:** There are tissues in the human body that have evolved a source of regenerative cells—or adult stem cells—to repair the tissues when they are damaged. For example, when a cave bear attacked an ancient Neanderthal and scratched the surface of his skin, there had to be stem cells there that could within a few days repair that damage. Similarly, our livers can regenerate extensively when damaged by toxins, accidents, or diseases. And when you have a strained muscle, muscle can regenerate too.

But unfortunately, not all cells and tissues of the human body have extensive regenerative capacity, and indeed, in the case of humans, adult stem cells all appear to be mortal. They can regenerate tissue function, but only for a finite period of time. We can observe the aging of adult stem cells through telomere shortening.

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**Immortal Cells**

Early in the history of evolution, life existed as single cells, not unlike the protozoa swimming around in pond water today. These animals replicated by simply splitting into two new cells. They didn’t have to die and are therefore called “immortal.” In the following millennia, these immortal cells spun off specialized helper cells to help them compete in feeding and reproduction. These helper cells selflessly served the needs of the immortal cells and became what we call the “body” while the immortal cells became what we call the “germ line.” Since the immortal cells carried genetic information, they selected for the body to die after it served its purpose.

Where are these immortal cells in you and me? In the adult human, they are the egg cells in a woman’s ovary, and the sperm-forming cells in the testicles of a man. When a sperm and egg unite, the resulting cells continue the germ line by forming a small cluster of immortal cells that go on to make new body and new immortal reproductive cells of a new human being, a cycle that continues forever.

For the first time in the history of life on earth, the body cells have evolved a brain that is capable of understanding evolution and capable of deciphering the molecular mechanisms of cellular mortality and immortality. This conscious body is now plotting to take on the legacy of immortality for itself.
If we can learn the lessons of how our reproductive lineage has been creating babies for millions of years to continue the human species, we should be able to design medical therapies to allow the human body to regenerate itself and escape the genetic boundaries of human life.

Fahy: You have suggested in the past that this might be accomplished using stem cells derived from embryos, and, in particular, embryos created by somatic cell nuclear transfer (cloning).

West: Once we knew it was telomerase that was maintaining the germ line, it occurred to me that we might be able to isolate germ line cells from human embryos and just propagate them in a laboratory dish. These cells should be immortal in the laboratory just like they are in nature. Think of it this way: they would be in a sense the immortal stem cell of human life itself, regenerating human beings generation after generation, forever. If we could tap into that amazing lineage of cells, it could allow us to manufacture all cell types in the human body. And theoretically we could make an unlimited assembly line, making new young tooth-forming cells, new young cells for the retina, for the cornea, for the heart, for the kidneys, and so on. And so that was the genesis of the project to isolate human embryonic stem cells, a project that began in the mid-1990s and culminated with the publication of human embryonic stem and embryonic germ cells in 1998.4,5

The isolation of these cells was controversial because of the need to derive the cells from human embryos. Certainly elevating their notoriety was President George W. Bush’s first national address on August 9, 2001, when he discussed the ethics of the cloning of human beings, but was only to clone hundreds of cell types we had purified using a technology we call ACTCellerate. And using computer programs to search for the genes that were different in these cells, we found, at the top of the list, almost as if highlighted in glowing bold letters, four transcription factors that are active in embryonic stem cells and would not only take a skin cell back to an embryonic state, but that it would also make an old cell young again by rebuilding the telomere back to an embryonic state. So our goal was to be able to produce young cells of any type identical to the patient’s own cells, and we called the process for doing this therapeutic cloning.7

Fahy: Why was therapeutic cloning insufficient?

West: Of course, it was very controversial because of the need to clone human embryos. In addition, the difficulties of getting a sufficient number of human egg cells and the technical challenge of implementing cloning made advances in that field slow and difficult. What we desperately needed was to find a means to make all these therapies we’d been talking about possible on a scalable and affordable platform that would allow them to be implemented commercially for millions of patients.

Fahy: Which brings us to induced pluripotent stem cells (or iPS cells). What are these cells and how are they generated?

West: iPS cell technology is a way of using just a handful of genes to coax a cell back in time without using egg cells or cloning. And this is the exciting part: the technology works. It is one of the most active areas in medical research today.

Let me tell you a fun story. Shortly after we cloned human embryos in 2001, I was at a birthday party for Jack Szostak in Boston. Jack, along with Liz Blackburn and Carol Greider, won the Nobel Prize in 2009 for their early research in telomere biology. Mark Ptashne was at Jack’s house too, and after a few glasses of wine I asked him, “Mark, after hearing about cloning, how many genes do you think are in the egg cell that are responsible for taking the cell back in time?” After a couple more sips of wine, Mark, who is an expert in transcription factors, the master regulators of all the genes in somatic cells, said quite definitely, though I think tongue-in-cheek, “four.” I responded “you’re wrong” with an exclamation point, because I believed there were published data suggesting that what is in the egg cell that is required to turn back the clock in cells is enormously complex.

However, a couple years later we were using microarray DNA sequences on a chip to look at the thousands of genes in embryonic stem cells and in hundreds of cell types we had purified using a technology we call ACTCellerate. And using computer programs to search for the genes that were different in these cells, we found, at the top of the list, almost as if highlighted in glowing bold letters, four transcription factors that are active in embryonic stem cells and
inactive in virtually all body cell types—Oct4, Sox2, Lin28, and Nanog. I looked at these genes and, remembering my conversation with Mark, had to ask myself, “Could it really be that simple? Could I be looking at the master regulators of the immortal renewal of human life?”

As I thought about this carefully, I came to believe that the earlier data that cloning was complex was not that solid, and so we filed patent applications on the use of these and other related germ line-specific genes as master regulators that, if expressed in a human body cell, would be fully capable of transporting an old skin cell (and many other adult body cells) back to an embryonic state, rewinding the “clock” of development whereby embryonic cells normally differentiate into the specialized cells of the body, as well as the telomere “clock” of cellular aging. Since this is resetting both, we call it the reversal of developmental aging.

Kent: You’re leaving out the fact that scientists did, in fact, find that these four transcription factors do indeed work.

West: Right. In 2007, Yamanaka of Japan and James Thomson in Wisconsin, published the first papers showing that this family of transcription factors was indeed successful at turning back the developmental clock of aging. Taking a skin cell, for instance, back to an embryonic state. Since no embryos are used in their derivation, they are called “induced pluripotent stem (iPS) cells” instead of embryonic stem (ES) cells.

Fahy: iPS cell technology has been on the cutting edge of regenerative medicine ever since. But you found a problem. What is it?

West: Recognizing the problems of implementing cloning, we began working in this field in the 1999–2005 time frame with a strong interest in what happens to the clock of cellular aging. Thomson and Yamanaka had not carefully looked at whether the clock of cellular aging was reversed in their iPS cell lines, so after these lines and others were widely distributed in the scientific community, we surveyed their telomere lengths and saw that they were not at the length expected for the beginning of life.

In cloning, when you take a cell from an old animal and transplant that cell or its nucleus into an egg cell, the clock of aging gets rewound. So even though you take a cell from a very old animal, the young cloned animal is born young. Cloning takes a body cell and transforms it back into an immortal germ line cell and creates a baby just as if it had been sperm and egg that created it. The rumors that cloned animals are generally born old are myths. So the egg cell can function as a cellular time machine, reversing developmental aging, so an animal cloned from an old animal is born young.

Now, with iPS technology, which is a way of performing the equivalent of cloning without using an egg cell or making an embryo, everyone believed from the start that it would also transport the cell back to immortality, since that is what happens in cloning. But when we looked at telomeres in several widely used iPS cell lines we saw they were all short. In the paper we just published, our survey showed that, although all iPS cell lines out there do reactivate telomerase and otherwise look like embryonic stem cells, they do not properly reset the clock of aging because their telomeres remain shorter than they should be.
The good news is that we found a way to identify iPS cells that have reset the clock of aging. And so while iPS cell technology is not as efficient as cloning in rapidly and reliably reversing the clock of aging, we’ve shown in this paper that it can be made to work quite simply. So the ability to reverse the aging of human cells both from the standpoint of embryological development and in terms of the clock of aging and in an ethically non-problematic manner, and to do it on a commercial and affordable scale, makes regenerative medicine an attractive pathway to profoundly intervene in human aging.

Kent: But as you said, the majority of iPS cells don’t maintain the length of their telomeres. What percentage of the cells that are produced in this manner are, in fact, turned back in time based on their telomere lengths and telomerase activity?

West: These are still the early days of our investigation of iPS technology, but of the six lines we generated, one successfully reset the clock of aging. And so our current success rate is one out of six. But of course those numbers will likely change with larger studies.

Kent: Do you know any reason that might explain why one in six are different from the others?

West: We’ve taken the successful cell line whose telomeres got reset all the way back to embryonic telomere lengths again, and looked at it carefully using DNA chips that measure gene expression in all human genes, and we were able to identify some genes related to the telomere that, at minimum, are a marker of the cells whose clocks have been turned back successfully.

Why the egg cell is so much more efficient than these genes remains unknown, but the important thing is that it really is a matter of efficiency here. Even if the efficiency is never improved beyond one out of six, we still have a commercially feasible technology.

Fahy: However, you referred in your paper to the possibility of developments such as the use of germ cell extracts and the like that might be able to improve the efficiency of making fully successful iPS cells. Do you have plans to actually pursue that, and is it a practical approach?

West: Yes. We are now developing a technology we call ReCyte™. ReCyte™ uses testicular cells called EC cells that we genetically engineer to express large quantities of these master regulators such as Oct4, Sox2, and Lin28 to be little time machines to transport a patient’s cells back in time. ReCyte™ is a technology designed specifically to increase the efficiency of reprogramming, and to do so on a robotic, commercial scale. Based on our understanding of how all this technology works, we believe this will allow us to manufacture a product for resetting the clock of aging in cells inexpensively and efficiently and improve the quality of reprogramming, making the safest and most efficacious cells available for patients that can be produced as of today.

Kent: You may be right about that, but right now the best you can do is one out of six. And as I understand it, the way this technology will be most effectively used is to take somatic cells from individuals and turn them back into embryonic-like cells. What is the chance that you’ll be unable to do so effectively in a particular individual?
**West:** In our paper we manually created these lines, so we only made six cell lines, one of which properly rewound the clock. With the newer robotic platform we are developing, we could increase that number of lines markedly. So, even with no improvements in efficiency, we could increase the number of lines to make a successful outcome for a particular patient highly probable.

**Fahy:** Is the ReCyte™ process patented by BioTime?

**West:** Yes. ReCyte™ is a proprietary technology of BioTime and is based on several issued and pending patents.

**Fahy:** Do you also have exclusive ownership over the process of choosing cells that spontaneously maintain their telomeres and excluding those that don’t?

**West:** We’ve filed for patent protection on the selection process to identify these cell types based on the data in our paper.

**Fahy:** Are there alternative ways of achieving the same effect you’ve been able to obtain? For example, it has been possible to artificially restore telomerase to cells since 1998, as you referred to earlier in the interview. Is there any reason iPS cells could not simply be telomerized to correct their defect in telomere maintenance?

**West:** Well, we looked at a telomerized line in our publication, an iPS cell line from Harvard Medical School. That line had, in addition to these germ line genes that make this time machine work embryologically, some added telomerase, in the belief that there may be a problem with the telomere. But those cells still have inappropriately short telomeres. And so what we’ve learned is that telomerase is indeed very important, but merely adding telomerase to the iPS techniques as currently used in most laboratories is not sufficient.

**Fahy:** In the paper, you speculate that maybe the reason the iPS cells are not maintaining their telomeres is that they’re not maintaining their undifferentiated embryonic state over time. Is there any evidence that they might be losing their undifferentiated state?

**West:** All I can say is that what’s so striking about iPS cells is how similar they are to human embryonic stem cells in every respect. If one scans through 30,000 plus genes and looks at the expression of all those genes in human embryonic stem cells and iPS cells they are essentially indistinguishable. It’s very difficult, in fact, to find any differences, and it was hard for us to find what differences might be causing this inefficient resetting of the clock of aging. So the striking thing is their similarity, not that there are problems with the technology. However, we mention in the paper that our survey of widely-studied iPS cell lines may have been influenced by the poor culture of the cells in some laboratories.

There have been reports that iPS cells are less likely to make various cell types, like neurons, compared to embryonic stem cells. But it’s important to remember that most of the world is working with iPS cells that are geriatric in terms of aging, and so all of those studies need to be repeated with these new cell lines that have their clock of aging reset properly before any conclusions can be drawn about the normality or abnormality of iPS cells.

**Fahy:** What about the possibility that the cells that are naturally able to restore and maintain their telomeres are those that have DNA damage?

**West:** We looked carefully throughout the genome of these cells using what is called SNP analysis and couldn’t find any evidence of DNA damage such as rearrangements, so for this and other reasons, we don’t have any reason to think the iPS cells that maintain their telomeres do so because of DNA damage the way cancer cells do.

A long-standing theory of aging is that our body accumulates cells that have broken chromosomes, serious DNA damage, and damage unrelated to telomere shortening per se. And that almost certainly happens. Nevertheless, we also know that the human body has many trillions of cells that are completely intact, and with modern sequencing technologies it’s now possible for just a few thousand dollars to completely sequence a cell line’s genome. And so I believe it will be commercially feasible to perform a previously unthinkable amount of quality control to be sure that the young cell types that we make by new technologies like ReCyte™ are pristine, young cells as good as the cells we were born from, and not carrying a significant load of genetic damage.

**Kent:** Robert Bradbury and others have talked about plucking pristine stem cells out of a pool of adult stem cells and having the best possible adult stem cells rather than some of them being contaminated or damaged.

**West:** There are many cells in the aged human, even in a person of a hundred years of age, that are entirely normal and have essentially not aged to a significant degree. The problem in aging is that an increasing percentage of cells in the human body have very serious DNA damage, and it only takes a few of those cells to stimulate what we call bystander effects; they can cause damage to a wide range of cells around that...
cell, resulting in the manifestations of human aging. But yes, there remain cells, including stem cells, that have pristine DNA, and the selection of those cells to create whole populations of cells is one approach to developing new stem cell therapies.

But I believe the most powerful approach is to use those pristine cells as a source of DNA when taken back in this time machine of reprogramming to make all the cell types of the human body pristine, and thereby give the physician the ability to regenerate the inner ear for hearing loss in aging, the retina for macular degeneration, part of the midbrain in Parkinson’s disease, the heart muscle to deal with the number one killer; heart disease, and cartilage, which has no regenerative capacity whatsoever and whose loss is the number one complaint of the elderly, and so on.

By taking the cells back in time, both from an aging standpoint and also by taking them back in time in development to make embryonic cells, we hope to unlock early pathways of embryological development that are utilized in primitive vertebrates that allow them to profoundly regenerate tissues, such as re-growing amputated limbs and so on.

Fahy: Is there any independent confirmation of your discovery that there is a telomere problem with most iPS cells? Have others found at least any indirect signs that are in agreement with your observations?

West: Back in 1999, my old company, Geron, in collaboration with the Roslyn Institute, announced that cloned animals were born old. The thought then was that it would be unthinkable that cloning would be so miraculous that it would reverse both development and aging as well. But in 2000 we published evidence that cloning actually does reverse both development and aging, and since that time it’s become established that cloning really does both. So much so that, when iPS researchers saw that telomerase is reactivated in iPS cells, they assumed that this was sufficient for telomeres to be restored, without looking at the telomeres themselves.

We were a bit concerned that we were the only ones who had identified that most iPS cells do not rewind the clock of aging, but just recently a group at Advanced Cell Technology published a paper showing that all iPS cell lines they looked at showed accelerated aging when turned into blood-forming cells even though they did not look at telomeres specifically. And in our new paper, we cite similar additional indirect evidence from other labs in support of our findings.

More recently, a group at Harvard showed an increase in telomere length after reprogramming by iPS technology in cells affected by a premature aging disease caused by a mutation involving one of the telomerase components. And so the scientific community is presently somewhat confused over this issue, but we believe that the answer is that iPS technology is indeed capable of reversing the aging of human cells, it’s just that it’s not 100% of the time, and so it’s necessary to identify the cells that have had their clock of aging rewound.

Fahy: How serious of a problem would it be if you used iPS cells that had not had their telomeres restored?
West: It all depends on the application. In the case of the heart muscle, if you’re in heart failure and you need new heart muscle regenerated identical to your own so it will be not rejected, I think you could get away with cells that were not embryonic in regard to cellular aging. But for many of the cells of the human body there really is, I believe, a great advantage to giving us back the cells we were born with many decades earlier.

An example is blood-forming cells. In aging we can watch telomere length shorten in the blood cells every decade, and the tie-in between that shortening of telomeres and the onset of chronic infectious disease and other immune disorders, like anemias, is pretty well documented. To give us back the blood-forming cells that we were born with, so our immune system would have a robust reservoir of cells capable of fighting infections, would be highly desirable.

Fahy: There has been some talk recently about the possibility of transdifferentiation as an alternative to iPS cell technology, in which instead of going back to an embryonic state, you simply convert cell A into target cell B without having to go back in time and then redifferentiate the cell back to target cell B. You just go straight to your target. Do you see that as a significant competitor to iPS cell technology, and do you think that the same issues that you’ve identified for iPS cells will pertain to transdifferentiated cells?

West: I believe these master regulatory genes we call transcription factors are able to take cells back to the germ line, but will also be able to take a cell, like a skin cell, directly to a neuron. The advantage of taking cells back to the germ line is that we reset the clock of aging in cells, as well as make all these primitive embryonic lineages that we anticipate will be more effective in regenerating tissue function compared to adult cells.

Kent: How do you see regenerative medicine dealing with non-dividing cells such as neurons and muscle cells, which are critically important?

West: Non-proliferating cells can become injured or lost as a result of aging, so to extend human longevity, medicine needs to have a way to replace those cells and tissues as well. For example, in Parkinson’s disease, cells are lost in the mid-brain, resulting in the progressive symptoms of the disease, which we can only partially treat today, and the loss of heart muscle cells can progress to heart failure, now a leading cause of death in the United States. The hope of regenerative medicine would be for the first time to add to the doctor’s toolbox products that could allow the regeneration of these cells and tissues to replace those worn out with age and thereby essentially cure these important diseases for the first time.

Kent: You just referred to the loss of non-dividing cells as a result of aging, yet you tend to equate aging with telomere shortening, which should not happen in non-dividing cells. Can you clarify what you mean by aging in non-dividing cells?

West: I am glad you brought that up, Saul, because there is this debate in the aging research community about the mechanisms of aging, and the critics of the telomere hypothesis use this as one of their arguments. I would point out two things. First, most tissues with non-dividing cells, like the brain and heart, are also full of cells that do divide over time. In the case of the brain, the dividing cells are called astrocytes, and in the heart they are stromal fibroblasts. And so, in my mind it is specious to point to these tissues as evidence against the role of cellular aging in the aging brain and heart since the dividing cells could be important pacemakers. Second, the lack of telomerase activity in non-dividing cells could also impart an inability to repair telomeres broken as a result of normal wear-and-tear. So, we might have degenerative changes occurring in non-dividing cells as a result of the lack of telomerase but not from replicative senescence.

Fahy: There are natural precedents for replacement of non-dividing cells in the brain. The brain makes new cells all the time in a process called neurogenesis. This is particularly active in the hippocampus, which is where memories are distributed, so replacing non-dividing cells even in the brain seems to be feasible.

Kent: While it’s true that new neurons can be developed in the hippocampus from neural stem cells, which aid in learning and memory, this natural process doesn’t work nearly well enough to prevent the loss of memory and other cognitive functions with aging, or to prevent the development of age-related diseases such as Parkinson’s disease and Alzheimer’s disease. Perhaps the introduction of additional neural stem cells will be able to solve these problems, but isn’t there a risk that if you replace neurons in the brain that contain memories and information regarding the individual’s personality with young, healthy neurons, that these neurons won’t have that information and the identity of the person could be partially or entirely lost?

West: Absolutely. The goal of regenerative medicine is, obviously, to both repair the human body and to maintain the identity of the individual in the process, so ultimately we will need to look carefully at this unique problem you’re mentioning regarding specific sites in the brain.
Kent: Perhaps rather than replacing dysfunctional neurons outright, we’ll be able to repair them by replacing component parts of these neurons, which might not affect memory encoded in these neurons. West: I think there’s a lot of potential for exactly what you’re suggesting.

One of the hallmarks of our time is shifting paradigms in the way we think about aging. Not that many years ago, neurobiologists were set in stone in the belief that the neurons in the human brain do not proliferate, and now we have a complete revolution in thought with scientific evidence that these cells can turn over. This is consistent with what we’re talking about today, regenerative medicine, which could enable doctors to regenerate new, young cells of any kind to replace those worn out with aging.

Kent: What evidence do you have to support the idea that once you introduce these young cells into a person’s body, they will rejuvenate the area in which you have injected them or the system which you have tried to rejuvenate?

West: In the history of embryology research, there have been scientists who have been transplanting embryonic cells and tissues, oftentimes between different bird species like chick and quail. And what we see there is that these primitive embryonic cells are unusually plastic, by which I mean that they can be scooped up with a syringe or a scalpel and transplanted into corresponding tissue and recognize where they are, and promote scarless regeneration. While the aging human body is progressively dysfunctional and increasingly ravaged with disease processes, the cells that we envision putting into the body are cells with an amazing amount of plasticity that can recognize where they are and what they need to do.

A simple way of seeing this is that early in evolution, before telomerase was repressed and a lot of these changes occurred to cause aging, primitive vertebrates maintained their embryonic plasticity, and we can still see this in some animals today. As I alluded to earlier, there are species of salamanders in which you can cut off a leg, you can remove a large chunk of their heart or even of their brain, and the tissues will regenerate. An arm will grow back right where it was cut off, and you’ll have a new functioning limb with blood vessels and nerves and muscles and bones and cartilage, all in their proper places. That is the type of plasticity and regenerative capacity that these embryonic cells have, and it is the reason Bill Haseltine christened this field regenerative medicine.

Kent: Another possibility is that there could be a risk of getting cancer as a result of using immortal iPS cells. West: That’s possible. Some scientists hypothesize that in order to live as long as humans live without dying of cancer, evolution selected to turn off the immortalizing gene telomerase in virtually all cells of the human body. The result is that it gave us a genetic limit to our life span, but it also limited our exposure to cancer. Once we’ve reproduced and raised our babies, we’ve helped to continue the species, and it is okay from an evolutionary standpoint to die from old age.

But it’s important to remember that the iPS cells only are immortal in the germ line state. Once we turn them into the early cell lineages of the human body, telomerase is shut off.

Kent: Severe calorie restriction extends maximum life span, which indicates that aging has been slowed, but postpones the incidence of cancer as well. So both problems can be addressed simultaneously.

West: I share your optimism. I believe that through new technologies aimed at targeting and destroying tumors combined with a more complete understanding of the connections between telomere shortening and cancer, we can find ways to walk that tightrope. If we eliminate the major causes of aging and dramatically improve the quality of human aging or even human life span, it’s almost a certainty that we will increasingly then have to face the problems of cancer. That’s just the reality of human biology.

Kent: If we had a chance of slowing or reversing aging and increasing our maximum healthy life span in exchange for an added risk of cancer, I think many people would likely take that risk because cancer in many cases is both preventable and curable, but so far aging is not.

Fahy: Since all of the adult-onset forms of cancer are probably caused by telomere shortening rather than from having telomeres that are too long, it seems that nature’s use of telomere shortening as an anti-cancer device may have been overdone! Also, immortal stem cells already exist in some places in the body, and yet most people don’t die of cancer.

Kent: When do you anticipate that the initial therapies based on iPS cell technology will be available to humans?

West: In the United States, with its stringent regulatory burden of approval, it could take many years. In other countries, such as China and India, you have very sophisticated and large medical establishments and even larger aging populations than the US. In the case of China, the post-Mao baby-boom generation is significantly larger than the post World War II baby-boom generation in the US. I believe that these
technologies will be implemented in a fraction of the time there than in the United States. But it’s important, again, to emphasize that nowhere in the world are these technologies available today. I would urge people not to rush off and seek therapies that have not been proven safe and effective.

A tsunami of aging is coming our way, which is going to be disastrous in its consequences, both to the individuals in need of healthcare and to the economies of countries that will be faced with escalating healthcare costs. In my opinion, we now have the science and technologies to prepare for this tsunami by developing new medical therapies within the next 10 years to reverse age-related degenerative diseases and profoundly influence the course of aging itself.

In the face of this impending healthcare and economic crisis, many gerontologists are reaching out for capital to fund their research. To advance these novel therapies through regulatory approval will require significant capital expenditure. The day that these technologies can be used to treat human beings is entirely dependent on the number of scientists that can be employed to move development forward.

I want to take this opportunity to thank the Life Extension Foundation for their financial help in the early stages of this project. Now it’s time for Congress to fund basic research in aging. The looming baby-boom population threatens to break the bank. Our future is in the balance.

Fahy: Thank you, Dr. West, for this extremely important and strategic look into the future of therapies to combat aging.

References

2. Ingest six grams of soluble fiber before each meal. Studies show that pre-meal fiber intake helps induce early satiety. One or more of the following low-cost fiber supplements can be used:

**Fiber Food** is a natural bulk-producing soluble fiber consisting of psyllium, guar gum, and apple pectin that is available both in capsule and powder forms.

A bottle of 200 capsules of Fiber Food Capsules retails for $15. If a member buys four bottles, the price is reduced to $9.38 per bottle. Contains corn. Item # 00229

A bottle of 300 grams of Fiber Food Powder retails for $15. If a member buys four bottles, the price is reduced to $9.38 per bottle. Contains corn. Item # 00228

**CocoaGold™ with Beta-Glucan**

This combination powder provides standardized cocoa extract plus oat beta-glucans. The CocoaGold™ polyphenols support healthy insulin sensitivity, while beta-glucan fiber delays carbohydrate absorption. Beta-glucans have a slower and more sustained effect on blood glucose and energy.

A jar of 180 grams of CocoaGold™ with Beta-Glucan retails for $20. If a member buys four jars, the price is reduced to $13.50 per jar. Contains tree nuts (cocoa beans), gluten, and corn. Item # 01285

To order CALORIE RESTRICTION MIMETIC FORMULA or any of the other supplements that help protect against chronically bloated bloodstream, call 1-800-544-4440 or visit www.LifeExtension.com
REduce thE EfFect of Excess CaloRies

Famine prevailed throughout most of mankind’s evolutionary history. Those who efficiently absorbed and stored scarce calories are our direct ancestors. With abundant quantities of calorie-dense foods, it is no wonder that problems associated with excess food intake are so prevalent in modern-day societies.

Excess consumption of dietary fat and carbohydrate results in rapid spikes in levels of fat (triglyceride) and sugar (glucose) in the blood. Regrettably, many people are not aware of the age-accelerating consequences of postprandial overload. Elevated levels of post-meal blood fat (triglycerides) and blood sugar (glucose) accelerate the aging process in our cardiovascular system.

Ingested foods are broken down by digestive enzymes before they are absorbed into the bloodstream. Green and black tea polyphenols target the fat-digesting enzyme lipase. Theaflavins from tea polyphenols have been shown in experimental studies to help reduce the post-meal impact of ingested fat calories in a dose-dependent manner. Most of us eat too many refined carbohydrates that add to the calorie burden. The enzymes amylase, glucosidase, and sucrase break down ingested carbohydrates to smaller starch and sugar particles. Nutrients such as white kidney bean (targets amylase activity), InSea™ (targets amylase and glucosidase activity), and Irvingia (targets amylase activity) and L-arabinose (targets sucrase activity) have been shown in published scientific studies to help reduce the metabolic impact of ingested carbohydrate calories from dietary starch and/or sugar. These nutrients are all contained in the new Optimized Irvingia formula.

Optimized Irvingia with Phase 3™ Calorie Control Complex contains Green Tea Phytosome Extract to slow down the breakdown and absorption of dietary fat. Phase 2™ White Kidney Bean extract to moderate alpha-amylase activity, InSea™ seaweed extract, which can help support a slowing of the rate of carbohydrate absorption from the intestines, Irvingia gabonensis extract for leptin sensitivity support, and Phase 3™ Sucrase Modulator to reduce the number of absorbed calories from sugar. Directions are to take two capsules before the two heaviest meals of the day. A bottle of 120 capsules of Optimized Irvingia with Phase 3™ Calorie Control Complex retails for $64. If a member buys four bottles, the price is reduced to $45 per bottle. Contains soybeans, tree nuts, yeast, and corn. Item # 01492

CONTROL YOUR gENE EXPRESSION

Restricting the amount of calories allowed into your bloodstream increases healthy life span via several mechanisms. Cardiovascular support can be maintained by blunting the post-meal surge of glucose, insulin, triglycerides, and inflammatory-inducing compounds that engorge the bloodstream following eating binges.

Scientists, however, are focused on an even more important mechanism to explain how calorie restriction so radically extends life span. They have uncovered favorable alterations in gene expression in response to reduced calorie intake. It turns out that caloric restriction slows aging by activating beneficial “youth” genes while disabling detrimental “senescence” genes.

The incredible news is that a select group of nutrients has been discovered that trigger many of the favorable mechanisms (including more youthful gene expression patterns) as caloric restriction.

Among the most promising of these caloric restriction mimics and enhancers are resveratrol, pterostilbene, quercetin, and grape seed polyphenols, along with black tea extract. These nutrients have been shown to generate many of the same effects in the body as caloric restriction, without significant dietary modification. In particular, they help “mimic” caloric restriction’s favorable impact on genes that influence the aging process.

Genes have the capacity to directly affect life span by regulating a broad spectrum of aging factors. Calorie restriction exerts a beneficial effect on the activity of gene expression, supporting healthy cellular function through numerous physiological pathways. Compounds that mimic caloric restriction bring about favorable changes in gene expression and improve the primary biomarkers of aging.

Those taking high-dose vitamin D, along with coenzyme Q10 and fish oil are already favorably altering many of their gene expression patterns. Calorie Restriction Mimetic Formula includes resveratrol, pterostilbene, quercetin, grape seed polyphenols, and black tea extract to provide even broader-spectrum gene expression support in one nutritional compound. Two capsules of Calorie Restriction Mimetic Formula provides:

- Trans-Resveratrol: 250 mg
- Trans-Pterostilbene: 3 mg
- Quercetin: 150 mg
- Black tea extract: 300 mg
- Grape seed polyphenols: 50 mg

A bottle containing 60 vegetarian capsules of Calorie Restriction Mimetic Formula contains $36. If a member buys four bottles, the cost per bottle is reduced to $24.75. Item # 01419

While Calorie Restriction Mimetic Formula can enable aging individuals to simulate many of the beneficial gene expression effects associated with caloric restriction, Life Extension members are still urged to reduce their pathologic calorie burden by following steps #1 and #2 as outlined herein.

REFERENCES

10. Lipids Health Dis. 2009 Nov 13;8:44.
People today are aware of the importance of maintaining optimal blood levels of vitamin D for their overall health and well being. What many people do not know is that vitamin D is also indispensable to the health, beauty, and longevity of the largest organ in the body: your skin.

The problem is that while the body uses sunlight to make vitamin D, sun exposure itself accelerates skin aging. Over time, ultraviolet light damages the skin, leading to wrinkles, sun spots, and higher risk of skin cancer. In addition, much of the vitamin D produced in the skin is taken up and used by other systems of the body.

In this article, you will discover the critical role vitamin D plays in skin cell development and repair, as well as how it mobilizes your skin’s immune system and helps destroy free radicals that can cause premature aging. You will also learn how topical vitamin D lotion can deliver benefits directly to your skin, preserving its softness, health, and youthful appearance. > >
OPTIMAL SKIN PROTECTION WITH VITAMIN D

Shedding Light on Vitamin D’s True Identity

Technically, vitamin D doesn’t fit the classic definition of a vitamin at all. A vitamin is a substance that is crucial to normal everyday life function, but can’t be synthesized in sufficient quantities by an organism, and thus must be obtained from the diet.¹ Your skin has the ability to manufacture as much as 10,000 IU of vitamin D after 20–30 minutes of summer sun exposure.² But there are many limiting factors to internal vitamin D synthesis that include age, skin color, geographic latitude, seasonal variation in sunlight availability, and the widespread (but necessary) use of sunscreen, which all make it difficult for your body to produce the vitamin D it needs for optimal health through sun exposure alone.

Too much sun damages the skin, creating wrinkles and fine lines, while increasing skin cancer risk. Still, your skin’s ability to synthesize a portion of its daily requirement directly from sunlight³ makes vitamin D unique among all other nutrients.

Functionally speaking, vitamin D more closely resembles a hormone than a vitamin.⁴,⁵ Hormones are chemical messengers produced by certain glands and cells in your body that bind to specific receptors in order to produce a targeted biological response. The active form of vitamin D, calcitriol, is one of the most powerful hormones in the human body, endowed with the ability to activate over 2,000 genes (roughly 10% of the human genome).² In order to become calcitriol, however, vitamin D must first undergo a complex series of biochemical reactions that begin in your epidermis, the outermost layer of your skin and the key to its youthful appearance. (See sidebar on page 76.)

The Key Nutrient for Skin Cell Growth and Replacement

Being fat-soluble, vitamin D as calcitriol easily crosses the phospholipid membranes of your cells and migrates to the nucleus. Here it binds with vitamin D receptors,⁶ a special group of proteins that sense the presence of steroid hormones. This linking regulates the expression of genes that turn different cell functions on or off.⁷,⁸ Vitamin D receptors are directly involved in cell proliferation and differentiation, as well as optimal immune function. These issues are vitally important to your skin, which not only serves as your first line of defense against pathological invaders, but must also replace approximately 30-40,000 lost cells a minute.⁹

This constant loss of cells on your skin’s surface must be offset naturally by an ongoing vitamin D-dependent renewal process that takes place in specialized cells called keratinocytes. Keratinocytes account for about 95% of all cells in your epidermis.¹⁰ They possess two properties which make them...
extremely valuable—the ability to actively divide, and the ability to differentiate. They are continuously providing new cells for replenishment of your skin’s surface.

Cell activity in this layer is responsible for the creation of an underlying structural framework for your skin to reinforce the delicate matrix of skin tissue. This helps your epidermis form a watertight barrier that locks in moisture and keeps your skin soft and supple.

This is where vitamin D comes in: rates of cell division and differentiation are triggered by growth factors and other molecules that are controlled by the presence of vitamin D. If adequate amounts of vitamin D are not available, your epidermal cells won’t differentiate optimally. As a result, the outer layer of your skin may become thinner and more fragile. It begins to sag from lack of adequate support. Dryness and wrinkles set in as moisture is gradually lost to the outside. This is one of the main reasons why vitamin D is absolutely essential to the maintenance of healthy-looking skin.

Skin Protection and Vitamin D

- In addition to overall health, vitamin D plays an integral role in skin protection and rejuvenation.
- In its active form as calcitriol, vitamin D contributes to skin cell growth, repair, and metabolism. It optimizes the skin’s immune system and helps destroy free radicals that can cause premature aging.
- While the body can produce vitamin D on its own through sun exposure, too much sun accelerates skin aging. Over time, it can damage the skin, leading to wrinkles, sun spots—and increased risk of skin cancer.
- Age, skin color, geographic latitude, seasonal variations in sunlight availability, and sunscreen use make it difficult for your body to produce all the vitamin D it needs.
- Much of the vitamin D produced in the skin is also taken up and used by other systems of the body.
- Between the ages of 20 and 70, your skin loses about 75% of its ability to produce vitamin D3—the metabolic precursor to calcitriol.
- Along with optimal vitamin D intake, topical vitamin D application can exert a protective and rejuvenating effect on aging skin.
OPTIMAL SKIN PROTECTION WITH VITAMIN D

Sunlight, Heat, and Skin: The Intricate Process of Vitamin D Production

There are five distinct layers that make up your epidermis. These are (from outer to inner): the stratum corneum, stratum lucidum, stratum granulosum, stratum spinosum, and stratum basale. Where vitamin D is concerned, however, it’s the stratum basale and stratum spinosum that are the most important. These two layers contain the highest concentration of a substance called 7-dehydrocholesterol (about 25-50 micrograms for every square centimeter of skin).29 7-dehydrocholesterol absorbs UVB light wavelengths that are present in sunlight.

Ultraviolet-B (UVB) light breaks the B ring of 7-dehydrocholesterol’s chemical structure to form what is called pre-D3. Pre-D3, a thermodynamically unstable molecule, then undergoes a heat-induced rearrangement to form the prohormone vitamin D3 or cholecalciferol.30

From here, vitamin D3 is transported to your liver, where it is combined with the 25-hydroxylase enzyme to form calcidiol (25-hydroxycholecalciferol or 25-hydroxyvitamin D). Once produced, calcidiol is stored in your liver until it is needed. Later calcidiol is released into the blood where it’s transported to the proximal tubules of your kidneys. Here it is hydroxylated by another enzyme, 1-alpha-hydroxylase, to create the biologically active form of vitamin D, 1,25-dihydroxycholecalciferol or calcitriol. Following this conversion, calcitriol is released back into the bloodstream and carried to the various target organs of your body by binding primarily to vitamin D binding proteins (85-88%) and albumin (12-15%).31

An intriguing study demonstrated one mechanism by which vitamin D may participate in innate immunity.15 After a skin wound occurred, keratinocytes surrounding the wound increased the expression of genes coding for antimicrobial receptors and the antimicrobial peptide, cathelicidin. The active form of vitamin D helped induce these gene expression changes, assisting the eradication of infectious invaders at the site of the skin wound. Vitamin D thus helps keratino-cytes recognize and respond to microbes and protect wounds against infection.

Topical application of a vitamin D analog has been found to increase expression of the LL-37 antimicrobial peptide in human skin. LL-37 is a prevalent antimicrobial peptide expressed by keratinocytes that plays numerous roles in skin health, including: controlling microbial flora in intact and damaged skin, attracting immune cells, promoting epithelial repair, and supporting angiogenesis needed for skin healing. Decreased expression of numerous antimicrobial peptides has been reported in certain skin conditions such as atopic dermatitis and chronic leg ulcers.16 Together, these findings highlight vitamin D’s crucial role in helping skin cells recognize and respond to invading microorganisms, protecting healing wounds against infection, and promoting skin healing.

Fighting Age-Accelerating Free Radicals in Your Skin

Although your body metabolizes oxygen very efficiently, your cells still get damaged by reactive oxygen species (ROS)—reactive molecules that contain oxygen.17 This happens when an oxygen molecule sacrifices one of its electrons during chemical reactions inside your body. The oxygen molecule is then left with an unpaired electron in its outer orbit, making it highly unstable.18 This oxygen free radical has to reestablish its balance and form an octet (an atom with eight valence electrons), so it steals a neighboring electron from other natural proteins in your skin to regain stability. This sets off chain reactions that result in an aftermath of misshapen and broken molecules. In the end, the structure of your skin is damaged and its cellular structure is weakened.19,20 Free radicals initiate the deterioration of your skin’s structural support and decrease its elasticity, resilience, and suppleness.

The most common oxygen free radicals are the singlet oxygen, the hydroxyl radical, and the superoxide anion, all of which are normally found in your skin because of its high rate of metabolic oxidation and the availability of fatty acids.21-23 However, other factors such as air pollution, alcohol consumption, cigarette smoke, and stress can increase free radical production as well.24 Stress not only generates potent, destructive free radicals—it also produces adrenaline-related products that restrict blood flow to your skin. Your skin is able to protect itself from this destructive oxidative...
stress through the use of low molecular weight antioxidants that combat free radicals. **Among the most important of these is vitamin D.** In fact, *vitamin D has been found to be more effective in reducing lipid peroxidation and increasing enzymes that protect against oxidation than vitamin E.*25,26

Unfortunately, between the ages of 20 and 70, **your skin loses about 75% of its ability to produce vitamin D3**—the necessary precursor to calcitriol. In conjunction with optimal intake of vitamin D3, topical vitamin D application may enhance its protective and rejuvenating effect on aging skin.

While most people now understand the importance of maintaining optimal vitamin D blood levels for its numerous health benefits, few know of its role in skin protection and rejuvenation. More a hormone than a vitamin, it is integral to the beauty, suppleness, and youthful appearance of skin. The complex process of vitamin D synthesis and utilization yields the active form, calcitriol, a hormone-like compound intrinsic to cellular proliferation and differentiation. Vitamin D thus contributes to skin cell growth, repair and metabolism. It mobilizes the skin’s immune system and helps destroy free radicals that can cause premature aging. Between the ages of 20 and 70, **your skin loses about 75% of its ability to produce vitamin D3**—the necessary precursor to calcitriol. In conjunction with optimal intake of vitamin D3, topical vitamin D application may enhance its protective and rejuvenating effect on aging skin.

**Summary**

While most people now understand the importance of maintaining optimal vitamin D blood levels for its numerous health benefits, few know of its role in skin protection and rejuvenation.

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

**References**

OPTIMAL SKIN PROTECTION WITH VITAMIN D


Maintaining strong, healthy bones is a cornerstone to successful aging. Unfortunately, even supplement users often fail to consume enough calcium, vitamin D, and other nutrients shown to help maintain healthy bones.

New research on vitamin D has led an increasing number of experts to advise men and women to consume 1,000 IU (and higher) of vitamin D each day to help maintain bone density.

The daily dose of Bone Restore provides 1,200 elemental milligrams of highly absorbable calcium, plus 1,000 IU of vitamin D3.

Bone Restore also contains ample magnesium, along with nutrients that enable calcium and magnesium to be incorporated in the bone matrix.

In addition, Bone Restore delivers a patented form of boron that is identical to natural plant forms found in food. Considered more bioavailable than other forms of boron, FruiteX B® OsteoBoron® supports healthy joints and bone.

Bone Restore comes in fast-release capsules, making the minerals and other nutrients immediately available for absorption.

The retail price for 150 capsules of Bone Restore is $22.50. If a member buys four bottles, the price is reduced to just $14.63 per bottle.

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

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As we get older our eyes become vulnerable to a variety of insults that can cause irritation, dry eye, and structural dysfunctions. Applying lubricating eye drops can alleviate eye discomfort.

Life Extension®’s Brite Eyes formula provides the best daily eye drops without irritation.

Brite Eyes contains two proven lubricants (hydroxyethylcellulose and glycerin) that are FDA-approved for ophthalmic use. Unlike conventional eye drop formulas, these lubricants are preserved with potent antioxidants and anti-glycating agents.

The Brite Eyes formula is buffered in a way to make it soothing to the eye. The suggested use of Brite Eyes III is to apply 1 to 2 drops in each eye every day.

Each box of Brite Eyes III contains two individual vials that provide 5 ml each. The reason for putting Brite Eyes into individual vials is to reduce the risk of bacterial contamination. Having small vials also makes it convenient for consumers to keep Brite Eyes readily accessible at home, the office, in one’s purse or pocket, and other places where access to a soothing eye drop is needed.

The retail price for a box containing two 5-ml vials of Brite Eyes III is $34. If a member buys four boxes, the price is reduced to $24 per box.

To order Brite Eyes III today, call 1-800-544-4440 or visit www.LifeExtension.com
Aging may be measured in years, but when it comes to your skin, every second counts. Over the course of a normal day, the epidermis, the outermost layer of your skin, naturally loses 30-40,000 cells per minute.¹

As you get older, your skin replaces these dead cells more slowly and produces less natural oil, as wrinkles, lines, and areas of dry rough-looking skin begin to appear. Sun exposure, pollution, and stress also take a daily toll by heightening the activity of damaging free radicals.²

Now you can replenish these areas and preserve your skin’s youthful radiance with new Vitamin D Lotion from Cosmesis®. Created by renowned dermatologist Gary Goldfaden, MD, this cutting-edge formula supplies rejuvenating factors directly to aging skin to maintain its healthy-looking, natural glow.

The Key Nutrient for Dry, Aging Skin

Vitamin D Lotion contains a highly absorbable form of vitamin D₃ called cholecalciferol.³ It readily penetrates the outer layer of your skin, nourishing dry areas by helping to lock in moisture before it’s lost. This helps to offset the visible impact of your skin’s gradually declining ability to renew itself.

Because of its quenching action, this active nutrient also helps with rough patches, dry spots, and areas of tough-looking skin that result from dehydration, cold weather, irritating fabric, or repeated friction and pressure.

Upper arms, elbows, knees, hands, and extremities are especially susceptible. Applying Vitamin D Lotion helps to restore their natural appearance.

A proprietary blend of highly refined tea extracts (green, black, red, white) has been added to augment vitamin D’s moisturizing and rejuvenating effect with polyphenols and antioxidants.⁴⁻⁶

Use Vitamin D Lotion wherever it’s needed, for a radiant complexion and soft, supple skin.

The retail price for a 4 oz bottle of Vitamin D Lotion is $29.95. If a member buys two bottles, the cost is only $21 each.
Based on an enormous amount of published data showing the multiple beneficial effects of lemon balm extract and L-theanine, Life Extension® has combined these potent, but safe nutrients into a proprietary formula called Natural Stress Relief. Each capsule of Natural Stress Relief provides:

- 300 mg of Cyracos® lemon balm extract
- 200 mg of Suntheanine® L-Theanine

Note that the amount of L-theanine in this product is double that of most L-theanine stand-alone supplements. The reason for this potency increase is reports of greater benefit when at least 200 mg of L-theanine are taken.

The retail price of a 30 count bottle of Natural Stress Relief is $28. If a member buys four bottles, the price of this potent stress-relieving formula is reduced to just $18 per bottle.

References:
Abraham Morgentaler, MD, FACS

Testosterone Therapy for Life

Millions of men needlessly suffer from low sex drive, loss of energy, and diminished enthusiasm for life—because of low levels of the male hormone testosterone. Normal levels can be readily restored using simple testosterone replacement therapy (TRT)—but in many audiences, those very words evoke the responses we commonly attribute to the hormone itself: rage, aggression, impulsiveness, and territoriality! Most physicians and many lay people continue to labor under a host of misconceptions, both about testosterone’s effects on human biology and behavior, and about the role of testosterone therapy in older adults.

The truth is finally emerging, however, thanks largely to the efforts of Dr. Abraham Morgentaler of the Harvard Medical School, and a small number of equally dedicated clinician-scientists who have devoted their careers to understanding testosterone’s myriad effects on humans throughout the life span, and on building a fact-based, myth-busting approach to TRT, thus revealing its benefits and its risks.
We recently had the opportunity to interview Dr. Morgentaler at length about his latest book, *Testosterone for Life* (McGraw-Hill, 2008), and about the exciting breakthroughs in men's health and medicine for older adults in which he has participated. Morgentaler is no newcomer to this field—he's a practicing urologist, an Associate Clinical Professor of Urology at the Harvard Medical School and the founder of Men's Health Boston (a center focusing on sexual and reproductive health for men). The author of a number of books including *The Male Body* (Fireside, 1993) and *The Viagra Myth* (Jossey-Bass, 2003), Morgentaler has been working in men's health, and particularly on the impact of testosterone, since he was an undergraduate student 30 years ago.

It’s unusual for undergraduates to publish as a first author, especially in the field that turns out to be their life’s work—so we asked Dr. Morgentaler to take us back to 1978 and his original study in the journal *Hormones and Behavior*. Morgentaler laughed—“We were actually studying lizards, which have very elaborate and ritualized mating behaviors,” he recalled. “We were just beginning to learn about the powerful effects of testosterone on specific regions of the brain, and how it influences behavior.” To that end, Morgentaler and his mentor, Dr. David Crews, were working with lizards that had been castrated to remove any source of native testosterone. “Castration completely eliminated the mating displays in male lizards,” Morgentaler noted. “They were simply oblivious to females in their presence.”

But when Crews and Morgentaler implanted testosterone in a very primitive brain center called the pre-optic area, the mating ritual was restored completely! “What was particularly remarkable about this,” Morgentaler continued, “was that these effects were purely local—we didn’t see any increase in blood testosterone levels. This showed us that testosterone has very precise, very specific effects on highly complex behaviors that originate deep in the brain.” The pre-optic area is responsible for many aspects of reproductive behavior in humans as well, and in fact the interaction of testosterone with the brain is a fundamental fact throughout the animal kingdom. Intrigued by all this, Dr. Morgentaler set out on a lifetime of discovery. Let’s be “armchair travelers” on the high points of his journey.

**Testosterone and Aging: Why Should We Care?**

“The first question to be asked in thinking about testosterone in humans is ‘Why should we care?’” Morgentaler began. “Among men more than 45-50 years old, the prevalence of low testosterone is at least 20-30%,” he continued (that’s an estimated 2 to 4 million men in the US alone!). “Many people (highly-respected physicians among them) have long believed that levels decline as a natural consequence of advancing age, and that therefore there is nothing we can or should do about it,” he went on. “That’s like telling a middle-aged person that since vision typically deteriorates with age, there’s no point in prescribing glasses—or that we shouldn’t treat atherosclerosis to prevent heart attacks, because it too is an age-related phenomenon. It just doesn’t make sense!”

How can a man know if he has low testosterone levels (or as Dr. Morgentaler calls it, “Low T”)? “Not every man with low T will have symptoms,” Morgentaler responded, “though many people with symptoms aren’t aware that they have low T. Because of their lack of understanding of the problem, compounded by some genuinely erroneous data that have been misquoted or overstated for decades, most doctors don’t regularly check testosterone levels—so many men go on suffering, undiagnosed.”

“In my practice, of course I see men whose complaints are primarily sexual: diminished drive and interest in sex, but also poor performance and absent or unsatisfying orgasms.” But low T also affects mood and behavior outside the bedroom. “I also find a very large number of men whose complaints are non-sexual in nature: they have chronic fatigue, they feel tired, lack energy and focus; they seem to have lost much of the drive that made them the men they thought they were (and liked to be).” As one of Dr. Morgentaler’s patients put it eloquently, “it feels like I have ‘brain fog’ all the time.”
Physical performance can suffer as well. Many patients complain that it takes much longer to "recharge" after exertion. "They tell me they just feel dead after what was once a normal workout," Morgentaler reports, "or they say that they just can't seem to improve with progressive training. That makes a lot of sense since we know that reduced testosterone levels contribute to loss of muscle bulk and strength, as well as to increased fat stores."7,5

It isn’t just the men themselves who perceive these gradual changes—in fact, frequently their wives and partners see the problems most clearly, especially when it comes to mood and behavior. “I sometimes ask a man if he feels crankier or more short-tempered than he used to,” Morgentaler relates. “Often the guy will say ‘No, not really,’ but his wife will exclaim ‘Oh my gosh yes, that’s exactly what’s going on! I thought it was just me!’”

That seemed paradoxical—doesn’t testosterone cause men to have a short fuse, to be ready for a fight, and to be reactive? “That’s just one of the many misconceptions about testosterone,” said Morgentaler. “It probably comes from widespread public knowledge about athletes who take a variety of steroid hormones at unnaturally high levels.” In fact we find that men who’ve become nastier as their T levels dropped actually stabilize their moods with replacement therapy.” Researchers at Germany’s Institute of Reproductive Medicine recently provided some independent support for this observation, noting that “testosterone substitution can increase positive mood and decrease negative mood.”9

But there are less obvious reasons to be concerned about declining testosterone levels—reasons that relate to total body health, not just behavior and performance, sexual or otherwise. According to Canadian expert Dr. Jerald Bain, “Testosterone is more than a ‘male sex hormone.’ It is an important contributor to the robust metabolic functioning of multiple bodily systems.”8 Dr. Morgentaler concurs, vehemently. “Testosterone stimulates and maintains muscle and bone growth, for example—many men don’t realize that low T puts them at increased risk for osteoporosis with advancing age. It also stimulates red blood cell production, helping to prevent anemia.” Testosterone levels are reduced in type 2 diabetes and the metabolic syndrome, and although cause and effect remain unclear, therapy with testosterone in these conditions can reduce LDL cholesterol, blood sugar, glycated hemoglobin, and insulin resistance.8,10,11 Finally, Morgentaler notes, “Men with low T die earlier than those with normal T.”7,12 That alone is ample reason to take notice.

Summarizing the “Why should we care” question, Dr. Morgentaler said, “If I told you of a known medication that can improve mood and performance, while reducing the risks for a host of chronic, apparently age-related conditions, and has the real potential for increasing longevity, you would jump at it. Well, there’s solid evidence for all
WELLNESS PROFILE

of that with responsible TRT. Men who feel old, have decreased ‘get up and go,’ and diminished sex drive may not simply be ‘getting old;’ they may be suffering from a treatable hormone deficiency.” The good news is that Morgentaler believes there’s a growing awareness of this issue, both among lay people and physicians: “I predict that within 5-10 years primary care physicians will be checking T levels routinely, and that men will know their T levels just like they know their cholesterol and PSA levels today.”

Obstacles to Acceptance of T Replacement Therapy

Why will it take even that long for such a successful approach to become mainstream? “There are three fundamental obstacles to widespread acceptance of TRT,” Morgentaler observed. “The first is that the benefits, though clear, have not been as well-documented in the literature as they should be, and therefore physicians simply don’t get a chance to learn as much as they could. Paradoxically, testosterone was ‘grandfathered’ into approval by the FDA years ago, so its benefits weren’t as rigorously demonstrated as would be required today. That means that, until recently, physicians didn’t have a large body of evidence to turn to. Fortunately, that’s changing with an increased number of studies on the subject.” In fact, by 2004 Dr. Morgentaler and a colleague found sufficient data to write a review article for the New England Journal of Medicine in which they provided the kind of summary that modern physicians need in order to best understand both the benefits and the possible risks of TRT.4

“Another obstacle to acceptance is that the diagnosis of testosterone insufficiency has been and is confusing to people both within and outside of medicine,” Morgentaler continued. “One of the main benefits I hope that my book will provide is to help individuals and their physicians to decide if low T is actually present or not. Some of this confusion has had to do with lack of awareness, some with lack of understanding of the various ways of measuring testosterone, and some with variations in the standards that laboratories use in reporting it.”

“The last, and possibly greatest, hurdle to overcome is the persistent idea that TRT causes prostate cancer,” Dr. Morgentaler went on. “As I point out in my book, this concept turns out to be based on a very few, very sketchy, and very old reports, most of which have also been very inaccurately cited—but cited so frequently that they’ve taken on the aura of truth. In fact, while prostate cancers do usually need testosterone to grow, there’s interesting laboratory evidence that prostate cancer cells behave less aggressively in the presence of testosterone than they do without it, suggesting that normal levels of testosterone may even turn out to be beneficial for men with prostate cancer.”

“Fortunately,” Dr. Morgentaler concluded, “all of these barriers are now relaxing, as it becomes clear how many body systems rely on healthy, normal T levels, and how normal T levels contribute to prevention of cardiovascular disease, diabetes, and the metabolic syndrome.”10,14

Making the Diagnosis

With the growing number of scholarly articles on T replacement therapy helping physicians and lay people alike overcome the knowledge barrier, the next step is clarifying the diagnosis. The most important clues come from the patient’s own history. “When I hear a man say ‘The sofa speaks to me,’ I am concerned,” Dr. Morgentaler said. “So often I hear variations on that theme—men just find that their new ‘normal’ level of activity is much lower than it used to be. They have trouble focusing, staying on top of their game. I see men from all walks of life, often those whose careers have been built on being sharp, on asking incisive questions, on making snap decisions—and they’re finding they just have trouble doing those things.”

As we’ve seen, mood can also be affected—it’s well known that men with low T are more prone to depression.15 “Beyond depression, my patients also frequently complain of dramatic mood swings,” Morgentaler noted.
Testosterone Therapy

- Men with diminished sex drive, energy, and enthusiasm for life may be suffering from low testosterone levels (“Low T”).
- Testosterone levels drop with advancing age—but that doesn’t mean the consequences are an inevitable part of aging.
- Harvard urologist Dr. Abraham Morgentaler has led the scientific effort to better understand how low T impacts a man’s overall function, performance, and even longevity.
- Most doctors still subscribe to the myth that T replacement increases the risk of prostate cancer, so they may resist treating their patients appropriately.
- Testosterone for Life, the new book by Harvard expert Dr. Abraham Morgentaler, documents the life-changing effects of safe, responsible testosterone replacement therapy (TRT).
- Morgentaler busts the T replacement-prostate cancer myth—and even provides evidence that it is safe in men at high risk for cancer.
- Men with low T (and their families) can enjoy enhanced quality of life with simple, effective, and easy to use T replacement therapy.

Blood levels are an important part of the diagnostic process too—but it isn’t entirely black and white. “While we currently don’t recommend that every man undergo regular testosterone checks as a screening test,” Morgentaler noted, “We do need to get primary care doctors thinking about the diagnosis in an increasingly broad way. Men who complain of fatigue, poor focus, and low energy levels, in addition to those with purely sexual complaints, should have their T levels checked. Not all will have low T, of course, but we know that we’re missing a very large number of people at present.”

As with any other blood test, it’s important to know what the “normal” levels are, and how they apply to an individual. “According to the FDA, “a ‘normal’ total T level is 300 ng/dL,” says Morgentaler. “Strictly interpreted that would mean that a man with a level of 299 is low, while a man with a level of 301 is normal. That’s simply not a sensible approach. The Endocrine Society, a very august group, has produced guidelines that mirror the FDA, though they do point out that no single number should be used and that symptoms should guide the diagnosis." The International Society for the Study of the Aging Male uses a higher number, 348. The point is that we need to interpret these numbers in the context of a man’s signs and symptoms.” In other words, if a man’s symptoms are consistent with low T and his level is anywhere near the low end of these scales, he and his physician should consider a trial of T replacement therapy.

According to Dr. Morgentaler, “Which tests are done, where they are done, and how they are reported also matter. Most primary care physicians use local laboratories, which can be inaccurate and arbitrary in their ‘normal’ reporting range. We pulled 25 hospital laboratories’ reference ranges at random, and found 17 different low and high ‘normal’ values.” Worse, none of these values were based on symptoms—they were based simply on standard deviation from average levels in the population. “In a population with 10% of men with truly low T levels, this approach means you’d miss three-quarters of them with standard testing,” Morgentaler points out. This can have significant impact when a primary care physician, appropriately concerned about the possibility of low T, gets back a “normal” result and falsely concludes that the problem lies elsewhere.

“A more rational approach, and one we’ve taken with other blood tests such as cholesterol, glucose, and PSA, is to establish healthy target levels based on the literature,” continued Morgentaler. “That way we have an objective measure that actually says something about a person’s risk for a particular outcome.”

Physicians may also need some reminding about which test to order for testosterone. Like other sex hormones, testosterone is found in the blood largely bound to a protein called sex hormone-binding globulin, or SHBG. But it’s the “free” testosterone that actually affects risk and performance, and standard testing measures only total T (free plus bound). “Physicians need to order both total and free T levels when they do their testing,” says Morgentaler. “If either one is low or in the ‘low normal’ range in a man with symptoms consistent with low T, then treatment should be considered.”

Do doctors need to send this test out to specialized labs? “Not at all,” responded Dr. Morgentaler. “Most labs can do both tests—physicians just have to know to order them.”

**So You Have Low T—What Can Be Done About It?**

Fortunately, once the diagnosis has been made on the basis of concerning symptoms and low or low-normal T levels, treatment is
fairly straightforward. “We have many options for treatment of men with low T,” Dr. Morgentaler observed. “There’s no recommended pill available in the US—there are some old ones still around that are not very effective and they are associated with significant liver toxicity, so no one should be using them for TRT.” But just about every other route has been explored.

“I usually start a man on a fairly short-acting form of T replacement,” Morgentaler continued, “so that we can gauge the effects together and make adjustments as needed. The market leader in this area is the testosterone gel, which is easy to use and has minimal skin reactivity. A man just shivers, dries, and then applies the gel to the upper arms or shoulders. It’s absorbed very rapidly, so there’s no need to cover the area with a dressing of any kind. Men like the gel because it’s convenient, and we like it because it delivers reliable blood levels of testosterone quickly.”

The gel will probably replace the still-available transdermal patch, still in use especially by the Veterans Administration. “The patch is easy to use, but it causes a significant amount of skin irritation,” says Dr. Morgentaler, “and it doesn’t produce great blood testosterone levels.” There’s also the injection route—an intramuscular shot given every 2 weeks. “The advantage,” Morgentaler notes, “is that we always get adequate levels this way—but of course it requires biweekly shots which most people don’t like.”

In a revival of an old technique (remember the lizard experiments), time-release implants are now available as well. “These are inserted just under the skin in the buttocks—we use 8-10 rice grain-sized pellets that slowly release T into the circulation. They produce great levels, there’s no ongoing maintenance required, and they are fully-absorbed, so never need to be removed,” says Morgentaler.

Finally, in terms of readily-available options, there are oral pastiches—tiny tablets that are placed between the cheek and gum. “They’re not visible to others,” Dr. Morgentaler points out, “and you just switch them every 12 hours.” These may be a good option for men who are uncomfortable with gels, injections, or implants.

What’s on the horizon? “A long-lasting injectable form of testosterone, called testosterone undecanoate, may soon be available—if approved by the FDA it will be called Aveed™ (it is known as Nebido® outside the US), and it is good for 2.5 months. This product is ideal for men who’ve had a favorable response to treatment, and just want to continue with good T levels without having to fuss with other dosing forms,” Dr. Morgentaler remarked.

What about side effects? “Testosterone therapy is safe,” Dr. Morgentaler stressed, “because unlike most pharmaceuticals, testosterone is a naturally occurring product of a man’s body. The replacement hormone is identical to endogenous testosterone. We see fairly minimal side effects of appropriate treatment: some minor swelling and tenderness of the breasts, and occasionally some acne breakouts occur. T therapy may also cause elevation of red blood cell counts, but there have been no reports of stroke or other related adverse effects.” An important consideration, though, is that production of sperm will decrease during treatment, and testicular size may also decrease. All reported side effects go away as soon as treatment is stopped, which is also reassuring.” And unlike the effects seen in body builders who use high-dose androgen injections that include non-testosterone hormones, “T therapy doesn’t cause kidney, liver, or cardiovascular disease. We monitor our patients by checking their T and PSA levels, examining their skin and breasts periodically, and checking blood counts once or twice yearly,” says Morgentaler.

**T Therapy and Prostate Cancer**

With diagnosis simplified and so many safe treatment options available, why are only about 5% of men with low T getting appropriate care? There’s a persistent fear of prostate cancer, and the belief that T therapy causes the disease continues to influence physicians and patients alike. “Most of my research and scientific writing has been on the purported relationship between T therapy and prostate cancer,” Dr. Morgentaler said. “The concerns have a historical basis—it’s long been known that reducing testosterone or its effects in men with metastatic prostate cancer makes the cancers smaller and slows their growth. That, perhaps naturally, led to the assumption that increasing testosterone would make the cancers larger and speed their growth.”

But in the past ten years, Morgentaler and other scientists have been aggressively challenging that assumption. “Long-term studies looking for increased incidence of prostate cancer in men with naturally high T levels have consistently failed to show any relationship at all,” notes Morgentaler. “Other studies showed that PSA was unchanged in men who received treatment that increased their T levels to more than twice the ‘normal’ range.” In fact, Dr.
Morgentaler has published data showing that men with significant reductions in testosterone levels actually have an increased risk for prostate cancer.\(^\text{18}\)

Other world-class researchers have become interested. A “pooled data” study by dozens of scientists in the Endogenous Hormones, Prostate Cancer Collaborative Group and published in the *Journal of the National Cancer Institute* reviewed 18 prospective studies that included 3,886 men with prostate cancer and 6,438 control subjects.\(^\text{19}\) The studies had all evaluated the risk of prostate cancer and levels of total and free testosterone as well as other sex hormones. The conclusion? “In this collaborative analysis of the worldwide data on endogenous hormones and prostate cancer risk, serum concentrations of sex hormones were not associated with the risk of prostate cancer.”

“More and more placebo-controlled studies are showing no increase in prostate cancer in men actually receiving T therapy,” Dr. Morgentaler noted. “So far these are only short-term studies because we just haven’t been doing it long enough,” he continued, “but the longitudinal studies are so strong that I believe the question has been answered firmly.” Does T therapy cause increases in PSA (the marker for early prostate cancer)? “There’s no difference between PSA ‘trigger events’ (PSA over the threshold of 4 ng/dL) in men receiving T replacement and those who aren’t,” Morgentaler said, citing data both from his own work\(^\text{20}\) and another pooled meta-analysis study.\(^\text{21}\)

Based on the overwhelming wealth of data, Dr. Morgentaler is now beginning to provide T replacement therapy to men who’ve had prostate cancer—something that would have been anathema just a few years ago.\(^\text{22}\) Other experts are beginning to follow suit.\(^\text{23,24}\) Even more impressively, Morgentaler and his colleague Emani Rhoden at Harvard have also begun T therapy in men at high risk for prostate cancer—men who have biopsy-proven prostatic intraepithelial neoplasia (PIN), which is considered to be a precancerous condition.\(^\text{25}\)

This is more than just good science—Morgentaler’s work is providing improved quality of life for men who thought they’d seen the last of their male vigor. “I saw an 84-year-old man with prostate cancer,” recalls Morgentaler. “He wasn’t interested in treating the cancer at his age, and he wanted T therapy because he was interested in the benefits. Two years later he’s actually seen a decrease in his PSA levels, and more importantly, he feels great!”

**Cautionary note:** Although quite a number of urologists and oncologists will now offer TRT to men with a history of prostate cancer, primarily after successful treatment of the cancer, many others are still concerned that treatment may increase the risk of cancer recurrence. And language mandated by the FDA for all commercial testosterone products advises against using TRT in men with any history of prostate cancer. The field still awaits large studies to determine the degree of safety of TRT in men with prostate cancer.

**Summary**

Dr. Morgentaler closed our discussion with this summary of where we are with T replacement therapy: “Low T is common—much more so than most people realize. It has effects far beyond the very important impact on sexual function; in fact low T is associated with everything from...
atherosclerosis to the metabolic syndrome to male osteoporosis. And men with low T simply don’t feel good, and they don’t know why. Low T is vastly under-treated, yet T replacement therapy is safe and rapidly effective—we typically see results within weeks of starting treatment. I believe that any man over the age of 50 who feels rundown, off his game, or has any of the other symptoms of low T owes it to himself and his family to have his T levels checked, and if they are low, to be treated.” The final words in Morgentaler’s book say it eloquently: “We always have choices when it comes to our health. For many men with low T, learning about the condition and finding help to treat it is a good choice—a choice for life.”

The cover price of Testosterone for Life is $16.95, Life Extension® members pay only $11.87 a copy.

Item#33809

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

References

Dr. Morgentaler is recognized as one of the top international authorities on testosterone therapy. He is an Associate Clinical Professor at Harvard Medical School. Dr. Morgentaler’s scientific work has been published in *NEJM, JAMA* and *Lancet*. He is the author of three books: *Testosterone for Life*, *The Viagra Myth* and *The Male Body*.

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#### MEN’S ANNUAL BLOOD TESTING

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<td><strong>MEN’S ANNUAL BLOOD TESTING</strong></td>
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<td>DHEA-S</td>
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<td>Pregnenolone and Dihydrotestosterone (DHT)</td>
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<td>To provide an even more in-depth analysis of a man’s hormone status. Life Extension has created this panel as an additional to the Male Life Extension Panel. This panel provides information about a testosterone metabolite that can affect the prostate; and the hormone progesterone that acts as a precursor to all other hormones.</td>
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<td><strong>THYROID ADD-ON PANEL (LCTHYROID)</strong></td>
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<td><strong>VITAMIN D (25-OH)</strong> (LC081950)</td>
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<td>This test is used to assess vitamin D status in your body.</td>
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<td><strong>OMEGA SCORE++</strong> (LCOMEGA)</td>
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<td>Provides valuable information on your risk of developing heart disease, sudden heart attack, and cardiac death. The Omega Score™ also includes your AA:EP ratio, allowing you to determine and track a major factor in total body inflammation.</td>
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<td>High levels of this blood-clotting factor increase the risk of heart attack and stroke.</td>
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<td><strong>COENZYMES Q10†</strong> (LC120251)</td>
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<td>This test is used to aid in predicting risk for coronary heart disease, and ischemic stroke associated with atherosclerosis. LP-PLA2 is a cardiovascular risk factor that provides unique information about the stability of the plaque inside your arteries.</td>
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<td><strong>VAP™ TEST</strong> (LC084500) <strong>UPDATED</strong></td>
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<td>The VAP cholesterol test provides a more comprehensive coronary heart disease (CHD) risk assessment than the conventional lipid profile. This test includes measurements of LDL particle size and lipoprotein subclasses.</td>
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<td>This test measures delayed (IgG) food allergies for 45 common foods.</td>
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</tr>
<tr>
<td>Used to evaluate iron stores in the body and to determine iron deficiency anemia.</td>
<td></td>
</tr>
<tr>
<td><strong>HEMOGLOBIN A1C</strong> (LC001453)</td>
<td><strong>$23.25</strong></td>
</tr>
<tr>
<td>Used to assess long-term glucose control.</td>
<td></td>
</tr>
<tr>
<td><strong>VITAMIN B12/FOLATE</strong> (LC000810)</td>
<td><strong>$24.75</strong></td>
</tr>
<tr>
<td>This test measures the amount of vitamin B12 and folate in the blood.</td>
<td></td>
</tr>
<tr>
<td><strong>INSULIN (FASTING)</strong> (LC003433)</td>
<td><strong>$31.50</strong></td>
</tr>
<tr>
<td>Can predict those at risk of diabetes, obesity, and heart and other diseases. * For non-member pricing call 1-800-208-3444. ** This test is packaged as a kit, requiring a finger stick performed at home.</td>
<td></td>
</tr>
</tbody>
</table>

### SUGGESTED ADDITIONS TO ANNUAL BLOOD TESTING

<table>
<thead>
<tr>
<th>Test Description</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FIBRINOGEN†</strong> (LC001610)</td>
<td>$23.25</td>
</tr>
<tr>
<td><strong>COENZYMES Q10†</strong> (LC120251)</td>
<td><strong>$108.75</strong></td>
</tr>
<tr>
<td><strong>FERRITIN</strong> (LC004598)</td>
<td><strong>$21</strong></td>
</tr>
<tr>
<td><strong>HEMOGLOBIN A1C</strong> (LC001453)</td>
<td><strong>$23.25</strong></td>
</tr>
<tr>
<td><strong>VITAMIN B12/FOLATE</strong> (LC000810)</td>
<td><strong>$24.75</strong></td>
</tr>
<tr>
<td><strong>INSULIN (FASTING)</strong> (LC003433)</td>
<td><strong>$31.50</strong></td>
</tr>
</tbody>
</table>

*Certain tests need to be shipped to the lab on dry ice for customers using a blood draw kit, and incur an additional $35 charge. If you are going to LabCorp, this charge does not apply.
### POPULAR PANELS

**CBC/CHEMISTRY PROFILE (LC381832)**

- **Note:** This CBC/Chemistry profile is included in the Male and Female Life Extension panels.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Cholesterol</td>
<td>Cholesterol/HDL Ratio</td>
</tr>
<tr>
<td>HDL Cholesterol</td>
<td>Estimated CHD Risk</td>
</tr>
<tr>
<td>LDL Cholesterol</td>
<td>Glucose</td>
</tr>
<tr>
<td>Triglycerides</td>
<td></td>
</tr>
</tbody>
</table>

**LIVER FUNCTION PANEL**

- AST (SGOT) Total Bilirubin
- ALT (SGPT) Alkaline phosphatase
- LDH

**BLOOD PROTEIN LEVELS**

- Total Protein
- Globulin
- Albumin
- Albumin/Globulin Ratio

**BLOOD COUNT/RED AND WHITE BLOOD CELL PROFILE**

- Red Blood Cell Count
- White Blood Cell Count
- Eosinophils
- Basophils
- Monocytes (Absolute)
- Lymphocytes
- Eosinophils
- Basophils
- Platelet Count
- Hemoglobin
- MCHC
- MCV
- Hematocrit
- Total Red Blood Cells
- White Blood Cell Count
- Basophils
- Monocytes
- Eosinophils
- Neutrophils
- Erythrocytes
- Leukocytes
- Basophils
- Monocytes
- Eosinophils
- Neutrophils
- RDW

**BLOOD MINERAL PANEL**

- Calcium
- Sodium
- Potassium
- Chloride
- Phosphorus
- Iodine

**FEMALE HORMONE RE-TEST PROFILE (LCRTF)**

- CBC/Chemistry Profile, DHEA-S, Total Estrogen, Pregnenolone, Total and Free Testosterone, Progesterone, and TSH. Continual monitoring of hormone levels is necessary for women seeking to maintain optimal blood level values.

**MALE HORMONE RE-TEST PROFILE (LCRTM)**

- CBC/Chemistry Profile, DHEA-S, DHT, Estradiol, PSA, Pregnenolone, Total and Free Testosterone, and TSH. Continual monitoring of hormone levels is necessary for men seeking to maintain optimal blood level values.

**DR. LICHTEN COMPREHENSIVE THYROID PANEL (LICHTENO2)**

- TSH, T4, Free T3, Reverse T3, Thyroid antibodies, Thyroid peroxidase antibodies, Red cell magnesium, vitamin D(25-DH).

**DR. LICHTEN CARDIC RISK FACTORS (LICHTENO5)**

- Homocysteine, C-Reactive Protein, Ferritin, Fibrinogen, ABO, and Rh blood typing.

**DR. LICHTEN COMPREHENSIVE MALE PANEL (LICHTEN01M)**

- Male Life Extension Panel PLUS: IGF-1, FSF, LH, TSH, Free T4, Cortisol, Fasting Insulin, Sex Hormone Binding Globulin, and Hemoglobin A1C.

**DR. LICHTEN COMPREHENSIVE FEMALE PANEL (LICHTEN01F)**

- Female Life Extension Panel PLUS: IGF-1, FSF, LH, TSH, Free T4, Cortisol, Fasting Insulin, Sex Hormone Binding Globulin, and Hemoglobin A1C.

### POPULAR SINGLE TESTS

#### OSTEOCALCIN (LC010249)

- **Price:** $88.25
- A valuable aid in identifying risk of developing osteoporosis.

#### DPD CROSS LINK TEST (LC511105)

- **Price:** $59.25
- A urine test used as a tool to assess the true rate of bone turnover.

#### IGF-1 (LC010363)

- **Price:** $56.25
- Indicates growth hormone secretion levels. Low levels have been associated with atherosclerosis as well as all-cause mortality.

#### INSULIN-LIKE GROWTH FACTOR BINDING PROTEIN 3 (IGFBP3) (LC140152)

- **Price:** $35.25
- Elevated levels in hypertensive individuals have been associated with nine-fold increase of carotid arteriosclerosis.

#### DHEA-SULFATE (LC004697)

- **Price:** $45.75
- This test shows if you are taking the proper amount of DHEA.

#### DIHYDROTESTOSTERONE (DHT)† (LC500142)

- **Price:** $74.25
- Measures serum concentrations of DHT.

#### FREE AND TOTAL TESTOSTERONE (LC140103)

- **Price:** $74.25
- Determines whether testosterone replacement should be considered as a therapy for depression, abdominal obesity, low energy, poor mental performance, or loss of libido.

#### PROGESTERONE (LC004317)

- **Price:** $41.25
- Primarily for women. Determines the proper amount in the body.

#### PSTA (TOTAL PSA)† (LC480780)

- **Price:** $45.75
- Recommended to determine if an elevated PSA is indicative of prostate cancer.

#### FREE-PSA (INCLUDES TOTAL PSA)† (LC004515)

- **Price:** $24.75
- For men and women. Determines the proper amount in the body.

#### PREGNENOLONE† (LC140707)

- **Price:** $87
- Used to determine ovarian failure, hirsutism, adrenal carcinoma, and Cushing’s syndrome.

#### SEX HORMONE BINDING GLOBULIN (SHBG) (LC808106)

- **Price:** $24.75
- This test is used to monitor SHBG levels which are under the positive control of estrogens and thyroid hormones, and suppressed by androgens.

#### URINARY 2/16 ESTROGEN METABOLITE RATIO (LCU73000)

- **Price:** $128
- The ratio is relevant as a risk factor for estrogen-sensitive diseases including breast and cervical cancers and osteoporosis.

### TERMS AND CONDITIONS

This blood test service is for informational purposes only and no specific medical advice will be provided. National Diagnostics, Inc., and the Life Extension Foundation contract with a physician who will order your test(s), but will not diagnose or treat you. Both the physician and the testing laboratory are independent contractors and neither National Diagnostics, Inc., nor the Life Extension Foundation will be liable for their acts or omissions. Always seek the advice of a trained health professional for medical advice, diagnosis, or treatment. When you purchase a blood test from Life Extension/National Diagnostics, Inc., you are doing so with the understanding that you are privately paying for these tests. There will be absolutely no billing to Medicare, Medicaid, or private insurance. I have read the above Terms and Conditions and understand and agree to them.

**Signature of Life Extension Member**

**MEMBER NO.**

- Male
- Female

**Name**

**Date of Birth (required)**

**Address**

- **City**
- **State**
- **Zip**

**Credit Card No.**

**Expiration Date**

**Mail your order form to:**

**Life Extension**

1100 West Commercial Blvd.,
Ft. Lauderdale, FL 33309

Phone your order to: 1-800-208-3444

Fax your order to: 1-866-728-1050

**For non-member prices call 1-800-208-3444**

This is NOT a complete listing of LE blood test services. Call 1-800-208-3444 for additional information.
AMINO ACIDS
Acetyl-L-Carnitine
Acetyl-L-Carnitine-Arginate
Branched Chain Amino Acids
D, L-Phenylalanine Capsules
GABA Powder
Glycine Capsules
Glycine Powder
Arginine Capsules
L-Arginine Free Base Powder
Arginine/L-Ornithine Capsules
L-Carnitine Capsules
L-Carnitine Powder
L-Cysteine Capsules
L-Glutathione, L-Cysteine & C
L-Glutamine Capsules
L-Glutamine Powder
L-Lysine Capsules
L-Lysine Powder
L-Methionine Powder
L-Tyrosine Powder
L-Tyrosine Tablets
Mega L-Glutathione Capsules
N-Acetyl Cysteine Capsules
Optimized Carnitine with GlycoCarn®
PharmaGABA
Super Carnosine Capsules
Taurine Capsules
Tryptopure® Tryptophan
(Also available with Probiotics)
(Optimized) Tryptopure® Plus
Arginine/L-Ornithine Capsules
Arginine Capsules
Agave Digestive-Immune Support
ArthroMax™ with Theaflavins
Bone-UP™
Bone Restore™
Bone Strength Formula w/KoAct™
Chondroitin Sulfate
ChondroX
Fast Acting Joint Formula
Glucosamine Chondroitin Capsules
BRAIN HEALTH
Acetyl-L-Carnitine
Acetyl-L-Carnitine-Arginate
CDP Choline Capsules
Cognitex with NeuroProtection Complex
Cognitex with Pregnenolone &
NeuroProtection Complex
DMAE
D3MAE-Ginkgo
DMAE Powder (37% DMAE)
Ginkgo Biloba Certified Extract™
Huperzine A
Lecithin with B5 and BHA
Lecithin Granules
Methylcobalamin Lozenges
Optimized Ashwagandha Extract
Phosphatidylserine Capsules
Rhodiola Extract
Super Ginkgo Extract
Vinpocetine
DIGESTIVE
Agave Digestive-Immune Support
Bromelain Powder
CamuCamu w/PicroProtect
Digest RC™
Enhanced Super Digestive Enzymes
(also available with Probiotics)
Florasoft
Intact Digest
LifeFlora™
Natural Esophaguard
NutraFlora (FOS) Powder
N’Zimes™
Pancreatin
Papain Powder
Primal Defense
Regimint®
DURK AND SANDY PRODUCTS
Blazr™
Dual-C
Inner Power™
Memory Upgrade
EYE CARE
Bilberry Extract
Blackcurrant Freeze Dried Extract
Brite Eyes III
Lutein Plus Powder
Overcast Polarized Sunglasses
Solarshield Sunglasses
Super Zeaxanthin with Lutein &
Meso-Zeaxanthin
(Plus Astaxanthin also available)
Vision Optimizer
FIBER
Apple Pectin Powder
Chitosan
Enhanced Fiber Food Powder
Hi-Ligan® Nutri-Flax®
SlimStyles™ PGX
WellBetX PGX™ Soluble Fiber Blend
HAIR CARE
Dr. Proctor’s Advanced Hair Formula
Dr. Proctor’s Shampoo
Healthy Hair Spray
Life Extension Shampoo and Conditioner
Super-Absorbable Tocotrienols
HEART HEALTH
Advanced Lipid Control
Cho-Less
D-Ribose Capsules
D-Ribose Powder
Endothelial Defense™ w/Full-Spectrum
Pomegranate™
Enhanced CoQ10 with Brewer’s Yeast
Fibrogen Resistant
Forskolin
Homocysteine Resistant
Low Dose Aspirin (Enteric Coated)
Natural BP Management
Peak ATP® with GlycoCarn®
Policosanol
Red Yeast Rice
Super Absorbable CoQ10™ with d-Limonene
Super Omega-3 EPA/DHA with Sesame
Lignane & Olive Fruit Extract
Super Ubiquinol CoQ10
Super Ubiquinol CoQ10 with Enhanced
Mitochondrial™ Support
Sytroltol™
Theaflavin Standardized Extract
TMG Powder
TMG Tablets
Vascular Protect
HERBAL/PHYTO PRODUCTS
Artichoke Leaf Extract
Astragalus
Berry Complete
Blackcurrant Juice Concentrate
Blueberry Extract
Blueberry Extract w/Pomegranate
and CocoaGold™
Butterbur Extract w/Standardized
Rosmarinic Acid
Calcium D-Glucarate
Chlorophyll
Citrus Bioflavonoid
CocoaGold™
Enhanced Berry Complete with RZD™ Acai
Grapeseed Extract with Resveratrol &
Pterostilbene
Green Tea Leaves
Hesperidin Complex Powder
Huperzine A with Natural Vitamin E
Kyolic® Garlic Formula 105
Kyolic® Reserve
Lycopene
Mega Green Tea Extract
Mega Green Tea Extract (Decaffeinated)
Mega Lycopene
Mega Silymarin with Isosilybin B
Nutrim
Optimized Ashwagandha Extract
Phyto-Food
Pomegranate Extract
Pomegranate Extract with CocoaGold™
(Full-Spectrum) Pomegranate™
Pomegranate Juice Concentrate
ProGreens®
Pure-Gar™
Pycnogenol
Optimized Quercetin
Resveratrol with Pterostilbene
Rhodiola Extract
Rosmarinic Acid Extract
Rubin Powder
Silymarin
SODzyme™ with GliSOdin®
Stevia Extract
Super Bio-Curcumin®
Super Curcumin with Bioperine®
Super Polyphenol Extracts w/CocoaGold™
Super Ginkgo Extract
Triple Action Cruciferous Vegetable Extract
Venotone Tablets
Whole Grape Extract
HORMONES
7-Keto DHEA
DHEA
DHEA Complete
GH Pituitary Support Day Formula
GH Pituitary Support Night Formula
Melatonin
Melatonin Timed Release
Natural Estrogen with Pomegranate Extract
Pregnenolone
ProFem Cream
Pure IGF
Super Miraforte with Standardized Lignans
IMMUNE ENHANCEMENT
Agave Digestive-Immune Support
AHCC® (Active Hexose Correlated Compound)
Buffered Vitamin C Powder
Echinacea
Enhanced Life Extension Whey Protein
25’ Hyperimmune Egg
Immune Protect with PARACTIN®
Lactoferrin
Maitake SX-Fraction
Norwegian Shark Liver Oil
Primal Defense™
ProBoost™ Thymic Protein A
Pure Gar™
Sambucus Guard
Theralac Capsules
Thymic Immune Factors
Ultimate Flora Advanced Immunity
Vitamin C with Diphydrotocopherol
Zinc Lozenges with Vitamin C
INFLAMMATORY REACTIONS
Arthrod-Immune Joint Support
ArthroMax™ with Theaflavins
Barlean’s Kids DHA
Boswellia
Boswellia™ Topical Cream
Bromelain (Specially-coated)
Coromega Kids Brain and Body (DHA)
DHA 240
Emulsified Norwegian Cod Liver Oil
Emulsified Super Twin EPA/DHA
Fast Acting Joint Formula
Korean Angelica
5-LOXIN®
Mega EPA/DHA
Mega GLA with Sesame Lignans
MSM
Natural Relief 1222™ Cream
PhosphOmeGA™ Krill Oil
Perilla Oil
Serralyszyme
Shark Cartilage
SODzyme™ with GliSOdin® and Wolfberry
Super Omega-3 EPA/DHA with Sesame
Lignans & Olive Fruit Extract
Tart Cherry
Udo’s Choice Oil
Zyflamend Easy
LIVER HEALTH
Branch Chain Amino Acids
HepatoPro
Mega Silmarin with Isoisolybin B
N-Acetyl Cysteine
SAMe
Silmarin

MINERALS
Biosil
Bone Restore
Bone Strength Formula w/KoAct™
Bone-Up
Boron Capsules
Calcium Citrate with D3
Chromium Ultra
Copper
Iodoral
Iron Protein Plus
Magnesium
Magnesium Citrate
Mineral Formula for Men
Mineral Formula for Women
Only Trace Minerals
OptiZinc
Sea-Iodine™
Se-Methylselenocysteine
Vanadyl Sulfate
Zinc/Vitamin C Lozenges

PROSTATE & URINARY HEALTH
BetterWOMAN®
Optimized Cran-Max® with UTIRose™
5-LOXIN®
(Water-Soluble) Pumpkin Seed Extract
Super Saw Palmetto with Beta-Sitosterol
Super Saw Palmetto/Nettle Root Formula
w/Beta-Sitosterol
Ultra Natural Prostate Formula

SKIN CARE
Anti-Aging Mask
Anti-Glycation Serum
Antioxidant Facial Mist
Antioxidant Rejuvenating Foot Cream
Antioxidant Rejuvenating Foot Scrub
Antioxidant Rejuvenating Hand Cream
Antioxidant Rejuvenating Hand Scrub
Anti-Redness & Blemish Lotion
Cellulite Suppress™ Formula
Corrective Clearing Mask
Derma Whey
Dual-Action MicroDerm Abrasion
Essential Plant Lipids Reparative Serum
Face Master® Platinum
Face Rejuvenating Antioxidant Cream
Enhanced FerBlock® with Sendara™
Fine Line-Less
Hair Suppression Formula
 Healing Mask
Hyaluronic Facial Moisturizer
Hydroderm®
Lavilin Underarm Deodorant
Life Extension Sun Protection Spray
Lifting & Tightening Complex
Melatonin Cream
Mild Facial Cleanser
NaPCA w/Aloe Vera
Neck Rejuvenating Antioxidant Cream
New Face Solution
Peel Off Cleansing Mask
Pigment Correcting Cream
(ultra) Rejuvenex™
Rejuvenex® Body Lotion
Rejuvenex® Factor
Rejuvenating Serum
Skin Lightening Serum
Skin Stem Cell Serum
Total Sun Protection Cream
Triple Action Under Eye Rejuvenator
Ultra Rejuvenex™
Ultra RejuveNight™ w/Progesterone
Ultra RejuveNight™ w/Progesterone
Ultra Lip Plumper
Ultra Wrinkle Relaxer
Under Eye Refining Serum
Under Eye Rescue Cream
Vitamin C Serum
Vitamin D Lotion
Vitamin K Healing Cream

SOY
Natural Estrogen w/Pomegranate
Soy Power Powder
Soy Protein Concentrate
Super Absorbable Soy Isoflavones
Ultra Soy Extract

SPECIAL PURPOSE FORMULA
Anti-Alcohol Antioxidants w/HepatoProtection Complex
Benfotiamine w/Thiamine
Breast Health Formula
Butterbur Extract w/Standardized Rosmarinic Acid
Chlorella
Chlorophyllin w/ Zinc
CocoaGold w/Beta Glucan
Curcumin Versicolor Super Strength
DermaVita
Enhanced Cinsulin® w/Glucose Management Proprietary Blend
EDTA (European Leg Solution) Diosmin95
Fem Dophilus
Fenugreekens MacaPause®
GlucoFit™
Ideal Bowel Support 299V
Lustre™

VITAMINS
Ascorbic Acid Powder
Ascorbyl Palmitate Capsules
Ascorbyl Palmitate Powder
B1
B2
B12
Beta-Carotene
Bilatin Capsules
Biotin Powder
Buffered Vitamin C Powder
Complete B Complex
Eligen® B12
Folic Acid + B12
Folic Acid powder
Gamma E Tocopherol w/Sesame Lignans
Gamma E Tocopherol/Tocotrienols
Inositol Capsules
Inositol Powder
Liquid Emulsified Vitamin A
Mega Lycopene Extract
Methylcobalamin MK-7
No-Flush Niacin
Optimized Folate
PABA Capsules
PABA Powder
Super Ascorbate C Capsules
Super Ascorbate C Powder
Super K w/Advanced K2 Complex
Tocotrienols w/Sesame Lignans
Vitamin B1 Powder
Vitamin B2 Powder
Vitamin B3 (Niacin) Capsules
Vitamin B5 Powder
Vitamin B6
Vitamin B12 Powder
Vitamin C
Vitamin D
Vitamin D3
Vitamin D3 w/Sea-Iodine™
Vitamin E Succinate
Vitamin K1

WEIGHT MANAGEMENT
AII® Refill Pack
Belly Slim & Tone
Chitosan
CitriChrome
7-Keto DHEA
DHEA Complete
Enhanced Fiber Food
Fucosaxanthin Slim™
HCA
IntegraLean® Irvingia
Optimized Irvingia w/Phase 3™ Calorie Control Complex
Life Mix
Natural Appetite Control
SlimStyles® PGX Natural Weight Loss
Stevia Liquid Extract
Super CLA Blend w/Guarana and Sesame Lignans
Super CLA Blend w/Sesame Lignans
Udo’s Choice Wholesome Fast Food Blend
WellBetX PGX® Soluble Fiber Blend
### Buyers Club Order Form

<table>
<thead>
<tr>
<th>No.</th>
<th>Retail Price</th>
<th>Member Price</th>
<th>Qty</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0049</td>
<td>ACETYL-L-CARNITINE - 500 mg, 100 caps</td>
<td>$56.00</td>
<td>$42.00</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ACETYL-L-CARNITINE - 4 bottles of 100 caps</td>
<td>186.64</td>
<td>139.98</td>
<td></td>
</tr>
<tr>
<td>00788</td>
<td>ACETYL-L-CARNITINE ARGINATE - 100 caps</td>
<td>59.00</td>
<td>44.25</td>
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</tr>
<tr>
<td></td>
<td>ACETYL-L-CARNITINE ARGINATE - 4 bottles of 100 caps</td>
<td>203.96</td>
<td>152.79</td>
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</tr>
<tr>
<td>01308</td>
<td>ADVANCED LIPOID CONTROL - 60 veg. caps</td>
<td>30.00</td>
<td>22.50</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ADVANCED LIPOID CONTROL - 4 bottles of 60 veg. caps</td>
<td>106.00</td>
<td>81.00</td>
<td></td>
</tr>
<tr>
<td>01300</td>
<td>ADVANCED ORAL HYGIENE - 60 veg. mint lozenges</td>
<td>20.00</td>
<td>15.00</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ADVANCED ORAL HYGIENE - 4 bottles of 60 veg. mint lozenges</td>
<td>72.00</td>
<td>54.00</td>
<td></td>
</tr>
<tr>
<td>01417</td>
<td>AGAVE DIGESTIVE IMMUNE SUPPORT - 360 grams of powder</td>
<td>30.00</td>
<td>22.50</td>
<td></td>
</tr>
<tr>
<td></td>
<td>AGAVE DIGESTIVE IMMUNE SUPPORT - 4 bottles of powder</td>
<td>106.00</td>
<td>81.00</td>
<td></td>
</tr>
<tr>
<td>00681</td>
<td>ACIC - 500 mg, 30 caps</td>
<td>48.98</td>
<td>36.74</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ACIC - 4 bottles of 30 caps</td>
<td>174.20</td>
<td>130.65</td>
<td></td>
</tr>
<tr>
<td>46925</td>
<td>ALL® REFILL PACK - 60 mg, 120 caps</td>
<td>69.95</td>
<td>58.00</td>
<td></td>
</tr>
<tr>
<td>00261</td>
<td>ALL-IN-ONE WEIGHT LOSS FORMULA - 300 caps</td>
<td>59.95</td>
<td>44.96</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ALL-IN-ONE WEIGHT LOSS FORMULA - 2 bottles of 300 caps</td>
<td>110.00</td>
<td>82.50</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ALL-IN-ONE WEIGHT LOSS FORMULA - 4 bottles of 300 caps</td>
<td>174.00</td>
<td>139.50</td>
<td></td>
</tr>
<tr>
<td>00457</td>
<td>(SUPER) ALPHA-LIPIC ACID w/BIOTIN - 250 mg, 60 caps</td>
<td>37.00</td>
<td>27.75</td>
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</tr>
<tr>
<td>(SUPER) ALPHA-LIPIC ACID w/BIOTIN - 4 bottles of 60 caps</td>
<td>128.00</td>
<td>96.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>01420</td>
<td>ANTI-ALCOHOL ANTIOXIDANTS w/HEPATOPRO - 100 caps</td>
<td>18.00</td>
<td>13.50</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ANTI-ALCOHOL ANTIOXIDANTS w/HEPATOPRO - 4 bottles of 100 caps</td>
<td>64.00</td>
<td>48.00</td>
<td></td>
</tr>
<tr>
<td>00105</td>
<td>APPLE PECTIN POWDER - 227 grams of powder</td>
<td>14.75</td>
<td>11.06</td>
<td></td>
</tr>
<tr>
<td></td>
<td>APPLE PECTIN POWDER - 4 bottles of powder</td>
<td>55.00</td>
<td>41.25</td>
<td></td>
</tr>
<tr>
<td>00102</td>
<td>ARGININE CAPS - 800 mg, 200 caps</td>
<td>36.50</td>
<td>28.88</td>
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<td>ASTAXANTHIN - 2 mg, 30 softgels</td>
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</table>

**SUB-TOTAL OF COLUMN 1**

**SUB-TOTAL OF COLUMN 2**

To order call: 1.954.766.8433 or 1.800.544.4440

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JUNE 2010

**LIFE EXTENSION MEMBERS RECEIVE 25% OFF THE RETAIL PRICE OF ALL PRODUCTS**

* These products are not 25% off retail price.
LIFE EXTENSION MEMBERS RECEIVE 25% OFF THE RETAIL PRICE OF ALL PRODUCTS

### Buyers Club Order Form

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<th>No.</th>
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<td>BROMELAIN POWDER - 100 grams of powder</td>
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<td>CALCIUM/MAGNESIUM POWDER - 4 bottles of 60 caps</td>
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<td>CDP CHOLINE CAPS - 4 bottles of 60 caps</td>
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<td>CHILDERELLA - 500 mg, 200 tablets</td>
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<td>CHOLINE BITARTRATE - 4 bottles of powder</td>
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**SUB-TOTAL OF COLUMN 3**

**SUB-TOTAL OF COLUMN 4**
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<td>COSMESIS ANTI-AGING MASK - 2 oz bottle</td>
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<td>COSMESIS ANTI-AGING MASK - 2-2 oz bottles w/BLUEBERRY &amp; POMEGRANATE EXTRACTS</td>
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<td>COSMESIS ANTI-AGING CREAM - 2 oz jars</td>
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<td>COSMESIS LIFTING &amp; TIGHTENING COMPLEX - 1 oz</td>
<td>$69.95</td>
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<td>COSMESIS MELATONIN CREAM - 1 oz jar</td>
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<td>COSMESIS NECK REJUVENATING ANTI-OXIDANT CREAM - 2-2 oz jars</td>
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<td>DR. PROCTOR'S ADVANCED HAIR FORMULA - 2 oz</td>
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<td>FLOSTART* - 250 mg, 50 caps</td>
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<td>FOLIC ACID + B12 CAPSULES - 200 caps</td>
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<td>FORSKOLIN - 10 mg, 60 caps of elemental forskolin</td>
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** Due to license restrictions, this product is not for sale to wholesalers outside of the United States of America and Canada.
** Can only be sold in the United States and cannot be sold into the health food retail store channel.
† Member pricing not valid on this item.
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**Sub-Total of Column 11**

**Sub-Total of Column 12**
## Buyers Club Order Form

**JUNE 2010**

### (ENTERIC COATED) - 10 bottles of 120 softgels

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### (FULL-SPECTRUM) POMEGRANATE

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**SUB-TOTAL OF COLUMN 13**

**SUB-TOTAL OF COLUMN 14**

To order call: 1.954.766.8433 or 1.800.544.4440

**LIFE EXTENSION MEMBERS RECEIVE 25% OFF THE RETAIL PRICE OF ALL PRODUCTS**
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<td>(D) ROSE-POWDER 120 mg powder</td>
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<td>RNA POWDER 200 mg, 100 caps</td>
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<td>ROSMARINIC ACID EXTRACT 60 mg caps</td>
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<td>SEA-IONE 1000 mcg, 60 veg caps</td>
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* Product cannot be sold outside the USA.
** These products are not 25% off retail price.

** SUB-TOTAL OF COLUMN 15 **

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<td>PROGRESS® - 15 stick pack</td>
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<td>00396</td>
<td>PRO M - 500 mg, 100 caps</td>
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** SUB-TOTAL OF COLUMN 16 **

JUNE 2010
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**SUB-TOTAL OF COLUMN 18**
LIFE EXTENSION MEMBERS RECEIVE 25% OFF THE RETAIL PRICE OF ALL PRODUCTS

To order online visit: www.lifeextension.com

HOW TO JOIN
THE LIFE EXTENSION FOUNDATION®

As a member of the Life Extension Foundation®, you have the opportunity to participate in a great scientific endeavor. We are the world’s premier organization dedicated to stopping and reversing aging.

Our 30-year track record shows that we have been five to ten years ahead of conventional and alternative medicine in making new life-saving therapies available to our members.

When you join the Life Extension Foundation®, we update you on the latest published medical research by sending you FREE books. Our most impressive publication is the 1,666-page Disease Prevention and Treatment protocol book that contains novel therapies to treat 133 common diseases of aging. Disease Prevention and Treatment is the only book that combines conventional and alternative therapies in order to implement a treatment regimen for fighting the multiple processes involved in degenerative disease.

Each month, Life Extension Foundation® members receive a magazine packed with the latest medical findings from around the world. Members also can call a toll-free phone number to talk to our knowledgeable health advisors about their health issues.

If your number one priority is good health and a long life, please join our not-for-profit organization.

Four Easy Ways to Join
1. Call toll-free 1-800-544-4440
2. Go to www.lef.org
3. Fax back to 1-866-728-1050
4. Mail to: Life Extension Foundation® • PO Box 407198
   Ft. Lauderdale, FL 33340-7198 • Local Number: 954-766-8433

MEMBERSHIP APPLICATION

I want to contribute to your research efforts to extend the healthy human life span. Enclosed is my first year’s membership donation of $75 to join the most elite group of longevity enthusiasts in the world. (Canadians add $7, all others outside the U.S. add $35)

Item code: MEMB1. Call for multiple year membership rates.

Name
Address
City        ST        ZIP
Email       Phone

☐ Check enclosed *(payable to Life Extension Foundation*)

☐ Charge my cc:

Card #       Exp.

SUB-TOTAL OF COLUMN 19

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Buyers Club Order Form

**PLEASE MAIL TO:**
Life Extension Foundation® Buyers Club, Inc.
P.O. Box 407198 • Ft. Lauderdale, Florida 33340-7198
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**LIFE EXTENSION FOUNDATION® MEMBERS ONLY**

**MEMBER NO.**

PRINT MEMBERSHIP NO. FOR MEMBER DISCOUNT

**NOT A MEMBER? JOIN TODAY!**

- I want to join the Life Extension Foundation®.
  Enclosed is $75 for annual membership. (Canadians add $7.00, all others outside the U.S. add $35.00). Send me: Disease Prevention & Treatment Protocol Book

- **CHECK HERE FOR C.O.D. ORDERS**
- **CHECK HERE FOR UPS BLUE LABEL (2ND DAY)**
- **CHECK HERE FOR UPS RED LABEL (OVERNIGHT)**

**ORDER SUBTOTALS**

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**ORDER TOTALS**

Sub-Total A (Sub-total of Columns 1 through 19) $5.50

Postage And Handling (Any size order, continental U.S.)

C.O.D.s (Add $7 for C.O.D. orders)

Shipping

**GRAND TOTAL** (Must be in U.S. dollars)

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PRICES SUBJECT TO CHANGE WITHOUT NOTICE. PLEASE NOTIFY THE LIFE EXTENSION FOUNDATION® OF ANY ADDRESS CHANGE.
### LIFE EXTENSION MEDIA

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1. Report by the National Telecommunications and Information Administration of the US Department of Commerce. 2001 Sep.

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