Life Extension
The ULTIMATE Source For New Health And Medical Findings From Around The World
April 2018

Combat Aging with Artificial Intelligence

Boron Protects Against Cancer

New Green and Purple Teas

Replenish Your Digestive Enzymes

Benfotiamine Attacks Alzheimer’s Pathology

Hearing Loss Linked to Homocysteine
Super Bio-Curcumin® features a patented extract from turmeric root that absorbs up to 7 times better than standard curcumin.

Advanced Bio-Curcumin® contains the same optimal potency of curcumin with the added benefits of ginger and additional turmeric extracts.

Suggested dose for either Bio-Curcumin® formula is one capsule daily for otherwise healthy individuals.

For full product description and to order Super Bio-Curcumin® or Advanced Bio-Curcumin® with Ginger & Turmerones, call 1-800-544-4440 or visit www.LifeExtension.com

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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.
AS WE SEE IT: CELLULAR REGENERATION STRATEGY

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

IN THE NEWS

Processed meat linked to breast cancer; lithium may improve fetal alcohol syndrome; calcium and vitamin D lower risk of early menopause; and latest protocol in Disease Prevention and Treatment book.

REPORTS

22 BORON: AN OVERLOOKED MICRONUTRIENT

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

30 BENEFOTIAMINE IMPROVES COGNITION IN ALZHEIMER’S PATIENTS

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

40 ARE YOU GETTING THE FULL BENEFITS OF DRINKING GREEN TEA?

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

67 RESEARCH UPDATE: HIGH HOMOCYSTEINE AND HEARING LOSS

Recent studies indicate that hearing loss involves damage to brain cells that support hearing—and that elevated homocysteine contributes to this loss. Low-cost B vitamins combat the dangers of high homocysteine and may help prevent age-related hearing loss.

74 TOPICAL MELATONIN PROMOTES YOUTHFUL SKIN

The age-related decline in melatonin is a factor in skin-aging. Human research shows that topically applied melatonin initiates nightly skin repair and renewal.

82 WHO NEEDS DIGESTIVE ENZYMES?

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

89 SUPER FOODS: GINGER

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

93 HEALTHY EATING: BREAD IS GOLD

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

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

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

The best way to keep You in the picture.

Ultra Prostate Formula was created to help maintain prostate health. It contains a dozen standardized ingredients to:

• Support easier urination
• Promote healthy prostate function
• Encourage prostate cell division

Ultra Prostate Formula is the most comprehensive standardized-ingredient prostate-health supplement.

For full product description and to order Ultra Prostate Formula, call 1-800-544-4440 or visit www.LifeExtension.com

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

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

Mark S. Bezzer, MD, FACP, FAARM, FAAEM, is board-certified in internal medicine, emergency medicine, and anti-aging/regenerative medicine. He is the director of Med-Link Consulting, which specializes in bioidentical hormone replacement therapy, natural alternatives, anti-aging, and degenerative diseases. He holds US patents for a multivitamin/mineral supplement, an Alzheimer’s/dementia compilation, and a diabetic regimen.

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.

William Davis, MD, is a preventive cardiologist and author of Wheat Belly: Lose the Wheat, Lose the Weight and Find Your Path Back to Health. He is also medical director of the online heart disease prevention and reversal program, Track Your Plaque (www.trackyourplaque.com).

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.

John DeLuca, MD, DC, is a 2005 graduate of St. George’s University School of Medicine. He completed his internal medicine residency at Monmouth Medical Center in Long Branch, NJ, in 2008 and is board-certified by the American Board of Internal Medicine. Dr. DeLuca is a Diplomate of the American Academy of Anti-Aging Medicine and has obtained certifications in hyperbaric medicine, pain management, nutrition, strength and conditioning, and manipulation under anesthesia.

Sergey 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.

Patrick M. Fratellone, MD, RH, is the founder and executive medical director of Fratellone Associates. He completed his internal medicine and cardiology fellowship at Lenox Hill Hospital in 1994, before becoming the medical director for the Atkins Center for Complementary Medicine.

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.

Mitchell J. Ghen, DO, PhD, holds a doctorate in holistic health and anti-aging and serves on the faculty of medicine at the Benemerita Universidad Autonoma De Puebla, Mexico, as a professor of cellular hematopoietic studies.

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.

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 therapies. 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.

Maurice D. Marholin, DC, DO, is a licensed chiropractic physician and board-certified osteopathic family physician. While training at the University of Alabama, he completed fellowships in Clinical Nutrition and Behavioral Medicine. He is currently in private practice in Clermont, FL.

Prof. Francesco Marotta, MD, PhD, of Montenapo-leone Medical Center, Milan, Italy, is a gastroenterologist and nutrigenomics expert with extensive international university experience. He is also a consulting professor at the WHO-affiliated Center for Biotech & Traditional Medicine, University of Milano, Italy and hon. res. professor, Human Nutrition Dept, TWU, USA. He is the author of over 130 papers and 400 congress lectures.

Philip Lee Miller, MD, is founder and medical director of the Los Gatos Longevity Institute in Los Gatos, CA.

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.

Filippo Ongaro, MD, is board-certified in anti-aging medicine and has worked for many years as flight surgeon at the European Space Agency. He is considered a pioneer in functional and anti-aging medicine in Italy where he also works as a journalist and a writer.

Herbert Pardell, DO, FAAIM, practices internal medicine at the Emerald Hills Medical Center in Hollywood, FL. He is a medical director of the Life Extension Foundation.

Lambert Titus K. Parker, MD, an internist and a board-certified anti-aging physician, practices integrative medicine from a human ecology perspective with an emphasis on personalized brain health, biomarkers, genomics and total health optimization. He serves as the Medical Director of Integrative Longevity Institute of Virginia, a 501(c)3 Non-Profit Medical Research Institute. He also collaborates on education and research for Hampton Roads Hyperbaric Therapy.

Ross Pelton, RPh, PhD, CCN, is scientific director for Essential Formulas, Inc.

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.

Allan Rashford, MD, graduated from the University of Iowa Medical School. Upon completing medical training, he became chief of medicine at St. Francis Hospital in South Carolina, and he 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 staff of Pacific Alliance Medical Center, Los Angeles, and other area hospitals.

Michael R. Rose, MD, a board-certified ophthalmologist with the Rose Eye Medical Group in Los Angeles, CA, is on the staff 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.

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.

Michael D. Seidman, MD, FACS, is the director of skull base surgery and wellness for the Adventist Health System in Celebration, FL.

Ronald L. Shuler, BS, DDS, CCN, LN, is involved in immunology for the prevention and treatment of cancer, human growth hormone secretagogues, and osteoporosis. He is board-certified in anti-aging medicine.

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.
Scientific Advisory Board

Örn Adalsteinsson, PhD, is chairman of the Life Extension Scientific Advisory board. He holds a master’s and doctorate from the Massachusetts Institute of Technology (MIT). He has specialized in human therapeutics including vaccines, monoclonal antibodies, product development, nutraceuticals, formulations, artificial intelligence, hormones, and nutritional supplementation. He has also authored articles and contributed to peer-reviewed publications and served as an editor for the Journal of Medicinal Food.

Richard Black, DO, is a dedicated nuclear medicine physician practicing as an independent contractor out of Cleveland, Ohio. Dr. Black is board certified in internal medicine and nuclear medicine, and is licensed to practice medicine in multiple states throughout the United States.

John Boik, PhD, is the author of two books on cancer therapy, Cancer and Natural Medicine (1996) and Natural Compounds in Cancer Therapy (2001). He obtained his doctorate at the University of Texas Graduate School of Biomedical Sciences with research at the MD Anderson Cancer Center, focusing on screening models to identify promising new anti-cancer drugs. He conducted his postdoctoral training at Stanford University Department of Statistics.

Aubrey de Grey, PhD, is a biomedical gerontologist and Editor-in-Chief of Rejuvenation Research, the world’s highest-impact peer-reviewed journal focused on intervention in aging. He received his BA and PhD from the University of Cambridge in 1985 and 2000 respectively. Dr. de Grey is a Fellow of both the Gerontological Society of America and the American Aging Association and sits on the editorial and scientific advisory boards of numerous journals and organizations.

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

Deborah F. Harding, MD, is founder of the Harding Anti-Aging Center. She is double board-certified in internal medicine and sleep disorder medicine. She also earned the Cenegenics certification in age management medicine. She is a faculty member of the new University of Central Florida Medical School.

Steven B. Harris, MD, is president and director of research at Critical Care Research, a company that grew out of 21st Century Medicine in Rancho Cucamonga, CA. Dr. Harris participates in groundbreaking hypothermia, cryoablation, and ischemia research. His research interests include antioxidant and dietary-restriction effects in animals and humans.

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.

Dipnarine Maharaj MD, MB, ChB, FRCP (Glasgow), FRCP (Edinburgh), FRCPATH., FACP Dr. Dipnarine Maharaj is the Medical Director of the South Florida Bone Marrow Stem Cell Transplant Institute and is regarded as one of the world’s foremost experts on adult stem cells. He received his medical degree in 1978 from the University of Glasgow Medical School, Scotland. He completed his internship and residency in Internal Medicine and Hematology at the University’s Royal Infirmary.

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, The Complete Mediterranean Diet and Heart Attack Proof. For more information visit www.drozner.com.

Jonathan V. Wright, MD, is medical director of the Tahoma Clinic in Tukwila, 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 or co-authored 14 books, selling over 1.5 million copies.

Xiaoxi Wei, PhD, is a chemist expert in supramolecular assembly and development of synthetic transmembrane nanoribbons with distinguished selectivity via biomimetic nanoscience. She has expertise in ion channel function and characterization. She founded X-Therma, a company developing a radical new highway towards non-toxic, hyper-effective antifreeze agents to fight unwanted ice formation in regenerative medicine and reduce mechanical icing.
The Two-Per-Day multinutrient formula is superior to commercial multivitamins because it provides vastly higher potencies of most vitamins, minerals and plant extracts.

Two-Per-Day provides:

- **5-MTHF:** Active form of folate—up to 7 times more bioavailable.
- **Natural Vitamin E:** Twice as bioavailable as synthetic vitamin E.
- **Selenium:** Three different forms that each have specific properties.
- **B Vitamins:** Enzymatically active forms of B2 and B6.
- **Added value:** Plant extracts like apigenin.

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**Two-Per-Day Capsules**

Item #02214 • 120 capsules

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**Two-Per-Day Tablets**

Item #02215 • 120 tablets

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Each bottle provides a two-month supply.

For full product description and to order call 1-800-544-4440 or visit LifeExtension.com


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We live in an unprecedented era as it relates to our understanding of the fundamental causes of biological aging. This knowledge enables us to investigate and measure the effectiveness of interventions that may enable meaningful reversals of degenerative processes.

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

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

What makes aging different are the multiple biological and environmental factors involved. It is unlikely any one person will discover the ultimate cure.

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

Until recently, little could be done to mitigate this malfunction of cell-to-cell signaling. I’m pleased to announce that a group of scientists, utilizing deep-learning artificial intelligence, has identified a method we can utilize today to restore more youthful cell signaling.

Based on published laboratory results, this new approach may facilitate leaner body mass, improved cognition, reduced inflammation, more youthful gene expression and improved cell-protein stability.
In response to a concentrated extract from ashwagandha, a group of obese mice ate less food (compared to controls) and subsequently lost substantial weight.11

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

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

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

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

Delay of Brain Aging

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

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

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

Supplementation with withaferin A was started before the onset of neuronal dysfunction.16

Compared to controls, the withaferin A group showed:

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

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

Overcoming a Limit on Maximum Lifespan

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

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

For example, our cells survive via a process that involves precise folding of new proteins into cellular components, along with removal of damaged cell proteins.17
Aging causes “misfolding” of cellular proteins and an inability to degrade damaged proteins that accumulate inside cells. A limitation on maximal lifespan is loss of youthful protein function.

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

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

Withaferin A impedes cell protein misfolding that is linked to a number of age-related issues.

**Activating Cell-Signaling Pathways**

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

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

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

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

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

**We Fought Against This Aging Pathology in the 1980s**

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

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

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

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

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

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


(Note in years 1980-1985 the name of our scientific publication was Anti-Aging News. It was changed to Life Extension Report in 1986 and then Life Extension Magazine in 1994.)
The Insilico formula contains highly-standardized withaferin A and ginsenoside Rg3 extracts along with concentrated gamma linolenic acid.

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

<table>
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<th>Ingredient</th>
<th>Concentration</th>
<th>Longevity A.I.™ Formula</th>
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<tr>
<td>Withaferin A</td>
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<tr>
<td>Ginsenoside Rg3</td>
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<tr>
<td>Gamma linolenic acid</td>
<td>70%</td>
<td>Under 24%</td>
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Note the concentrations of active ingredients in the Longevity A.I.™ are several magnitudes higher than conventional dietary supplements.

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

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

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

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

This enhanced ability to validate novel approaches to wellness is enabling us to rapidly design formulas to stave off degenerative changes at the cellular level.

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

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

For longer life,

William Faloon, Co-Founder
Life Extension Buyers Club

References


EXTEND-RELEASE

MAGNESIUM
WHEN YOU NEED IT

Unique delivery system provides immediate and extended release magnesium for full-body coverage of this essential mineral.

For full product description and to order Extend-Release Magnesium, call 1-800-544-4440 or visit www.LifeExtension.com

Retail Price  Your Price
1 bottle  $13  $9.75
4 bottles  $8.75 each

Item # 02107 • 60 vegetarian capsules

These statements have not been evaluated by the Food and Drug Administration. This product is not intended to diagnose, treat, cure, or prevent any disease.
Geroprotect™ Longevity A.I.™ has been formulated using cutting-edge, artificial intelligence (AI) technology to modulate over 90 anti-aging pathways favorably affected by a calorie-restriction mimetic.

Longevity A.I.™ concentrates three unique geroprotective ingredients in one daily softgel.

For full product description and to order Geroprotect™ Longevity A.I.™, call 1-800-544-4440 or visit www.LifeExtension.com

Retail Price | Your Price
---|---
1 bottle | $56 | $42
4 bottles | $38 each |

Item #02133 • 30 softgels

These statements have not been evaluated by the Food and Drug Administration. This product is not intended to diagnose, treat, cure, or prevent any disease.
MEGA GREEN TEA EXTRACT
Powerful DNA Protection

Mega Green Tea Extract provides powerful antioxidant effects throughout the body.

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

- Protect against DNA damage and oxidative stress\(^1\)
- Support healthy blood sugar levels\(^2\)
- Enhance heart health\(^3\)
- Boost brain function\(^4\)
- Support strong bones\(^5\)
- Maintain healthy cholesterol levels already within normal range\(^6\)

Each cost-effective bottle lasts over three months!

Mega Green Tea Extract Decaffeinated
Item #00954 • 100 vegetarian capsules

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Mega Green Tea Extract Lightly Caffeinated
Item #00953 • 100 vegetarian capsules

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

References
In The News

Processed Meat Linked to Breast Cancer

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

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

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

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

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

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

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

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

Lithium Shows Potential for Treating Fetal Alcohol Syndrome

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

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

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

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

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

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

*Neurosci. 2018 Jan 15;269-277.*
Calcium and Vitamin D May Fight Early Menopause

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

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

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

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

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

Just-Published Protocol in the Disease Prevention and Treatment Book

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

**Sjögren Syndrome**

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

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

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

Life Extension’s updated Sjögren syndrome protocol summarizes the latest research and emerging treatment options for this troublesome condition.
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When it comes to nutrients that have critical roles in the body, there are the superstars, and then there are the unsung heroes.

**Boron** is one of the unsung heroes.

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

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

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

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

The good news is that most readers of this magazine have obtained ample boron potencies in their multinutrient supplements.
The researchers found that supplementation with boron prevented calcium loss and bone demineralization by reducing urinary excretion of both calcium and magnesium. This reduction was more marked on the low magnesium group. In other words, boron helped minimize loss of calcium and magnesium from bones.

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

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

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

In this way, boron impacted both the quantity and the quality of bone. Bone density refers to the quantity of bone, while microarchitecture refers to its quality. It is related to the mechanical strength of the bone, which impacts fracture risk.
A study published in the *Archives of Oral Biology* confirmed that a deficiency in boron adversely affects bone formation and microstructure. In this study, mice fed a boron-deficient diet had a 63% reduction in the percentage of osteoblast (bone-making cell) surfaces compared to control mice. In addition, the two main processes governing bone structure and mass formation (bone modeling and remodeling) were altered in mice on a boron-deficient diet. As a result, bone formation was inhibited in these boron-deficient mice.

Clearly, having ample boron is essential for many underlying factors that contribute to stronger bones. Boron doesn’t just keep our bones healthy. It also works tirelessly to prevent cancer from getting a start in our body.

**Anticancer Effects**

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

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

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

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

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

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

**What You Need to Know**

**The Total Body Benefits of Boron**

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

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

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

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

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

With data pointing to a 66% rise in the global incidence of prostate cancer between 2005 and 2015—²¹ and with more than 1.5 million men affected in 2015 alone—finding natural ways to combat prostate cancer is more important now than ever.²²

Summary

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

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

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

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

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

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

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References
Alzheimer’s disease is one of the most feared of all age-related conditions. To date, no drug therapy has been shown to alter the course of Alzheimer’s, much less prevent it.

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

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

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

Data from this study—as well as a host of other human, lab, and animal studies—suggest that this novel approach to Alzheimer’s could open a new front in our fight against cognition-robbing neurodegenerative diseases.
Researchers have used experimental thiamine deficiency for years to model many of these age-related brain diseases, and research shows that a deficiency in thiamine leads to many of the same brain abnormalities associated with those disorders.13

In addition to its known importance in brain function, benfotiamine, a synthetic derivative of thiamine, has the dual ability to help with sugar metabolism while also helping protect against the damage caused by elevated blood sugar1,15—two properties that make it an ideal candidate for intervening in glucose-induced brain dysfunction.

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

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

Cognitive Improvements in Alzheimer’s Patients

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

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

Prior to any treatment, patients underwent a specialized type of PET scan (positron emission tomography) that can predict progression of Alzheimer’s disease and detect the toxic Alzheimer’s protein beta-amyloid. All subjects showed evidence of beta-amyloid. This damaging protein builds up in the brain, where it triggers brain inflammation, imposes oxidative stress, and has been closely associated with changes caused by long-term exposure to excessive blood glucose.

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

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

This study demonstrates for the first time how a low-cost nutritional supplement can improve cognitive function in Alzheimer’s disease victims.1
The study provided new insight into the possibility that benfotiamine might have a significant beneficial impact for Alzheimer's patients, and definitely warrants a larger-scale study in the future.

**Benfotiamine’s Track Record**

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

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

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

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

**What You Need to Know**

**The Brain-Protective Effects of Benfotiamine**

- Alzheimer’s disease is now being referred to as “**type III diabetes**” because of its close connection with the effects of chronically elevated blood-sugar levels.
- Studies show that excessive blood glucose damages the endothelial lining of blood vessels, a factor that can contribute to cognitive decline, dementia, and Alzheimer’s.
- Endothelial dysfunction and the changes associated with high blood glucose are known to alarmingly raise the risk of cognitive decline, dementia, and Alzheimer’s disease.
- The connection between the effects of excessive blood sugar and dementia offers an entirely new approach to prevention: the use of natural supplements that can shield the body from the harmful effects of AGEs, and prevent the harm they could do to the blood vessels and the brain.
- **Benfotiamine**, a highly bioavailable form of vitamin B1, has many properties that may help explain how it was able to improve cognition in patients with Alzheimer’s disease.
- A groundbreaking clinical study found that supplementation with benfotiamine improved cognitive function scores in individuals with mild-to-moderate Alzheimer’s.
- A natural product with a long safety record, benfotiamine belongs on the short list of supplements recommended for maintaining brain health well into old age.
People with alcohol dependency also display rapid acceleration of brain aging. This is because excessive alcohol leads to thiamine deficiency.12,17 Two clinical trials have now shown that benfotiamine supplementation (600 mg/day) reduces alcohol consumption (a sign of reduced impulsivity) and improves psychiatric distress.19,20 These may be very important findings for people with Alzheimer’s who often suffer from increased impulsivity.21

The Impact of Elevated Sugar on the Brain

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

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

Most people have blood-sugar levels that are higher than optimal, even if they are technically below the threshold for diagnosable diabetes. This is called prediabetes, which the American Diabetes Association defines as fasting blood sugar between 100 to 125 mg/dL.24 Prediabetes is now recognized to be associated with increased risk for Alzheimer’s and other dementias.25-27

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

Protection Against Blood-Sugar Damage

Given all these impressive results, there is now excellent evidence that benfotiamine supplementation may reduce and prevent many of the problems that lead to cognitive decline, dementia, and Alzheimer’s disease — particularly among diabetics and prediabetics. Since many people may find the lifestyle changes that would help prevent the formation of AGEs quite difficult, something as simple as taking benfotiamine can help shield our bodies from their damaging effects.

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

Summary

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

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

A new human study has shown that supplementation with 300 mg/day of benfotiamine produced significant cognitive improvement over 18 months.
Benfotiamine acts by preventing the formation of advanced glycation end products (AGEs), fighting oxidative stress, and thereby reducing inflammatory processes that contribute to dementia.

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

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

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

How Benfotiamine Works

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

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

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

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

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

References


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

Green tea has been recognized as a natural defense against disorders ranging from cardiovascular disease and cancer to depression and cognitive decline.\(^1\text{-}^5\)

Like other “smart drinks” such as coffee or cocoa, the key factor behind green tea’s many health benefits lies in its rich polyphenol content. These healthy compounds have been associated\(^6\) with lower all-cause mortality.\(^7\)

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

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

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

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

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

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

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

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

Green Tea’s Secret Weapon

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

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

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

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

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

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

Safer, More Healthful Tea Option

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

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

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

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

Cardiovascular Health

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Cognitive Benefits

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

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

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

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

DNA Damage

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

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

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

Cancer

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

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

What You Need to Know

A More Potent Form of Green Tea

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

This difficult-to-treat disease is experienced by an estimated 16.2 million American adults in an average year.33 A study of people aged 70 and over showed that those consuming two to three cups of green tea daily had a 4% lower prevalence of mild and severe depressive symptoms, compared to those drinking less than one cup. Those consuming four or more cups daily had a 44% lower prevalence.3

Periodontal Disease

People with gum disease are 34%-72% more likely to die of cardiovascular disease and other complications, compared to those in good oral health.34,35 Research suggests that green-tea polyphenols—specifically catechins—inhibit periodontal pathogens. In addition, researchers recommend 2-3 cups of green tea daily for the prevention of periodontal disease.36 Note that all of these studies have one thing in common: To get the maximum benefits of green tea, you have to consume substantially more than one cup daily. But when it comes to health benefits and safety, not all green tea is the same.

Understanding Green Tea

To put a common misconception to rest, all tea—black, green, white, or oolong—comes from the same plant: Camellia sinensis. The vast differences arise largely from the time of harvest and how the leaves are treated and processed after being picked. Positioned at the start of the tea spectrum, green tea is the oldest known form of tea.37 As soon as the leaves are picked, they are heated by steaming or firing to lock in their bright, green character. This provides green tea’s uplifting flavor profile, which might be described as fresh and grassy. Purple tea is only grown in Kenya at that country’s highest peak, where it produces purple-reddish leaves.

Up to Three Times the Polyphenol Content

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

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

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

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

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

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

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

And if just one refreshing cup is all you have time or inclination for during your busy day, keep in mind that one cup of this tea delivers all the polyphenol protection—and health benefits—of up to three cups of any other green tea.
The secret behind green tea’s protective effects is its rich polyphenol content, which lowers the risk of diseases ranging from cancer to depression, and reduces all-cause mortality.

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

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

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

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

Purple Tea

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

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

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

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

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

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

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

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

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


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<td>Vitamin K2 (all-trans MK-7)</td>
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Warning to Coumadin® (warfarin) Drug Users: Patients prescribed vitamin K-antagonist anticoagulant prescription drugs like warfarin should consult their physician before taking vitamin K supplements like Super K and Once-Daily Health Booster. There is evidence, however, that users of drugs like warfarin could benefit from a consistent low dose of supplemental K. Ask your doctor if you can take a low dose (45 mcg a day) of vitamin K2 in the long-acting MK-7 form for the purpose of stabilizing your INR levels and also protecting your body against long-term vitamin K deficit. Do not initiate any form of vitamin K supplementation without full cooperation of your treating doctor, as your doctor may need to increase your dose of warfarin to compensate for your vitamin K supplement. Life Extension® provides several forms of low-dose vitamin K for physician consideration.

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**Neuro-Mag®** Magnesium L-Threonate Powder
Item #02032 • 93.35 grams of powder

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

To one extent or another, all seven processes are active in every chronic disorder that threatens human longevity and health.³

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

Deep-learning artificial intelligence is helping identify interventions that enable the restoration of more youthful cell signaling.
Combating AGING via Artificial Intelligence

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

It turns out that metformin can inhibit key aspects of degenerative aging, which in turn can boost protection against diabetes, obesity, cardiovascular diseases, neurodegeneration, and cancer.1-8

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

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

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

Natural Extracts With Metformin’s Anti-Aging Impact

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

These three highly concentrated plant extracts are:

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

The Seven “Pillars of Aging” Drive Healthspan

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<tr>
<th>Pillar</th>
<th>Definition/ Role in Aging</th>
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<tr>
<td>Macromolecular Damage</td>
<td>Damage to large functional molecules (macromolecules) that increases with age. This damage to proteins, DNA, lipids, and other macromolecules is an important factor in specific age-related diseases.62</td>
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<td>Epigenetics</td>
<td>Modifications of gene expression can be induced by the environment, altering which genes are either activated or suppressed.63</td>
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<tr>
<td>Inflammation</td>
<td>Chronic inflammation is a pervasive feature of age-related diseases.64</td>
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<tr>
<td>Cellular Stress</td>
<td>The rate of biological aging is modulated in part by genes interacting with environmental stressors.65</td>
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<tr>
<td>Proteostasis</td>
<td>Loss of proper regulation of protein structure and function, known as “proteostasis,” is a common feature of aging and disease that is characterized by the appearance of dysfunctional or destructive protein aggregates in various tissues.66</td>
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<tr>
<td>Stem Cell Dysfunction</td>
<td>Stem cells (capable of maturing into specialized, tissue-specific cells) normally provide sources of new tissue when regeneration is called for. Loss of stem cells or their ability to regenerate contribute to the age-related decline in tissue function.67</td>
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<tr>
<td>Metabolic Disorders</td>
<td>The aging process is characterized by changes in response to insulin (e.g., resistance), changes in body composition (e.g., increased fat, decreased muscle mass), and physiological declines in specific metabolic signaling molecules, e.g., growth hormone (GH), and sex steroids.68</td>
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Each pillar in this box is comprised of complex biochemical pathways that modulate the aging process at the whole organism level. Pathways that drive each pillar are capable of being modified to reduce impact on overall aging, with calorie restriction and metformin treatment being the best-studied to date.1,69,70
In combination, these three natural extracts are likely to provide broad-spectrum protection against underlying causes of age-related disorders.

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

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

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

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

**Artificial Intelligence Identifies Plant Extracts That Fight Aging**

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

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

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

Withaferin A Protects Against Neurodegeneration, Obesity, and Dysfunctional Proteins

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

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

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

Protect Your Body’s Proteins

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

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

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

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

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

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

Protecting Nerve Cells From Degeneration

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

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

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

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

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

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

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

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

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

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

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

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

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

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

In a first, *Life Extension* scientists teamed up with *[Insilico Medicine*, Inc.], to apply Insilico’s “deep learning” A.I. technology in order to identify known natural compounds that activate similar anti-aging pathways as metformin. A paper detailing Insilico’s unique discovery was published in the prestigious journal *Aging*.\(^{2}\)

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

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

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

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

What they found is depicted in Figure 2. Withaferin A, ginseng and GLA — all with established safety records in humans — between them influenced the same aging pathways as metformin.
Biochemical analysis showed that withaferin A-supplemented mice also had a significant reduction in the harmful unfolded protein response. This reduction is credited with restoring leptin sensitivity and the observed reductions in food intake and body-fat mass. By contrast, untreated leptin-resistant mice maintained much higher levels of leptin, but failed to suppress their appetites because of their resistance to the leptin hormone.

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

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

Ginsenoside Protects Against Neurodegeneration, Cancer, Cardiovascular Disease

Ginsenoside is a steroid-like molecule from ginseng. It was identified by the Insilico Medicine team as having an overlap with many of the age-decelerating pathways that metformin regulates.
GLA Slows Cancer, Prevents Diabetes, Fights Obesity, Lowers Cardiovascular Risk

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

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

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

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

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

A healthy adaptation to stress, both environmental and biochemical, is essential for fighting aging's effects on health. In animal studies, GLA has demonstrated its ability to fight such stresses and preserve more youthful functions.
For example, GLA supplementation reduced the blood pressure elevation and heart-rate increases in rats confronted with psychosocial stress. GLA also improved nerve function in diabetic rats by attenuating the oxidative stress associated with the disease. Metformin also fights such oxidative stress to protect against diabetic and nondiabetic age-accelerating processes.

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

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

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

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

“Towards natural mimetics of metformin and rapamycin.”


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

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

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

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

- **Withaferin A** restores proteostasis, protects against neurodegeneration, and can prevent obesity;

- **Ginsenoside** can protect against neurodegeneration, cancer, and cardiovascular disease, and;

- **GLA** can slow cancer growth, prevents experimentally induced diabetes, fights weight gain, and lowers blood pressure and other cardiovascular risk factors.
As it relates to what may be metformin’s most important mechanism, which is activation of the cellular enzyme AMPK, these compounds appear to have a modest effect.¹

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

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

**Summary**

**Metformin** is a multitargeted drug that confers protection against many age-related disorders.⁴⁻⁵⁻⁶¹

It has been approved for the first-ever study of aging in healthy humans.⁶

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

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

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

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

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

**References**


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Registration fees include 3 healthy meals to keep entire group together and constructively interacting with each other.
Hearing loss is considered to be a normal part of aging, but recent studies indicate otherwise.

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

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

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

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

This represents a novel approach to potentially mitigating hearing loss.
An Unexpected Cause of Hearing Loss

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

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

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

The 2017 study showed:

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

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

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

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

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

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

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

The Homocysteine/Folate Connection

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

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

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

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

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

Mysterious Epidemic Causes Hearing Loss

The first indication that restoring folate levels could impact hearing came nearly a quarter-century ago. At the time, a mysterious epidemic swept through Cuba, leaving more than 50,000 people suffering from a range of maladies related to poor nerve function. The most prominent included sensorineural hearing loss and deafness.7

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

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

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

Folate Reverses Hearing Loss

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

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

A human study confirmed the hearing-related benefits.

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

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

Facts About Hearing Loss in Older Adults14

• Hearing loss is the third most common chronic physical condition among American adults. It is twice as prevalent as diabetes or cancer.

• Nearly half of people over age 60 have hearing loss, amounting to 46 million Americans in 2014 and predicted to grow to 82 million by 2040.

• People with hearing loss do worse socially and economically, are more likely to be unemployed, and have higher healthcare costs than those with normal hearing.
Rising levels of homocysteine are now closely associated with both brain-cell injury and hearing loss. Strategies aimed at lowering homocysteine levels, such as folate supplementation, convincingly slow hearing loss.

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

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

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

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

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

References

Super R-Lipoic Acid is more bioavailable, stable, and potent, achieving 10-30 times higher peak blood levels.

CAUTION: If you are taking glucose-lowering medication, consult your health care provider before taking this product.

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

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Clinical evidence demonstrates that the nutrients in **DNA Protection Formula** help preserve healthy DNA by supporting the body’s defenses against environmental toxins.

Ingredients in **DNA Protection Formula** include:

- Xanthovital® hops extract
- Watercress extract
- Chlorophyllin

**DNA Protection Formula**
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For full product description and to order **DNA Protection Formula**, call 1-800-544-4440 or visit [www.LifeExtension.com](http://www.LifeExtension.com)

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Maintain Youthful Homocysteine Levels for Brain, Heart, and Hearing Health

Homocysteine Resist supports healthy levels of homocysteine, an unfavorable amino acid that can increase with normal aging.

Just one daily capsule of Homocysteine Resist provides:

- 5-MTHF (activated folate) 5,000mcg
- Methylcobalamin (activated vitamin B12) 1,000mcg
- Pyridoxal-5-phosphate (activated vitamin B6) 100mg
- Riboflavin (vitamin B2) 25mg

For full product description and to order Homocysteine Resist, call 1-800-544-4440 or visit www.LifeExtension.com

These statements have not been evaluated by the Food and Drug Administration. This product is not intended to diagnose, treat, cure, or prevent any disease.
The impact of a good night’s sleep on maintaining younger-looking skin is often overlooked.

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

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

The skin-rejuvenating effects of sleep are partially attributed to the hormone melatonin, which exerts a wide range of anti-aging benefits. As melatonin output decreases with age, many people become more vulnerable to sleep disturbances that fail to adequately repair aging and photodamaged skin.

Research has revealed that topical melatonin, along with additional compounds, restores youthful reparative processes during the night to produce visible and long-lasting improvements in the health and appearance of skin.
Melatoninergic Antioxidative System: Your Skin’s Internal Ultraviolet Defense

Derived from the amino acid tryptophan, melatonin is a hormone produced mainly by the brain’s pineal gland, where it regulates our internal biological clock.9 Melatonin secretion is triggered in response to darkness, and diminished in the presence of light. Over the past decade, accumulating evidence indicates that melatonin offers health-promoting benefits that extend beyond regulating circadian rhythms. For example, it provides significant protection against UV-induced skin aging (photoaging).9

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

- Act as a free-radical scavenger.12 After interacting with free radicals, melatonin is degraded to N1-acetyl-N2-formyl-5-methoxykynuramine (AFMK) and N1-acetyl-5-methoxykynuramine (AMK)—both of which possess antioxidant and anti-inflammatory effects themselves.13,14 This antioxidant cascade is known as melatoninergic antioxidative system of the skin.15

- Activate intracellular antioxidant systems including superoxide dismutase (SOD), glutathione peroxidase (GPx), and catalase (CAT).16-19

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

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

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

Why We Need Topical Melatonin

Melatonin secretion gradually declines over time, increasing our susceptibility to sleep debt that diminishes the skin’s capacity to recover from external insults.21,22 Oral ingestion of melatonin does not always provide optimal skin protection.23 A more effective method is to apply melatonin topically, where it penetrates the stratum corneum and accumulates to initiate nightly repair and renewal.24,25

A review of human studies found that topically applied melatonin safeguards against sun-induced erythema by reducing cell death, DNA damage, and oxidative stress.26
Let’s now take a look at how three other topical agents provide photoprotection, while repairing and regenerating damaged skin.

**Ectoin: Natural Skin-Cell Protection**

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

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

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

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

**What You Need to Know**

**Topical Melatonin Enhances Nightly Skin Repair and Renewal**

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

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

The age-related decline in heat-shock proteins—notably heat-shock protein 70 (HSP70)—diminishes the skin’s natural stress response and accelerates aging. A novel peptide called acetyl tetrapeptide-22 has been developed to boost HSP70 levels in the skin with or without prior stress, in turn maintaining protein homeostasis and increasing cell viability to slow down aging.

Coconut Amino-Acid Complex Soothes Sensitive Skin

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

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

Summary

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

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

Gary Goldfaden, MD, is a clinical dermatologist and lifetime member of the American Academy of Dermatology. He is the founder of Academy Dermatology in Hollywood, FL, and Cosmesis Skin Care. Dr. Goldfaden is a member of Life Extension®’s Medical Advisory Board. All Cosmesis products are available online.

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

References

Revive Worn-out Hair, Skin, and Nails from Within

Working from the inside out, Hair, Skin & Nails is an oral supplement with nutrients shown to benefit the hair, skin, and nails to keep them looking vibrant and healthy. Rejuvenating nutrients include:

- **VERISOL® Bioactive Collagen Peptides®**—Stimulates the formation of new collagen and elastin to promote skin suppleness and elasticity

- **Cynatine® HNS Plus**—Provides solubilized keratin, zinc, B vitamins, biotin, and copper to boost production of keratin for strong hair, skin, and nails

- **Biotin**—Supports nail strength and integrity

- **Silicon**—For the formation of collagen and keratin molecules

For full product description and to order Hair, Skin & Nails Rejuvenation Formula with VERISOL®, call 1-800-544-4440 or visit www.LifeExtension.com

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Give Your Skin a ‘Beauty Sleep’

The age-related loss of melatonin and the stresses of modern living cause skin changes that can add years to your appearance.

Promote your skin’s natural reparative processes with Cosmesis Melatonin Advanced Peptide Cream to maintain the glow of youth.

For full product description and to order Cosmesis Melatonin Advanced Peptide Cream, call 1-800-544-4440 or visit www.LifeExtension.com

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Not tested on animals. Keep out of reach of children. For external use only. Avoid contact with eyes.
In 1983, a well-informed Life Extension® member recommended a digestive enzyme formula that had been around for many decades.

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

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

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

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

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

This article describes the role that enzymes play in digestive health.
If you find yourself reaching for drugs such as Alka-Seltzer or Pepto-Bismol to relieve chronic digestive problems, you could have bigger health problems than you realize.

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

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

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

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

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

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

Enzymes and Digestion

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

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

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

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

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

Supplementing With Digestive Enzymes

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

Since then, human studies have confirmed the beneficial effects from various types of digestive enzyme supplements.⁹⁻¹¹ For example, in a larger, placebo-controlled study, patients taking a digestive enzyme supplement reported fewer episodes of abdominal pain, nausea, vomiting, heartburn, bloating, flatulence, and appetite loss than those not taking the supplement.¹⁰
Each major food group has specific enzymes responsible for its breakdown. A deficiency in any one of these enzymes can lead to a wide range of common intestinal troubles.

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

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

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

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

Lactase
Another food group that can become problematic with age is dairy. Lactase, the enzyme responsible for breaking down milk sugar (called lactose), is often deficient in older people.16 This may lead to cramps, bloating, gas, and diarrhea after consuming milk products.19 The symptoms are often so severe that victims suffer miserably before they figure out that dairy foods are the problem.

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

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

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

Without sufficient lipase, incompletely digested fats can pass through the GI tract, where they can produce greasy, fatty stools, and cramping. Even worse, since the body can't absorb undigested fats, a deficiency in lipase enzymes can also lead to malnutrition because it prevents the body from being able to absorb valuable fat-soluble vitamins.
Supplementing with lipase helps ensure that fats are properly digested. Pancreatic lipase enzymes have been used for years in people with pancreatic insufficiency (a condition in which the pancreas doesn’t produce enough enzymes) to assist with digestion, but we now know that they can be beneficial in healthy people as well.

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

Cellulase

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

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

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

Fortunately, there’s a way to get plenty of fiber and digest it well, which can help avoid the gas and bloating problems sometimes associated with a high-fiber diet—and once again, the answer is in supplemental enzymes. The enzyme cellulase breaks down cellulose, the indigestible polysaccharide in dietary fiber. This allows for smoother digestion of tough vegetable fiber.

Amylase

Amylase enzymes are responsible for digesting carbohydrates and starches.

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

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

Bromelain

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

Its benefits were seen in a study of adults with chronic pancreatic insufficiency, a condition in which the pancreas doesn’t produce enough digestive enzymes. Initially, these subjects were unable to fully digest and absorb fats and proteins. But supplementing with a pancreatic enzyme product that contained bromelain improved digestion and absorption of both protein and fat.
In a double-blind, placebo-controlled study, IBS patients took tablets containing 2 billion spores of MTCC 5856 B. coagulans daily. The probiotic led to improvements on every score tested, including those assessing symptoms, abdominal discomfort, stool quality, and physicians’ overall assessment. It also led to a significant decrease in clinical symptoms such as bloating, vomiting, diarrhea, abdominal pain, and stool frequency.44

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

Summary

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

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

When taken orally before a meal, supplemental digestive enzymes, combined with the probiotic B. coagulans, boost the body’s natural ability to break down food into its life-giving and healthful constituents while preventing gastrointestinal distress.
If you have any questions on the scientific content of this article, please call a Life Extension® Wellness Specialist at 1-866-864-3027.

References


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

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

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

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

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

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

References
FLORASSIST® GI WITH Phage Technology combines six strains of probiotics, along with four types of phages that work within hours, not days.

The addition of phages is designed to remove unwanted bacteria in the intestines to make room for the beneficial probiotics.

The suggested daily serving of one liquid vegetarian capsule of FLORASSIST® GI with Phage Technology provides:

**Probiotic Blend**
- 15 Billion CFU**
  - L. acidophilus La-14
  - B. lactis BI-04
  - L. paracasei Lpc-37

**TetraPhage Blend**
- 15 mg **
  - LH01 - Myoviridae
  - LLS - Siphoviridae
  - T4D - Myoviridae
  - LL12 - Myoviridae

For full product description and to order FLORASSIST® GI with Phage Technology, call 1-800-544-4440 or visit www.LifeExtension.com

*Colony Forming Units at time of manufacture.  ** Daily Value not established.
The body’s production of digestive enzymes decreases with age, leading to poor digestion and bloating, as well as other discomforts—especially after eating a large meal.

**Enhanced Super Digestive Enzymes** provides specific enzymes required to support the natural reactions that break down food proteins, fats, carbohydrates, and other nutrients.

**Enhanced Super Digestive Enzymes with Probiotics** provides the same enzymes that are in **Enhanced Super Digestive Enzymes**—but with the added benefits of the probiotic *B. coagulans*.

This probiotic creates a natural protective shield that resists digestion in the stomach allowing it to fully colonize in the intestines to support digestive health and suppress less beneficial bacteria to improve digestive comfort.\(^1,2\)

To order **Enhanced Super Digestive Enzymes** or **Enhanced Super Digestive Enzymes with Probiotics**, call 1-800-544-4440 or visit www.LifeExtension.com

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Visit us at www.jarrow.com for more product information.
Renowned Italian chef Massimo Bottura has long been concerned with issues of food waste, and is dedicated to the proposition that quality meals shouldn’t be exclusively available to those who can afford to frequent expensive restaurants.

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

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

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

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

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

Serves 6

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

Place the tomatoes in a colander set over a bowl. Sprinkle with ½ teaspoon salt and let drain.

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

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

Serve in bowls and garnish with the remaining basil leaves.

½ red onion, thinly sliced
Salt
8 plum tomatoes or other tomatoes of similar size, sliced
5 cherry tomatoes, sliced
7 oz (200 g) stale bread, torn into chunks
4 tablespoons white wine vinegar
1 yellow bell pepper, chopped
1 tablespoon capers
1 small garlic clove, minced
1/3 cup (90 ml) extra virgin olive oil
15 basil leaves
Spaghetti with Garlic, Olive Oil, and Chili Pepper

Serves 6

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

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

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

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

Zucchini with Eggplant Puree

Serves 4

1 lb 2 oz (500g) eggplant (aubergine)
1 garlic clove
2 tablespoons extra virgin olive oil
Salt and freshly ground black pepper
8 plums, pitted and cut into medium pieces
2 tablespoons sherry vinegar
1 tablespoon salt-packed capers, rinsed
3 tablespoons blanched almonds, coarsely chopped
¾ oz (20 g) pancetta, diced
4 small zucchini (courgettes), halved lengthwise
2 tablespoons corn oil

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

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

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

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

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

To serve, place a spoonful of the eggplant puree on each plate and top with the zucchini. Garnish with the plum mixture.
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For many years, Dr. Scott Hoffer thought he could literally outrun disease and sickness.

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

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

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

The same year he bought that first pair of Pumas, both of his parents died within six months of chronic diseases. His father succumbed to heart disease and his mother to breast cancer.
“My parents died of cancer and atherosclerotic disease,” he said. “I was thinking I’ve got those genetics.”

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

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

Dr. Hoffer’s Sentinel Moment

Hoffer returned to the United States in 1982. He came back with severe tendonitis in his Achilles tendon caused by excessive running, and hungry to discover a new way to approach longevity and disease prevention. Then two important things happened that would change his life. First, he began a one-year program in psychosomatic medicine and really begin to dive into the mind/body connection as it related to health, which led him to work with anti-obesity programs in the army.

Second, he discovered Life Extension®.

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

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

Dr. Hoffer’s Personal Supplement List

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

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- ArthroMax® Advanced with UC-II®
- Triple Action Cruciferous
- Super Ubiquinol CoQ10
- Life Extension Two-Per-Day
- Super Bio-Curcumin®

“Health, fitness, anti-aging medicine, and longevity had become a passion for me,” he said. “The more I learned, the more I wanted to learn and share with my medical colleagues and patients. My patients were somewhat wary, but most of my medical colleagues were repulsed. Some were hostile and quite challenging. Historically in medicine, those that think outside of the box are ridiculed and ostracized.”
Nevertheless, Hoffer persisted. He opened a psychiatric practice and began to put many of his ideas into practice. He bought a partnership in a gym where he lived. He started prescribing supplements like L-theanine, 5-HTP, DHEA, vitamin D, melatonin, SAM-e, and CoQ10. And he incorporated exercise, meditation, and relaxation training into his practice.

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

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

The Village Doctor

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

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

Once again looking to help, Hoffer became a certified personal trainer with a specialization in older adults. He began offering personal training free of charge for residents.

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

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

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

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

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

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

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

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

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

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

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

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<td>01524</td>
<td>ACETYL-L-CARNITINE • 500 mg, 100 veg. caps</td>
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<td>ACETYL-L-CARNITINE ARGINATE • 90 veg. caps</td>
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<td>ARGinine/ORithine POWER • 150 grams</td>
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<td>(L)-ARGININE CAPS • 700 mg, 200 veg. caps</td>
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<td>ARTERIAL PROTECT • 30 veg. caps</td>
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<td>ASHWAHANODHA EXTRACT (Optimized) • 10 mg, 60 veg. caps</td>
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<td>01805</td>
<td>ASIAN ENERGY BOOST • 90 veg. caps</td>
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<td>01066</td>
<td>ASPIRIN • 81 mg, 300 enteric coated tablets</td>
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<td>01923</td>
<td>ASTAXANTHIN WITH PHOSPHOLIPIDS • 4 mg, 30 softgels</td>
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**SUBTOTAL OF COLUMN 1**

$1,990.00

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<th>ITEM No.</th>
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<td>CALCIUM CITRATE W/VITAMIN D • 200 veg. caps</td>
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<td>CALREDUCE SELECTIVE FAT BINDER 120 mint chewable tablets</td>
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<td>CARNITINE (Optimized) • 60 veg. caps</td>
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<td>L-CARNITINE • 500 mg, 30 veg. caps</td>
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<td>CHLOROPHYLLIN • 100 mg, 100 veg. caps</td>
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<td>01359</td>
<td>CHO-LESS™ 90 capsules</td>
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<td>CHOL-SUPPORT™ 60 liquid veg. caps</td>
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<td>01504</td>
<td>CHROMIUM W/CROMINEX® 3+ (Optimized) • 500 mcg, 60 veg. caps</td>
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<td>01906</td>
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<td>01818</td>
<td>CITRIMAX® (Super) • 180 veg. caps</td>
<td>YOUR PRICE 40.00</td>
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**SUBTOTAL OF COLUMN 2**

$1,990.00
### Item No. 00818
**CLA BLEND W/SACCHARIDES LIGNANS**  (Super) • 120 softgels
- **Retail Each** $36.00
- **1 Unit Each** $27.00
- **4 Unit Each** $24.75
- **10 Unit Each** $24.75
- **QTY Total** $24.75

### Item No. 02033
**COLCUMIN™**  • 14 packets
- **Retail Each** $24.00
- **1 Unit Each** $18.00
- **4 Unit Each** $16.00
- **10 Unit Each** $16.00

### Item No. 01869
**Cognitex® W/BRAIN SHIELD®**  • 90 softgels
- **Retail Each** $60.00
- **1 Unit Each** $45.00
- **4 Unit Each** $39.00
- **10 Unit Each** $36.00

### Item No. 01897
**Cognitex® W/PREGNOLONE & BRAIN SHIELD®**  • 90 softgels
- **Retail Each** $62.00
- **1 Unit Each** $45.50
- **4 Unit Each** $39.75
- **10 Unit Each** $37.50

### Item No. 01421
**Cognitex® Basics**  • 60 softgels
- **Retail Each** $38.00
- **1 Unit Each** $28.50
- **4 Unit Each** $26.25
- **10 Unit Each** $24.00

### Item No. 01659
**CogNizin® COP-CHOLINE CAPS**  • 250 mg, 60 veg. caps
- **Retail Each** $36.00
- **1 Unit Each** $27.00
- **4 Unit Each** $25.50

### Item No. 02202
**ComfortMax™**  • 30 day supply
- **Retail Each** $44.00
- **1 Unit Each** $33.00
- **4 Unit Each** $29.00

### Item No. 01945
**Complete B-Complex**  (Bioactive) • 60 veg. caps
- **Retail Each** $12.00
- **1 Unit Each** $9.00
- **4 Unit Each** $8.00

### Item No. 02298
**Comprehensive Nutrient Packs Advanced**  • 30 packs
- **Retail Each** $90.00
- **1 Unit Each** $67.50
- **4 Unit Each** $61.50

### Item No. 01949
**CDQ10 w/ LIMONENE**  (Super-Absorbable) • 50 mg, 60 softgels
- **Retail Each** $25.00
- **1 Unit Each** $18.75
- **4 Unit Each** $16.50

### Item No. 01948
**CDQ10 w/ LIMONENE**  (Super-Absorbable) • 100 mg, 100 softgels
- **Retail Each** $46.00
- **1 Unit Each** $34.50
- **4 Unit Each** $28.00

### Item No. 01951
**CDQ10 w/ LIMONENE**  (Super-Absorbable) • 100 mg, 60 softgels
- **Retail Each** $30.00
- **1 Unit Each** $22.50
- **4 Unit Each** $20.00

### Item No. 01928
**CDQ10 (Super Ubiquinol)**  • 100 mg, 60 softgels
- **Retail Each** $56.00
- **1 Unit Each** $42.00
- **4 Unit Each** $36.00

### Item No. 01733
**CDQ10 w/PQQ**  (Super Ubiquinol) • 100 mg, 30 softgels
- **Retail Each** $50.00
- **1 Unit Each** $37.50
- **4 Unit Each** $30.00

### Item No. 01437
**CDQ10 w/ENH MITOCHONDRIAL SUPPORT™**  (Super Ubiquinol) • 100 mg, 30 softgels
- **Retail Each** $33.00
- **1 Unit Each** $24.75

### Item No. 01426
**CDQ10 w/ENH MITOCHONDRIAL SUPPORT™**  (Super Ubiquinol) • 100 mg, 60 softgels
- **Retail Each** $62.00
- **1 Unit Each** $46.50

### Item No. 01425
**CDQ10 w/ENH MITOCHONDRIAL SUPPORT™**  (Super Ubiquinol) • 100 mg, 60 softgels
- **Retail Each** $58.00
- **1 Unit Each** $43.50

### Item No. 01427
**CDQ10 w/ENH MITOCHONDRIAL SUPPORT™**  (Super Ubiquinol) • 50 mg, 100 softgels
- **Retail Each** $20.00
- **1 Unit Each** $15.00

### Item No. 01431
**CDQ10 w/ENH MITOCHONDRIAL SUPPORT™**  (Super Ubiquinol) • 200 mg, 30 softgels
- **Retail Each** $62.00
- **1 Unit Each** $46.50

### Item No. 02012
**Cortisol Balance**  (Advanced) • 30 veg. caps
- **Retail Each** $45.00
- **1 Unit Each** $33.75

### Item No. 00862
**Cran-Max®**  • 500 mg, 60 veg. caps
- **Retail Each** $17.50
- **1 Unit Each** $13.13

### Item No. 01424
**Cran-Max® with Ellirose™**  (Optimized) • 60 veg. caps
- **Retail Each** $18.00
- **1 Unit Each** $13.50

### Item No. 01529
**Creatine Capsules**  • 120 veg. caps
- **Retail Each** $10.95
- **1 Unit Each** $8.21

### Item No. 01746
**Creatine Whey Glutamine Powder**  • 454 grams (vanilla)
- **Retail Each** $30.00
- **1 Unit Each** $22.50

### Item No. 00467
**Curcumin®**  (Super Bio) • 400 mg, 30 veg. caps
- **Retail Each** $20.00
- **1 Unit Each** $15.00

### Item No. 00407
**Curcumin®**  (Super Bio) • 400 mg, 60 veg. caps
- **Retail Each** $38.00
- **1 Unit Each** $28.50

### Item No. 01924
**Curcumin® W/Ginger & Turmerones**  (Advanced Bio) • 30 softgels
- **Retail Each** $30.00
- **1 Unit Each** $22.50

### Item No. 01804
**Cytokine Supressor™ W/Egg** • 30 veg. caps
- **Retail Each** $30.00
- **1 Unit Each** $22.50

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### Subtotal of Column 4

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### April 2018

**Receive 25% Off the Retail Price of All Products**
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<td>DHEA • 50 mg, 60 caps</td>
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<td>00169</td>
<td>DHEA • 100 mg, 60 veg. caps</td>
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<td>00342</td>
<td>ENDOPTHAL MED w/ROSEHIP  • 60 softgels</td>
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<td>00382</td>
<td>EPA/DHA (Evenly) • 120 softgels</td>
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<td>00499</td>
<td>ERICBERG GUARDIAN w/BRENDERMUS  • 60 caps</td>
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<td>00654</td>
<td>ESSENTIALS FOR WOMEN  • 30 veg. caps</td>
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<td>01132</td>
<td>EXTRAVAGINAL ENZYMES • 60 caps</td>
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<td>01208</td>
<td>EUCALYPTUS EXTRACT  • 60 veg. caps</td>
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<tr>
<td>01243</td>
<td>EUPHYLLIN  • 120 veg. caps</td>
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<td>01290</td>
<td>FOSFOCYSTEINE  • 60 veg. caps</td>
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<td>01340</td>
<td>FRUCTOSE  • 100 caps</td>
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<td>01394</td>
<td>GALLIC (Optimized) • 200 veg caps</td>
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<td>01400</td>
<td>GASTRO-EASE™  • 60 veg caps</td>
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<td>GEOPROTECTION™ AGING CELL™  • 3 softgels</td>
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<td>GEOPROTECTION™ LONGEVITY A.J.™  • 30 softgels</td>
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<td>GINGER FORCE* • 60 liquid caps</td>
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<td>GINKGO BILOBA CERTIFIED EXTRACT™ 120 mg, 365 veg caps</td>
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<td>GLA WITH SESAME LIGNANS (Mega) • 60 softgels</td>
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<td>GLUTAMINE CAPSULES  • 500 mg, 100 veg caps</td>
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<td>GLUTATHIONE, CYSTEINE &amp; C  • 100 veg caps</td>
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<td>GLYCINE • 500 mg, 100 veg caps</td>
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<td>GREEN COFFEE EXTRACT COFFEENIC® 400 mg, 90 veg caps</td>
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<td>GREEN TEA EXTRACT (Mega)•lighty caffeinlated,100 veg caps</td>
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<td>HCACTIVE® GARCINIA CAMBOGIA EXTRACT • 90 caps</td>
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<td>HEPATOPRO® • 300 mg, 60 softgels</td>
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<td>HOMOXYSTEINE RESIST • 60 veg caps</td>
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<td>HUPERZINE A • 200 mg, 60 veg caps</td>
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<td>IMMUNE MODULATOR W/TINOFEND® • 60 veg caps</td>
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<td>INTEGRAL-LEAN® AFRICAN MANGO IRVINGIA 150 mg, 60 veg caps</td>
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<td>IONIC SELENIUM • 300 mg, 2 fl. oz</td>
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<td>JARRO-DOPHILUS EPS®  • 60 veg caps</td>
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<td>K W/ADVANCED K2 COMPLEX (Super)  • 90 softgels</td>
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<td>KRILL OIL (Jarrov)• 60 softgels</td>
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<td>PRODUCT</td>
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<td>KYOLIC® GARLIC FORMULA 102 • 200 veg. caps</td>
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<td>KYOLIC® RESERVE • 600 mg, 120 caps</td>
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<td>LACTOFERIN • 60 caps</td>
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<td>LECITHIN • 16 oz granules</td>
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<td>LIFE EXTENSION MIX™ • 240 tablets</td>
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<td>LIFE EXTENSION MIX™ W/EXTRA Niacin • 240 tablets</td>
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<td>LIFE EXTENSION MIX™ POWDER • 12.7 oz</td>
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<td>LIFE EXTENSION MIX™ • 240 tablets w/o copper</td>
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<td>5-LOX INHIBITOR W/APRES FLEX™ • 100 mg, 60 veg. caps</td>
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<td>L-LYSINE • 620 mg, 100 veg. caps</td>
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<td>LYCOPENE (Mega) • 15 mg, 90 softgels</td>
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<td>MACUGUARD® OCULAR SUPPORT w/SAFFRON • 60 softgels</td>
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<td>MACUGUARD® OCULAR SUPPORT w/SAFFRON &amp; ASTAXANTHIN • 60 softgels</td>
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<td>MAGNESIUM CAPS • 500 mg, 100 veg. caps</td>
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<td>MAGNESIUM (CITRATE) • 160 mg, 100 veg. caps</td>
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<td>(EXTEND-RELEASE) MAGNESIUM • 60 veg. caps</td>
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<td>MEDITERRANEAN WHOLE FOOD BLEND • 90 veg. caps</td>
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<td>01668</td>
<td>MELATONIN • 300 mcg, 100 veg. caps</td>
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<td>01083</td>
<td>MELATONIN • 500 mcg, 200 veg. caps</td>
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<td>00329</td>
<td>MELATONIN • 1 mg, 60 caps</td>
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<td>00330</td>
<td>MELATONIN • 3 mg, 60 veg. caps</td>
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<td>00331</td>
<td>MELATONIN • 10 mg, 60 veg. caps</td>
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<td>MELATONIN • 3 mg, 60 veg. lozenges</td>
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<td>MELATONIN (Fast-Acting Liquid) • 2 fl. oz (Citrus-Vanilla)</td>
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<td>MELATONIN TIMED RELEASE • 300 mcg, 100 veg. tabs</td>
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<td>MELATONIN TIMED RELEASE • 750 mcg, 60 veg. caps</td>
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<td>01786</td>
<td>MELATONIN TIMED RELEASE • 3 mg, 60 veg. tabs</td>
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<td>MEMORY PROTECT • 36 day supply</td>
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<td>METHYLCOBALAMIN • 1 mg, 60 veg. lozenges (vanilla)</td>
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<td>METHYLCOBALAMIN • 5 mg, 60 veg. lozenges (vanilla)</td>
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<td>00709</td>
<td>MIGRA-EEZE™ (Butterbur) • 60 softgels</td>
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<td>MILK THISTLE (European) • 60 veg. caps</td>
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<td>MILK THISTLE (European) • 60 softgels</td>
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<td>MILK THISTLE (European) • 120 veg. caps</td>
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<tr>
<td>01940</td>
<td>MIRAFORTE w/STANDARDIZED LIGNANS (Super) • 120 veg caps</td>
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<td>01869</td>
<td>MITOCHONDRIAL BASICS w/POQ • 30 caps</td>
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<tr>
<td>01868</td>
<td>MITOCHONDRIAL ENERGY OPTIMIZER w/POQ • 120 caps</td>
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<td>MK-7 • 90 mcg, 60 softgels</td>
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<tr>
<td>00451</td>
<td>MSM (Methylsulfonylmethane) • 1,000 mg, 100 caps</td>
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**SUBTOTAL OF COLUMN 7**

**RECEIVE 25% OFF THE RETAIL PRICE OF ALL PRODUCTS**

**APRIL 2018**
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<tr>
<th>Item No.</th>
<th>Product</th>
<th>Retail Each</th>
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<tbody>
<tr>
<td>00217</td>
<td>Pyradoxal 5'-phosphate • 100 mg, 60 veg. caps</td>
<td>22.00</td>
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<tr>
<td>01390</td>
<td>Quercetin (Optimized) • 250 mg, 60 veg. caps</td>
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<tr>
<td>01391</td>
<td>RED YEAST RICE (Bluebentonite) • 600 mg, 60 veg. caps</td>
<td>18.00</td>
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<tr>
<td>00005</td>
<td>REGIMINT • 60 enteric-coated caps</td>
<td>19.95</td>
</tr>
<tr>
<td>01708</td>
<td>REISHI EXTRACT MUSHROOM COMPLEX • 60 veg. caps</td>
<td>30.00</td>
</tr>
<tr>
<td>01448</td>
<td>REJUVENEX® BODY LOTION • 6 fl. oz</td>
<td>24.00</td>
</tr>
<tr>
<td>01621</td>
<td>REJUVENEX® FACTOR FIRMING SERUM • 1.7 oz</td>
<td>65.00</td>
</tr>
<tr>
<td>01220</td>
<td>REJUVENEX® (ULTRA) • 2 oz</td>
<td>52.00</td>
</tr>
<tr>
<td>00676</td>
<td>REJUVENIGHT® (ULTRA) • 2 oz</td>
<td>39.95</td>
</tr>
<tr>
<td>01410</td>
<td>RESVERATROL W/PTEROSTILBENE • 100 mg, 60 veg. caps</td>
<td>36.00</td>
</tr>
<tr>
<td>02030</td>
<td>RESVERATROL (Optimized) • 60 veg. caps</td>
<td>46.00</td>
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<tr>
<td>00888</td>
<td>RHODIOLA EXTRACT • 250 mg, 60 veg. caps</td>
<td>14.00</td>
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<tr>
<td>01900</td>
<td>RIBOGEN® FRENCH OAK WOOD EXTRACT • 200 mg, 30 veg. caps</td>
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<tr>
<td>00972</td>
<td>(D) RIBOSE POWDER • 150 grams</td>
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<tr>
<td>01473</td>
<td>(D) RIBOSE TABLETS • 100 veg. tabs</td>
<td>32.00</td>
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<tr>
<td>02169</td>
<td>RAINFROST BLEND GROUND COFFEE • 12 oz bag</td>
<td>13.00</td>
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<tr>
<td>02173</td>
<td>RAINFROST BLEND GROUND COFFEE Natural Mocha • 12 oz bag</td>
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<td>02172</td>
<td>RAINFROST BLEND GROUND COFFEE Natural Vanilla • 12 oz bag</td>
<td>15.00</td>
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<tr>
<td>02171</td>
<td>RAINFROST BLEND WHOLE BEAN COFFEE 12 oz bag</td>
<td>13.00</td>
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<td>02170</td>
<td>RAINFROST BLEND DECAF/DECAF GROUND COFFEE 12 oz bag</td>
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<tr>
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<td>R-LIPOIC ACID (Super) • 240 mg, 60 veg. caps</td>
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<tr>
<td>00070</td>
<td>RNA CAPSULES • 500 mg, 100 caps</td>
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<tr>
<td>01432</td>
<td>SAFFRON W/SATIereal® (Optimized) • 60 veg. caps</td>
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<tr>
<td>01935</td>
<td>SAMe (S-ADENOSYL-METHIONINE) 200 mg, 30 enteric coated tablets</td>
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**Q, R**

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<th>Retail Each</th>
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<td>QUERCETIN (Optimized) • 250 mg, 60 veg. caps</td>
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<td>RED YEAST RICE (Bluebentonite) • 600 mg, 60 veg. caps</td>
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<tr>
<td>00605</td>
<td>REGIMINT • 60 enteric-coated caps</td>
<td>19.95</td>
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<tr>
<td>01708</td>
<td>REISHI EXTRACT MUSHROOM COMPLEX • 60 veg. caps</td>
<td>30.00</td>
</tr>
<tr>
<td>01448</td>
<td>REJUVENEX® BODY LOTION • 6 fl. oz</td>
<td>24.00</td>
</tr>
<tr>
<td>01621</td>
<td>REJUVENEX® FACTOR FIRMING SERUM • 1.7 oz</td>
<td>65.00</td>
</tr>
<tr>
<td>01220</td>
<td>REJUVENEX® (ULTRA) • 2 oz</td>
<td>52.00</td>
</tr>
<tr>
<td>00676</td>
<td>REJUVENIGHT® (ULTRA) • 2 oz</td>
<td>39.95</td>
</tr>
<tr>
<td>01410</td>
<td>RESVERATROL W/PTEROSTILBENE • 100 mg, 60 veg. caps</td>
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<td>02030</td>
<td>RESVERATROL (Optimized) • 60 veg. caps</td>
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<td>RHODIOLA EXTRACT • 250 mg, 60 veg. caps</td>
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<tr>
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<td>RIBOGEN® FRENCH OAK WOOD EXTRACT • 200 mg, 30 veg. caps</td>
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<tr>
<td>00972</td>
<td>(D) RIBOSE POWDER • 150 grams</td>
<td>27.50</td>
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<td>01473</td>
<td>(D) RIBOSE TABLETS • 100 veg. tabs</td>
<td>32.00</td>
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<tr>
<td>02169</td>
<td>RAINFROST BLEND GROUND COFFEE • 12 oz bag</td>
<td>13.00</td>
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<tr>
<td>02173</td>
<td>RAINFROST BLEND GROUND COFFEE Natural Mocha • 12 oz bag</td>
<td>15.00</td>
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<tr>
<td>02172</td>
<td>RAINFROST BLEND GROUND COFFEE Natural Vanilla • 12 oz bag</td>
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<td>02171</td>
<td>RAINFROST BLEND WHOLE BEAN COFFEE 12 oz bag</td>
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<tr>
<td>02170</td>
<td>RAINFROST BLEND DECAF/DECAF GROUND COFFEE 12 oz bag</td>
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<tr>
<td>01208</td>
<td>R-LIPOIC ACID (Super) • 240 mg, 60 veg. caps</td>
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<tr>
<td>00070</td>
<td>RNA CAPSULES • 500 mg, 100 caps</td>
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**S**

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<th>Retail Each</th>
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<td>SAMe (S-ADENOSYL-METHIONINE) 200 mg, 30 enteric coated tablets</td>
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**TO ORDER ONLINE VISIT: www.LifeExtension.com**
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<th>4 Unit Each</th>
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<td>02102</td>
<td>Venoflow™ + 30 veg caps</td>
<td>52.00</td>
<td>39.00</td>
<td>36.00</td>
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<tr>
<td>00408</td>
<td>Venotonin + 60 caps</td>
<td>18.00</td>
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<tr>
<td>00372</td>
<td>Vitamin B3 Nicacin + 500 mg, 100 caps</td>
<td>7.65</td>
<td>5.74</td>
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<td>02028</td>
<td>Vitamin B5 + 500 mg, 100 veg caps (Pantothenic Acid)</td>
<td>14.00</td>
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<td>01535</td>
<td>Vitamin B6 + 250 mg, 100 veg caps</td>
<td>12.50</td>
<td>9.38</td>
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<tr>
<td>00381</td>
<td>Vitamin B12 + 500 mcg, 100 lozenges</td>
<td>8.75</td>
<td>6.56</td>
<td>5.44</td>
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<tr>
<td>01634</td>
<td>Vitamin C + Dihydroyeracetin 1,000 mg, 60 veg tablets</td>
<td>10.00</td>
<td>7.50</td>
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<tr>
<td>00927</td>
<td>Vitamin C + Dihydroyeracetin 1,000 mg, 250 veg tablets</td>
<td>30.00</td>
<td>22.50</td>
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<tr>
<td>00084</td>
<td>Vitamin C Powder (Buffered) + 454 grams</td>
<td>28.00</td>
<td>21.00</td>
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<td>01736</td>
<td>Vitamin C-Magnesium Crystals (Effervescent) 180 grams</td>
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<td>15.00</td>
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<td>01732</td>
<td>Vitamin D3 + 2,000 IU, 1 fl oz, Mint flavor</td>
<td>28.00</td>
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<tr>
<td>01753</td>
<td>Vitamin D3 + 1,000 IU, 90 softgels</td>
<td>7.00</td>
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<td>01751</td>
<td>Vitamin D3 + 1,000 IU, 250 softgels</td>
<td>12.50</td>
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<tr>
<td>01713</td>
<td>Vitamin D3 + 5,000 IU, 60 softgels</td>
<td>10.00</td>
<td>7.50</td>
<td>6.50</td>
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<td>01718</td>
<td>Vitamin D3 + 7,000 IU, 60 softgels</td>
<td>14.00</td>
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<td>01758</td>
<td>Vitamin D3 W/Sea-Iodine™ + 5,000 IU, 60 caps</td>
<td>14.00</td>
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<tr>
<td>00864</td>
<td>Vitamin D3 Liquid + 2,000 IU, 1 fl oz</td>
<td>28.00</td>
<td>21.00</td>
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<td>02040</td>
<td>Vitamin D And K W/Sea-Iodine™ + 60 caps</td>
<td>24.00</td>
<td>18.00</td>
<td>16.50</td>
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<td>01853</td>
<td>Vitamin E (Super) + 400 IU, 90 softgels</td>
<td>28.00</td>
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<tr>
<td>01936</td>
<td>Vitamin K2 (Low dose) + 45 mcg, 90 softgels</td>
<td>18.00</td>
<td>13.50</td>
<td>12.00</td>
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</tr>
</tbody>
</table>

**These products are not 25% off retail price.**

** Due to license restrictions, this product is not for sale to customers outside of the USA.

*** Due to license restrictions, this product is not for sale to Canada.

† Due to license restrictions, this product is not for sale to customers outside of the USA.

† † These products are not 25% off retail price. Due to license restrictions this product is not for sale to customers outside of the USA.

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**NOTICE:**

Not sure exactly which supplements you need?

Talk to a Wellness Specialist
toll-free at 1-800-226-2370
ORDER SUBTOTALS

<table>
<thead>
<tr>
<th>SUBTOTAL COLUMN 1</th>
<th>SUBTOTAL COLUMN 2</th>
<th>SUBTOTAL COLUMN 3</th>
<th>SUBTOTAL COLUMN 4</th>
<th>SUBTOTAL COLUMN 5</th>
<th>SUBTOTAL COLUMN 6</th>
<th>SUBTOTAL COLUMN 7</th>
<th>SUBTOTAL COLUMN 8</th>
<th>SUBTOTAL COLUMN 9</th>
<th>SUBTOTAL COLUMN 10</th>
<th>SUBTOTAL COLUMN 11</th>
<th>SUBTOTAL COLUMN 12</th>
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ORDER TOTALS

<table>
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<tr>
<th>SUBTOTAL OF COLUMNS 1 - 12</th>
<th>POSTAGE &amp; HANDLING</th>
<th>C.O.D.s (ADD $7 FOR C.O.D. ORDERS)</th>
<th>SHIPPING</th>
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</thead>
<tbody>
<tr>
<td>$5.50³</td>
<td>(Any size order, in the U.S., includes Alaska &amp; Hawaii)</td>
<td>UPS OVERNIGHT add $16, UPS 2nd DAY AIR add $7. For Puerto Rico, US Virgin Islands, add $7. CANADA UPS EXPRESS Flat rate $17.50, UK Flat rate $25 USD. ALL OTHER INTERNATIONAL AIR WILL BE ADDED.</td>
<td></td>
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</tbody>
</table>

GRAND TOTAL (MUST BE IN U.S. DOLLARS)

PLEASE MAIL TO: Life Extension
P.O. Box 407198 • Ft. Lauderdale, Florida 33340-7198
Or Call Toll Free 1-800-544-4440 • Fax: 866-728-1050

BILL TO ADDRESS

NAME

E-MAIL

ADDRESS

CITY/STATE/ZIP-POSTAL CODE

COUNTRY

PHONE

FAX

VISA/MASTERCARD/AMEX/DISCOVER #

EXP. DATE

SIGNATURE

SHIP TO ADDRESS

NAME

E-MAIL

ADDRESS

CITY/STATE/ZIP-POSTAL CODE

COUNTRY

PHONE

FAX

SIGNATURE

Prices subject to change without notice.
Please notify Life Extension of any address change.
Bone-Building NUTRIENTS In a Tasty CHEWABLE TABLET

To obtain enough calcium and other bone-building nutrients requires swallowing four capsules a day.

You can now ingest these potencies with two Chewable Chocolate Tablets of Bone Restore.

You’ll be pleasantly surprised how good these Chocolate Chewables taste.

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Quantity</th>
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<tbody>
<tr>
<td>Calcium</td>
<td>700 mg</td>
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<tr>
<td>Magnesium</td>
<td>300 mg</td>
</tr>
<tr>
<td>Silicon</td>
<td>5 mg</td>
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<tr>
<td>Boron</td>
<td>3 mg</td>
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<tr>
<td>Zinc</td>
<td>2 mg</td>
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<tr>
<td>Manganese</td>
<td>1 mg</td>
</tr>
<tr>
<td>Vitamin D3</td>
<td>1000 IU</td>
</tr>
</tbody>
</table>

Note: Recent recommendations for supplemental calcium dosing are around 700 mg based on typical amounts of dietary calcium consumed.

ITEM # 02123 • 60 chewable tablets • Retail price $22 • Your price $16.50 • 4 bottles $14.25 each

For full product description and to order Bone Restore, call 1-800-544-4440 or visit www.LifeExtension.com

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

These statements have not been evaluated by the Food and Drug Administration. This product is not intended to diagnose, treat, cure, or prevent any disease.
40 MORE POTENT GREEN-TEA DRINK
A patented process has led to a rich-tasting tea in quick-dissolving crystal form that boasts three times the polyphenol content of regular green teas.

67 HOMOCYSTEINE AND HEARING LOSS
New data reveals elevated homocysteine is involved in hearing loss. Low-cost B vitamins markedly reduce homocysteine blood levels.

82 WHO NEEDS DIGESTIVE ENZYMES?
Supplementing with digestive enzymes before meals assists in the proper breakdown of starch, proteins, fats, cellulose, and milk.

22 BORON: AN OVERLOOKED MICRONUTRIENT
Boron plays a crucial role in maintaining bone health. It also has anti-cancer properties including disruption of the human papilloma-virus (HPV) life cycle.

30 BENFOTIAMINE ATTACKS ALZHEIMER’S PATHOLOGY
Elevated blood sugar hastens neurodegeneration. A new study indicates that benfotiamine may stave off certain Alzheimer’s pathologies.

52 COMBAT AGING VIA ARTIFICIAL INTELLIGENCE
Aging disrupts cell-signaling pathways leading to whole-body degeneration. Utilizing the powers of AI, researchers have developed a novel solution.

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