Beyond Heart Health
Fish Oil Can Extend Human Lifespan

Probiotics Fight Winter Flu Virus
Benefits of NAD+ Restoration
Reply to American Heart Association
Green Tea and Colon Cancer
### Life Extension’s Annual Super Sale

Life Extension’s annual Super Sale enables clients to obtain premium-grade nutrient formulas at the year’s lowest prices.

Long-term supporters know that the quality of the products are backed by Life Extension’s commitment to extended healthy lifespans.

Below are a few examples of the savings you can enjoy during the Super Sale:

<table>
<thead>
<tr>
<th>Product Description</th>
<th>Item Number</th>
<th>Regular Price</th>
<th>Super Sale Price</th>
<th>Super Sale Price Per Bottle</th>
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<tr>
<td>Extend-Release Magnesium</td>
<td>#02107</td>
<td>$13</td>
<td>$7.88</td>
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<td>Provides immediate-release magnesium citrate along with a 6-hour extended-release magnesium for sustained benefits.</td>
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<td>Two-Per-Day Multinutrient Formula</td>
<td>#02214</td>
<td>$24</td>
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<td>Higher-potency bioactive vitamins, minerals, and plant extracts provide convenient doses in two daily capsules.</td>
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<tr>
<td>Advanced Bio-Curcumin® with Ginger &amp; Turmerones</td>
<td>#01924</td>
<td>$30</td>
<td>$18.23</td>
<td>(four-bottle purchase)</td>
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<tr>
<td>Absorbs up to 7-times better, with added benefits of ginger and turmeric extracts.</td>
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<td>Clearly EPA/DHA</td>
<td>#02200</td>
<td>$30</td>
<td>$18</td>
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<td>Concentrated fish oil uses a patented technology to provide 1,500 mg of EPA and 1,000 mg of DHA in four smaller clear softgels.</td>
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<td>Bone Restore Chewable Chocolate Tablets</td>
<td>#02123</td>
<td>$22</td>
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<td>New formula provides bone-building nutrients in tasty sugar-free, chewable, chocolate-flavored tablets.</td>
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<td>Super Ubiquinol CoQ10</td>
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<td>Super ubiquinol form of CoQ10 (100 mg) plus shilajit shown to double mitochondrial CoQ10 levels.</td>
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<td>Ultra Natural Prostate</td>
<td>#02029</td>
<td>$38</td>
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<td>Comprehensive support for an aging prostate gland utilizing extracts from pygeum, nettle, flower pollen, and saw palmetto plus boron, beta-sitosterol and lycopene.</td>
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Customers traditionally take advantage of the Super Sale to stock up on a year’s supply of their favorite supplements. To place your order, call 1-800-544-4440 or visit www.LifeExtension.com (Super Sale pricing available only to customers in the US, Canada, and England.)

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.
RESEARCH UPDATE: GREEN TEA AND COLORECTAL CANCER
Recent studies show that green tea blocks formation of colorectal-cancer stem cells. Green tea extract was found to reduce colorectal cancer risk in humans.

7 AWSI: AN ILLOGICAL POSITION OF THE AMERICAN HEART ASSOCIATION
In 2017, the American Heart Association published findings showing that fish oil supplements are beneficial for heart failure patients and reduce hospitalizations. The American Heart Association went on to state there is “lack of scientific research” to support use of fish oil in the general population. We rebut this irrational position that one should wait until after they develop heart disease before embarking on a program to optimize omega-3 status.

19 IN THE NEWS
Blueberries improve brain function; vitamin D supports pain management; Supplements lower risk of metabolic syndrome; resveratrol linked to lower glucose levels; and more.

83 SUPER FOODS: LENTILS
Lentils are remarkably nutritious legumes. They help control weight, stabilize blood sugar, promote healthy gut bacteria, and lower LDL cholesterol.

85 PROFILE: LISA BARTOLI, DO
Dr. Lisa Bartoli worked with Olympic athletes to avoid pain and injury and now helps private patients maintain youthful function through integrative and osteopathic medicine.

91 AUTHOR INTERVIEW: JIM MELLON AND AL CHALABI
The authors of Juvenescence: Investing in the Age of Longevity, explain the recent progress of scientists and companies in understanding the key molecular causes of aging.

95 ASK THE DOCTOR: MICHAEL OZNER, MD: REDUCING THE RISK OF HEART DISEASE
The prominent cardiologist and author explains the risk factors for heart disease and lays out a clear road map for avoiding it.
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.

Super Bio-Curcumin®
Item #00407 • 60 vegetarian capsules

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Advanced Bio-Curcumin® with Ginger & Turmerones
Item #01924 • 30 softgels

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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.
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.

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Thomas F. Crais, MD, FACS, 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).

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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.

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

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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, is an internist and a board-certified anti-aging physician, practices integrative medicine from a human ecology perspective with 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 a 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.

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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.

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

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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, cryoothermia, 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 nanopores with distinguished selectivity via biomimetic nanoscience. She has expertise in ion channel function and characterization. She founded X-Therma Inc., 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 Life Extension.com


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If you could travel back to year 1980, you’d read some of the first published data revealing low heart-attack rates in those who consume coldwater fish. These initial findings were based on observations of Eskimos and Greenlanders whose diets consist of foods high in omega-3s.1 Additional publications in the early 1980s provided biologic explanations for the arterial protective effects of omega-3s.2 Since then, many studies have been published describing the potential of omega-3s to reduce cardiovascular risks.

Here we are 38 years later and there is still a debate as to whether healthy people should supplement with fish oil. You may ask why anyone still questions fish oil’s value. After all, heart disease and ischemic stroke remain among the leading causes of disability and death.3

One answer can be found on the graphic at the end of this article. It describes 19 independent heart-attack risk-factors. Fish oil offers a degree of protection against some, but not all of these independent risks. So when an isolated study fails to show a cardioprotective benefit, hurried doctors erroneously conclude there to be little benefit to omega-3 supplements.

Omitted from these knee-jerk reactions are the other vascular risks that must be corrected if one is to reduce their odds of ischemic stroke, coronary artery blockage, and sudden cardiac arrest.

This kind of misguided reaction occurred in 2017 when the American Heart Association issued an advisory stating that fish-oil supplements:

“... prevent death from heart disease in patients who recently had a heart attack and may prevent death and hospitalizations in patients with heart failure.”

The American Heart Association immediately followed this advisory by stating there is “lack of scientific research” to support use of fish oil in the general population.4,5 An article on page 62 of this month’s issue refutes this illogic by describing studies supporting use of fish oil to mitigate vascular risks and a new study showing that omega-3s reduce all-cause mortality.

This editorial describes approaches to cardiovascular disease prevention that most Life Extension Magazine® readers already follow.
Fish-Oil Use Sharply Increases

Surging numbers of Americans now supplement with fish oil that provides omega-3 fatty acids.

According to a report published by the National Institutes of Health, between 2002 and 2012, there was almost a four-fold increase in the number of people using a fish-oil supplement.9

Another survey published by the American Medical Association showed a nine-fold increase in fish-oil supplement users between 1999 and 2012.7

This same survey, however, revealed only 12% of adult Americans are using an omega-3 supplement.7

This indicates that while fish oil-supplement use has increased over the past two decades, vast numbers of Americans are not achieving optimal EPA/DHA status.

And most people in the United States are not ingesting sufficient EPA/DHA potencies via their diet or supplement program.8

The public is now so aware of the heart-health properties of coldwater fish that the media garner few ratings by reporting on yet another favorable fish-oil study. Instead, headline-hungry reporters latch onto any comment that challenges the benefits of omega-3s. This happened in 2017, when the American Heart Association published a favorable report about fish oil’s newly discovered cardiac benefits,10 but then argued against fish-oil supplementation for healthy adults.

American Heart Association Declares that Fish Oil Combats Heart Failure

Heart failure occurs when the heart cannot adequately pump blood. An estimated 5.7 million Americans currently suffer failing heart function.11

Headline news stories in 2017 report on “surprising” findings that fish oil-supplements not only help prevent death in heart attack patients, but they may also prevent hospitalizations in patients with chronic heart failure.12,13

In response to this study, an American Heart Association physician stated:

“What is new is that people with heart failure also may benefit from omega-3 fish-oil supplements.”4

This study, published by the American Heart Association, was based on a large, randomized, clinical trial.10

Surging Use of Fish Oil/Omega-3 Supplements in the United States6

Results from the National Health Interview Survey Conducted by the National Center for Health Statistics

“Fish oil was the most popular natural product used by adults in the United States in 2012. Nearly 8 million more adults used fish oil in 2012 than in 2007.”9
The results showed a low-dose fish-oil supplement reduced death and hospitalization by 9% in heart-failure patients. This led the study authors to determine that doctors could consider fish-oil supplements for heart-failure patients.4

When we saw only a 9% risk reduction in heart-disease patients taking approximately 1,000 mg a day of an omega-3 supplement, our reaction was how trivial this risk reduction and fish-oil potency were.

We say this based on better improvements in cardiac function that have been observed in response to supplementation with coenzyme Q10,14-22 taurine,23-25 magnesium,26-29 and higher-dose fish oil.30-33

The fact that this modest dose (approximately 1,000 mg a day of EPA/DHA) produced such benefits in heart failure patients is a revelation.

Most of you supplement with double this EPA/DHA dose, along with healthy dietary choices AND other nutrients that protect against cardiovascular disease via different mechanisms.

**American Heart Association Attacks Fish-Oil Supplements**

After publishing the favorable 2017 report on fish oil aiding heart failure patients and preventing cardiac death, the American Heart Association emphasized that healthy people would not benefit by taking low-dose fish-oil supplements.

This recommendation against healthy people using fish oil was based on earlier flawed studies that were discredited in rebuttals we long ago published that can be accessed at LifeExtension.com/fish

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The American Heart Association advisory concludes that:

"supplementation with omega-3 fish oil may benefit patients with specific, clinical, cardiovascular disease indications, including patients with a recent prior heart attack and heart failure."4

According to this twisted logic, people should wait until after they have a heart attack or suffer heart failure before supplementing with fish oil.

We view these kinds of public decrees, such as “don't take fish oil until after you suffer a heart attack”, as an example of widespread medical stagnation that causes so many premature illnesses.

**Multiple Factors Involved In Heart Disease**

The arterial system is our modern day Achilles tendon.

Normal aging results in loss of endothelial function and subsequent development of atherosclerotic lesions that impede blood flow.

When platelets bump up against jagged atherosclerotic plaque, they can abnormally aggregate and cause an acute blockage of blood flow to a coronary or cerebral artery. This can result in a myocardial infarction (heart attack) or ischemic stroke.

Unstable arterial plaque is prone to sudden rupture, which can acutely occlude blood flow to arteries in our heart or brain resulting in sudden death.

Serious plaque buildup in coronary arteries creates angina pain that mercifully can be relieved via insertion of stents into narrowed arteries. In cases of severe coronary blockage, open-chest surgery is needed to bypass the blocked arteries.

Multiple pathologies are involved in the initiation and progression of arterial disease. Fish oil helps circumvent some of them by:

- Reducing triglyceride levels34,35
- Reducing C-reactive protein (helps stabilize plaque)36,37
- Reducing platelet stickiness (a thrombotic factor)38-40
- Reducing inflammation41-45
- Increasing EPA/DHA blood levels46,47
- Increasing large buoyant LDL particle size and other sub-lipid profiles48,49

These six validated benefits make it obvious that healthy people should ingest sufficient omega-3s.

Fish oil, however, does not miraculously circumvent all independent vascular pathologies.
When one understands that fish oil protects against many, but not all arterial risk factors, studies showing benefit to omega-3 supplementation alone should be viewed with greater respect.

The inability of fish oil to circumvent other atherogenic risk factors mandates that people take additional steps to protect their delicate vascular system. Most readers of this magazine follow these preventive strategies.

**Curcumin Mitigates Heart Failure**

Popularity of curcumin in recent years has grown more rapidly than fish oil.

Relief from inflammation is one reason why people use standardized curcumin supplements.

Curcumin is a polyphenol contained in the curry spice turmeric. It has demonstrated anti-cancer effects and may protect against the deleterious changes involved with atherosclerosis and atrial arrhythmia.\(^5\)

A hallmark characteristic of heart failure is enlargement of the heart muscle. In particular, the left ventricle that pumps blood directly into circulation enlarges and gradually loses functionality.

Heart enlargement can occur in response to stress signals that create adverse gene-expression changes in heart-muscle cells.

**Curcumin** has been shown to specifically inhibit gene-expression changes that contribute to chronic heart failure.\(^5\)

Curcumin inhibits enlargement of cultured heart cells and prevents onset of heart failure caused by hypertensive heart disease and coronary infarction in rat models.\(^5\)

One of several drugs used clinically to mitigate heart failure is enalapril. A group of researchers found that curcumin works similarly to enalapril monotherapy in rat studies.\(^5\)

When researchers combined curcumin with enalapril, they observed additive improvements in heart function. This suggests the mechanism of action of curcumin differs from the conventional cardiac drug (enalapril).\(^5\)

The researchers pointed out that:

“Combination therapy with curcumin and these agents [cardiac drugs] may be more effective for cardiac hypertrophy and heart failure.”\(^5\)

When reviewing published data, it would appear that combining curcumin with fish oil (along with conventional therapy) would reduce deaths and hospitalizations more than the meager 9% reported in 2017 by the American Heart Association that focused on low-dose fish oil.
Fight Back Against Medical Apathy

Protecting against arterial disease and heart failure are paramount concerns for aging humans.

Pomegranate improves nitric oxide status in the inner arterial wall,54,55 vitamins like 5-MTHF (folate) slash homocysteine,56 while CoQ10,57,58 PQ,60,61 and NAD+ bolster mitochondrial energy in heart cells. All of this improves cardiac function.

No one should be deficient in vitamins D and K2 as these are low-cost supplements that readily absorb when taken with a meal that contains some fat.

While some supplements help lower blood pressure, most aging people need medications to achieve optimal systolic readings of around 115 mmHg. The drug telmisartan safely lowers blood pressure AND has vascular side benefits.63-67

AMPK-activating nutrients and/or drugs (like metformin) lower blood glucose and insulin.68

We advocate that LDL cholesterol be kept in the low normal ranges (under 100 mg/dL). This can usually be accomplished by following a Mediterranean style diet and/or using low-doses of prescription drugs.

Hormone balance should be initiated after comprehensive blood testing.

Refuting Illogic

By understanding the many factors that underlie heart attack and stroke, one can readily dismiss allegations made by groups like the American Heart Association that claim fish oil benefits heart-disease patients but is of little value to the general population.

This illogic assumes heart-attack and stroke victims were not part of the general population prior to their vascular disaster.

Most readers of Life Extension Magazine® were alerted to these independent vascular risk factors decades ago and take appropriate preventive measures.

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Thirty-eight years ago, Life Extension® embarked on a mission to radically extend healthy human lifespans.

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For longer life,

William Faloon, Co-Founder
Life Extension Buyers Club

Turn this page to view 19 independent vascular risk factors.

Scientific references for this article begin on page 14.
This graphic shows 19 daggers aimed at an artery occluded with atherosclerotic plaque. Any one of these “daggers” can initiate and propagate atherosclerotic vascular disease.

You’ve just read statements made by the American Heart Association claiming there is little value in fish oil supplementation to the general population.

Most readers of this magazine are aware of the pathologies involved in arterial disease and follow comprehensive preventive measures.
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The best way to keep You in the picture.

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

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References


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Item #02101 • 36 capsules

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<td>4 boxes</td>
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Blueberries Improve Brain Function in Elderly

New research has found that concentrated blueberry juice is linked to improvements in brain blood-flow and cognitive function in older people.*

Researchers believe the flavonoids and pterostilbene content of blueberries, which can be obtained more easily and in greater concentration in supplement form, is likely responsible for these beneficial effects.

The study from England’s University of Exeter employed 26 healthy subjects ages 65 to 77. Twelve of the subjects drank concentrated blueberry juice once daily. The other 14 received a placebo. The study went on for 12 weeks.

Prior to and after the study, the participants were given a number of cognitive tests while their resting blood flow was measured and an MRI monitored their brain activity to establish a baseline.

Results showed that, during the study, subjects who consumed the blueberry concentrate had a significant increase in brain activity compared to those who took the placebo.

Editor’s Note: This study backs up a large number of studies showing the health benefits of fruits and vegetables in general. “Our cognitive function tends to decline as we get older,” said lead study author Dr. Joanna Bowtell. “But previous research has shown that cognitive function is better preserved in healthy older adults with a diet rich in plant-based foods.”

Vitamin D Supplementation Helps Manage Pain

Monica Levy Andersen and colleagues at Brazil’s Universidade Federal de Sao Paulo’s department of psychology suggest that supplementation with vitamin D combined with sound sleep could help manage chronic pain.*

“Sleep and pain share neurotransmitters in their physiological processes,” the authors explain. Decreased vitamin D levels have been associated with infectious diseases, inflammation, and sleep disorders, all of which can affect pain. Such conditions as fibromyalgia, rheumatoid arthritis, low back pain, lupus, and more have been associated with disordered sleep.

“We can hypothesize that suitable vitamin D supplementation combined with sleep hygiene may optimize the therapeutic management of pain-related diseases, such as fibromyalgia,” Dr. Andersen stated. “It is necessary to understand the possible mechanisms involved in this relationship, including immunological and neurobiological pathways related to interrelationship among sleep, vitamin D and pain.”

Editor’s Note: Periodic blood testing to determine serum 25-hydroxyvitamin D levels may be helpful for those experiencing chronic pain.

Supplements Lower Risk of Metabolic Syndrome

A study reported in the journal *Nutrients* found a lower incidence of metabolic syndrome among dietary supplement users in Korea.*

The study included 1,847 supplement users and 4,461 nonusers enrolled in the 2010-2011 Korea National Health and Nutrition Examination Survey. Twenty-four-hour diet recall data was analyzed for antioxidant content. Survey responses provided information concerning the use of supplements.

Metabolic syndrome was diagnosed when three or more risk factors for the condition—abdominal fat, high blood pressure, high blood sugar, and unhealthy cholesterol levels—were present during health examinations.

The study uncovered an 18% lower prevalence of metabolic syndrome in supplement users. Among those whose intake of vitamin A was among the highest one-third of supplement users there was a 28% lower risk of metabolic syndrome compared to nonusers whose intake of the vitamin was among the lowest third. For supplement users whose vitamin E intake was among the highest, the risk was 26% lower.

*Editor’s Note:* Supplement users whose total antioxidant capacity from diet and supplements was among the top third of subjects had a 28% lower risk of metabolic syndrome than nonusers whose total antioxidant capacity was among the lowest.

*Nutrients.* 2017 Sep 22.
Resveratrol Linked to Lower Glucose Levels

The results of a meta-analysis published in *Nutrition & Metabolism* add evidence to an association between supplementing with resveratrol and improved management of type II diabetes.*

For their analysis, Ling Li of Southeast University and associates selected nine randomized, controlled trials involving a total of 283 type II diabetics. They compared levels of glucose, insulin and other factors among participants who received resveratrol to those who received a placebo or to a control group of diabetics.

The analysis concluded that resveratrol supplementation was associated with significantly reduced insulin levels and insulin resistance. Fasting plasma glucose was reduced by an average of 5.2 mg/dL among those who received resveratrol compared to placebo or control groups.

**Editor’s Note:** Further analysis determined that only 100 mg or higher doses of resveratrol were associated with lower glucose levels.

Elevated fasting insulin often precedes diagnosis of type II diabetes by years or decades. Resveratrol exerts several beneficial mechanisms to help improve insulin sensitivity.

* Nutr Metab. 2017 Sep 22.
Diabetes Raises Risk of Sudden Cardiac Death

Research suggests that diabetics under age 50 have a seven-times higher risk of succumbing to sudden cardiac death compared to nondiabetics.*

Sudden cardiac death occurs when the heart’s electrical system malfunctions and the organ suddenly stops.

The 10-year Danish study looked at the medical records of all Danes in two groupings: those between the ages of 1 and 35 in 2000-2009 and those between the ages of 36 to 49 in 2007-2009. Out of 14,000 deaths, 5% were diabetic—about 500 had type I diabetes and about 200 had type II diabetes.

The results showed people with type II diabetes had a five-times higher risk of cardiac death and those with type I diabetes had a 12-times higher risk.

Moreover, the diabetics were found to have an eight-times higher risk of dying from heart disease of any kind.

Chief Cardiologist Dr. James Catanese of Northern Westchester Hospital in Mount Kisco, N.Y., was not surprised by the finding of higher risk in itself, but the amount of risk surprised him. “A seven- or eight-times higher risk is astounding, particularly in people below age 50,” he said.

Editor’s Note: Copenhagen University Hospital medical student and lead author Jesper Svane remarked, “It is important that healthcare providers are aware that young patients with diabetes have an elevated risk of mortality and that this is mainly explained by an increased risk of cardiac death.”

Life Extension® customers take extraordinary steps to stave off disease and aging while attaining optimal health.

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<tr>
<td><strong>AMPK Metabolic Activator</strong> • 30 vegetarian capsules, Item #02207</td>
<td>$38</td>
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<td>Dual ingredient plant compounds support youthful AMPK activity to fight belly fat and promote metabolic health. Just one caplet daily dosing.</td>
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<td><strong>Extend-Release Magnesium</strong> • 60 vegetarian capsules, Item #02107</td>
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<td>Provides immediate-release magnesium citrate along with a 6-hour extended-release magnesium for optimal benefits.</td>
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<td><strong>Super Bio-Curcumin®</strong> • 400 mg, 60 vegetarian capsules, Item #00407</td>
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<td>Absorbs up to 7 times greater than conventional curcumin. Each bottle lasts two months.</td>
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<td><strong>Super Ubiquinol CoQ10</strong> • 60 100 mg softgels, Item #01426</td>
<td>$62</td>
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<td>Superior ubiquinol form of CoQ10 (100 mg) plus shilajit shown to double mitochondrial CoQ10 levels.</td>
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<td><strong>Health Booster (Once-Daily)</strong> • 60 softgels, Item #02091 (2-month supply)</td>
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<td>Just one softgel provides three forms of vitamin K, blueberry extract, gamma tocopherol, sesame lignans, chlorophyllin, lycopene, trans-zeaxanthin, meso-zeaxanthin, and lutein.</td>
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<tr>
<td><strong>Vitamin D3</strong> • 5,000 IU, 60 softgels, Item #01713</td>
<td>$10</td>
<td>$5.85 (four-bottle purchase)</td>
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<td>High-potency vitamin D in a softgel to provide greater absorption into the bloodstream.</td>
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<td><strong>MacuGuard® Ocular Support</strong> • 60 softgels, Item #01992</td>
<td>$25</td>
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<td>Eye protection with meso-zeaxanthin, lutein, trans-zeaxanthin, and saffron to support healthy vision.</td>
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<tr>
<td><strong>ComfortMax™</strong> • 60 vegetarian tablets, Item #02202</td>
<td>$44</td>
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<td>Two natural compounds to reduce common discomforts and improve freedom of movement.</td>
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<td><strong>N-Acetyl-L-Cysteine</strong> • 60 vegetarian capsules, Item #01534</td>
<td>$14</td>
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<td>Increases cell glutathione levels to mitigate oxidative stress.</td>
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Mitochondrial Energy Optimizer with PQ® • 120 capsules, Item #01868
Glycation-protection formula helps maintain cell function, protein structural integrity, and mitochondrial biogenesis. Provides high potency carnosine along with R-lipoic acid, PQ, benfotiamine, luteolin, and taurine.

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Strawberry-flavored FLORASSIST® Prebiotic Chewable helps promote healthy bifidobacteria levels in as little as 14 days using a novel XOS prebiotic fiber.

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Promotes generation of new mitochondria in aging cells.

Memory Protect • 36-day supply, Item #02101
Microdose lithium and proline-rich polypeptide to inhibit cognitive decline.

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Highly purified EPA (1,400 mg) and DHA (1,000 mg) from Alaskan Pollock, sesame lignans plus potent olive extract provides essential components of the Mediterranean diet in four softgels.

Clearly EPA/DHA • 120 softgels, Item #02200
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Bone Restore Chewable Tablets • 60 chewable tablets, Item #02123
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Reverse
Underlying Cause of Degenerative Aging

To remain alive, your cells generate a continuous flow of energy.

When energy is produced by burning hydrocarbons such as coal or oil, the result is residual waste pollutants that damage living beings.

A similar event occurs during cellular energy metabolism. Left behind in the energy cycle is toxic debris.

The primary way cells “clean house” is via autophagy.¹

Autophagy defines a natural process whereby cells clear damaged proteins and other metabolic waste products.¹,²

An emerging body of evidence points to imbalanced autophagy as a driver of premature aging.³,⁴

Recent discoveries show that almost every intervention proven to extend healthy lifespan involves activation of autophagy (removing toxic cellular waste).³,⁴

Restoring balanced autophagy is a critical factor in reversing biological aging.⁴
**How to Restore Autophagy**

**Rapamycin** is a drug that regulates **autophagy**. Preliminary evidence points to its potential to delay aging.5,6

Although rapamycin has consistently demonstrated lifespan extension in animal models, mainly by delaying cancer onset,5 such a powerful drug needs more human studies to ensure against potential risks.

There are natural methods to improve **autophagy** that include supplementation with **lithium** and NAD+ precursors like **nicotinamide riboside**.7,9

One of the safest and most effective methods to optimize **autophagy** is by activating an **enzyme** in our cells called **AMPK**.10-12

When AMPK is activated, it signals cells to remove internal **pollutants** via the process of **autophagy**.13,14

This enables cells to function in a more **youthful** manner, as evidenced by **reduced abdominal fat** stores in many people using **AMPK-activating** compounds.15

**New Longevity Factor: mTOR**

**AMPK** performs its **fat-removing** process, in part, by regulating a protein called **mTOR** which stands for **“mechanistic target of rapamycin.”**14,23-25

The drug called **rapamycin** is a powerful **autophagy-inducer**. It is demonstrating significant age-delaying effects in older animals.26 Differing doses of **rapamycin** are being studied in humans to assess if a once-per-week dosing can provide benefits without the immunosuppression that occurs when rapamycin is taken daily.27

To clean out **metabolic waste** from aging cells today, the best way of regulating **mTOR** is to **boost** AMPK **functionality**.

**Balance mTOR to Burn Fat**

When cell **mTOR** is properly **balanced**, the initial effect is breakdown of **fat stores** that are used to fuel cellular energy.14,23-25,28

---

**AMPK Signals Cells to Devour Internal Fat**

**AMPK** was first identified in 1973 for its cell-regenerative effects.16

When people practice **calorie restriction**, AMPK activity increases in cells.17,18

Increasing **AMPK** activity helps protect against degenerative aging.3,19,20

**AMPK** turns down cell proliferation to conserve energy in the face of restricted food intake.17,18,20,21

**AMPK** signals cells to devour stored **fat** in response to perceived energy (food) shortages.20-22

This is how our ancestors survived **famines**. When confronted with food scarcity, cells react by slowing their replication and utilizing **stored fat** reserves for essential **energy** production.

If **mTOR** is **not** balanced, aging individuals often accumulate unwanted **fat stores**, even when they don’t excessively ingest calories.14,23-25,28

When nutrient **signaling** pathways are saturated, the result is **storage** of excess energy in adipose tissue, which manifests outwardly as **body fat**. This happens because of increased **size** of **adipocytes** (fat cells).

Excessive nutrition (calorie intake) causes up-regulation of **mTOR**, which sets the stage for increased risk of malignancy and atherosclerosis.

In our youth, energy-sensing **AMPK** delicately balances cellular energy and fat storage.29,30 Young bodies do a wonderful job of adapting to nutrient availability and energy demands.

Many factors contribute to the age-related loss in flexibility of our **signaling** pathways. Cell culture and animal data suggests that sensitivity of key energy regulators is lost with age. This causes some pathways to become hyperactive, whereas others are underactive.19,31

**AMPK** is a key **energy regulator** that seems an ideal target of longevity-enhancing therapeutics that can also help reduce unwanted belly fat.

Optimizing **AMPK** activity facilitates removal of cellular debris (via autophagy) and suppresses excess cell propagation.10,11,32 When **mTOR** is inhibited by **AMPK activators** there are **reductions** in cancer risks.20,33

As it relates to combatting aging, achieving **optimal mTOR activation status** is a critical factor that you will learn more about this upcoming year.
New Way to Activate AMPK

One of the most stubborn aspects of normal aging is accumulation of deep visceral (abdominal) fat. Not only can this be unsightly, but it generates systemic inflammation and glucose/lipid imbalances that are root causes of metabolic syndrome and type II diabetes.

Seeking a natural approach to boosting AMPK, researchers studied a citrus flavonoid called hesperidin. Laboratory results show that hesperidin markedly activates AMPK.

Hesperidin Studied in High-Risk Patients

Metabolic syndrome describes a cluster of factors that markedly increase heart attack and stroke risk. Patients with metabolic syndrome typically have:

- High blood pressure
- Elevated blood sugar
- Lipid imbalance (high triglycerides/low HDL)
- Excess fat around the waist
- Low-level systemic inflammation

Metabolic syndrome patients are at increased risk to progress to type II diabetes.

What You Need to Know

The Benefits of AMPK

- Autophagy is a process in which cells “clean house” by removing damaged proteins and other metabolic waste products. Almost every intervention proven to extend healthy lifespan involves the promotion of autophagy.
- Activation of an enzyme in our cells called AMPK is a particularly safe and effective method to optimize autophagy.
- AMPK signals cells to remove internal pollutants via autophagy. This enables cells to function in a more youthful manner, as evidenced by reduced abdominal fat in many who use AMPK-activating compounds.
- Abdominal fat isn’t just unsightly. It can also generate the systemic inflammation and glucose/lipid imbalances at the root of metabolic syndrome and type II diabetes.
- AMPK performs its fat-removing process, in part, by regulating a protein called mTOR. Currently, the best way to sweep out metabolic waste from aging cells is through regulating mTOR by boosting AMPK functionality.
- Laboratory results show that the citrus flavonoid hesperidin markedly activates AMPK.
- As well, an extract from the Gynostemma pentaphyllum plant has demonstrated strong AMPK-activating properties.
- Gynostemma pentaphyllum extract and hesperidin provide a dual boost to cell AMPK activity, which in turn helps reduce fat by burning it for energy and helps mitigate some of the deleterious mechanisms of aging.
- AMPK can be activated with prescription drugs like metformin or by using a new once-daily combination of standardized extracts of Gynostemma pentaphyllum and hesperidin.
Based on this festering heart attack epidemic, researchers tested standardized hesperidin on a group of metabolic-syndrome patients. In this randomized double-blind crossover clinical trial, half the metabolic-syndrome subjects took 500 mg/day of hesperidin or placebo over a three-week period. They were all “crossed over” so that each patient received either hesperidin or placebo at some point during the study period.

Participants were explicitly counseled before initiation of the study to maintain their usual physical activity and dietary habits. Baseline and follow-up tests included blood markers of cardiac risk and an ultrasound measure of arterial function.

C-reactive protein is a marker of inflammation that increases risk of heart attack and stroke. Those with excess belly fat often have elevated C-reactive protein blood levels. In this study, metabolic syndrome patients taking the hesperidin supplement had a striking 33% reduction in C-reactive protein levels compared to baseline. Flow-mediated dilation is a non-invasive test that utilizes ultrasound to assess endothelial function in humans.

When these metabolic syndrome study subjects were given hesperidin, there was a 25% improvement in this (ultrasound) assessment of arterial health. When the same metabolic syndrome patients were crossed-over and given placebo, endothelial function slightly worsened. (Metabolic syndrome is characterized by declining arterial health along with increased inflammation.)

Metabolic Syndrome Risk Factors

Apolipoprotein B is a protein portion of LDL cholesterol. Those with high apolipoprotein B levels are at significantly greater risk for coronary artery disease. In this study of metabolic syndrome patients, apolipoprotein B decreased 2.2% in the hesperidin arm but increased 3.3% when the recipients were given placebo.

Those afflicted with metabolic syndrome have a cluster of conditions that include excess belly fat, high blood pressure, high blood sugar, inflammatory indicators and abnormal lipids. These factors are an underlying cause of many hearts attack and strokes.

This three-week study demonstrated reductions in measures of cardiovascular risk in metabolic syndrome patients given a standardized hesperidin supplement. We attribute many of these benefits to the increase in AMPK activity that hesperidin was recently found to induce at the cellular level.

Activating AMPK to Reduce Belly Fat

AMPK activation helps remove excess stored fat by telling your cells that energy is needed so they will stop storing fat and begin using it for energy production. Based on the known fat-reducing effects of AMPK activation, a study evaluated people with moderately high body mass index 24-30 kg/m². Study participants were provided with a daily dose of nearly 400 mg of hesperidin that was administered over a 12-week period.

All participants in this study were advised to maintain their regular activity levels and meal size for the duration of the study. Baseline and follow-up tests included CT-scan imaging of abdominal fat.

At the study conclusion, abdominal fat in the placebo group increased over 5%, whereas the group receiving hesperidin had about a 1.5% abdominal-fat reduction. This is comparable to average belly fat-loss effects of metformin recorded in a separate open-label study of type II diabetics that were given exercise and diet plans.

Hesperidin demonstrated marked AMPK activation in the laboratory. This discovery has now been corroborated by findings of abdominal fat loss and improved vascular function in humans who supplemented with standardized hesperidin.
Hesperidin Increases AMPK

Preclinical studies have shown that AMPK activity declines with normal aging. Specific plant extracts can help reverse this degenerative trend. One of these AMPK-activating nutrients is the citrus flavonoid hesperidin. The charts below reveal greater than two-fold increase in AMPK activity in response to the bioactive form of hesperidin.

**Figure A.** The amount (10 µM) of hesperidin that resulted in a > two-fold increase in AMPK activity.

**Figure B.** Treatment of cells with 10 µM of hesperidin reveals statistically significant activation of AMPK.

Based on separate bioavailability clinical study of hesperidin, it is expected that after ingesting 500 mg of hesperidin, blood levels of bioactive hesperetin would remain at a concentration greater than 10 µM throughout the day.

Measuring AMPK Activity of Hesperidin

Hesperetin is the bioactive form of hesperidin the body converts to after oral ingestion. The diagram below shows the conversion of oral hesperidin to bioactive hesperetin:

Hesperidin is a citrus peel extract that long-ago demonstrated robust vascular benefits.

When hesperidin is orally ingested, it converts to bioactive hesperetin.

For cell-based in vitro studies, researchers use hesperetin to measure AMPK activity. In vitro cell studies help prove a biological concept, such as the ability of a nutrient or drug to activate AMPK. They do not always correspond to the same in vivo impact.

As it relates to hesperidin, human data indicates beneficial effects that correspond in many ways to AMPK-activating compounds like metformin.
Impressive Results with Gynostemma Pentaphyllum

An extract from the *Gynostemma pentaphyllum* plant has previously demonstrated potent AMPK-activating properties.⁴⁸,⁴⁹

In a randomized study of 80 obese-but-otherwise healthy people, supplementation with 450 mg a day of *Gynostemma*—standardized extract resulted in a 6.29% total decline in belly fat compared to a 0.86% drop in the placebo group.¹⁵

More impressively, obese individuals receiving the standardized *Gynostemma* extract had nearly an 11% drop in dangerous visceral fat compared to 2.96% in the placebo arm.¹⁵

Visceral fat accumulates around internal organs in the belly. It is the most dangerous kind of fat as it emits inflammatory cytokines that inflict systemic damage.⁵⁰,⁵¹

AMPK-Boosting Effects of Gynostemma pentaphyllum

In an *in vitro* study, a standardized extract from the *Gynostemma pentaphyllum* plant induced a nearly seven-fold increase in AMPK activity compared to baseline.⁵⁴

When humans take this standardized *Gynostemma pentaphyllum*,¹⁵ study findings reveal some benefits similar to diabetic patients using the drug metformin.⁴⁷

In particular, standardized *Gynostemma pentaphyllum* has shown significant reductions in abdominal fat mass compared to placebo in controlled studies.

This chart shows the increase in AMPK activity in response to *Gynostemma pentaphyllum*.

As noted with the hesperidin data, *in vitro* studies help prove a biological concept, but do not always correspond to the identical *in vivo* effect.

As it relates to *Gynostemma pentaphyllum*, published data reveals significant AMPK activation in the animal (*in vivo*) model.⁵⁴

Consistent with these findings, lower doses of standardized *Gynostemma pentaphyllum* (450 mg/day) used in a human study demonstrate significant reductions in belly fat.¹⁵

When analyzing *cell culture* (*in vitro*) and animal (*in vivo*) data showing AMPK activation and then comparing this with human data showing abdominal fat reduction, *Gynostemma pentaphyllum* demonstrates many beneficial properties of metformin.
Reducing **visceral fat** is a difficult but crucial objective for prevention of cardiovascular disorders, dementia and malignancies.52,53

*Gynostemma pentaphyllum extract* and *hesperidin* provide a dual boost to cell **AMPK activity**, which in turn helps mobilize fat stores by utilizing them as energy sources.

**Combat Aging While Reducing Belly Fat**

The age-related decline in **AMPK activity**19 is thought to set off a cascade of pathological processes that include:

1. Decreased autophagy  
   (removal of cellular debris)

2. Abnormal blood lipid profiles  
   (cholesterol/triglycerides)

3. Increased C-reactive protein  
   (chronic inflammation)

4. Increased abdominal fat storage  
   (especially visceral fat)

Boosting **AMPK** activity using nutrients like *Gynostemma* and *hesperidin* has been demonstrated to mitigate some of these deleterious **mechanisms of aging** while helping to reduce belly fat.

**Do You Need to Suppress mTOR?**

Not everyone should consider aggressive suppression of **mTOR** and turning up **autophagy** (cellular housecleaning).

If **mTOR** is excessively and constantly turned down, it could worsen sarcopenia and other frailty-associated conditions.

Western diets are increasingly putting Americans at risk of chronically elevated **mTOR activity** that contributes to metabolic disorders and unwanted fat accumulation.

There are people today who cycle between aggressively suppressing **mTOR** via calorie restriction and/or high-dose AMPK activators, and then eating balanced protein-rich diets. This enables **mTOR** to rebuild muscle mass while suppressing the undesirable impact of pathological **mTOR** activation.

When it comes to optimal health, **balance** is key.

**Summary**

Anyone contemplating a weight-loss program that involves reducing calorie intake along with greater physical activity should ensure they get maximum results by increasing their cellular **AMPK activity**.

**AMPK activation** can be accomplished with prescription drugs like *metformin* or by using a once-daily nutrient combination of standardized **extracts** of *Gynostemma pentaphyllum* and *hesperidin*.

Convenient dosing of just one tablet daily will enable more maturing individuals to boost their cellular **AMPK**.

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

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**Comparing AMPK-Boosting Nutrients to Metformin**

*Metformin* is an antidiabetic **drug** that Life Extension® recommended to combat degenerative aging processes starting in February 1995.

The most studied mechanism of **metformin** action is its ability to boost **AMPK activity**. Research indicates that **hesperidin** yields significant **AMPK-activating** properties.

Extracts from the *Gynostemma pentaphyllum* plant have also demonstrated **AMPK-activating** effects.48,49

Combining *Gynostemma pentaphyllum* with **hesperidin** may promote a greater increase in **AMPK activity**. This has been suggested by **human** studies that show **reduction** in **abdominal adiposity** in response to supplementation with these nutrients individually.
Metformin causes gastrointestinal upset in some people, along with vitamin B12 deficiency in those who do not supplement with B12.55

People with kidney, lung, cardiac, or significant liver impairment have been historically advised to use metformin with caution.56

The reason is that metformin is safely removed from circulation via the kidneys. Those with pre-existing kidney/liver impairment, or severe circulatory deficit should monitor metformin dosing and blood markers of kidney/liver health.

Metformin cell-culture studies demonstrate that maximal AMPK activation occurs within concentration ranges that metformin is expected to reach in plasma with oral doses of 690 mg to 1,175 mg. This dose is comparable to what many metformin users take today.

This means that those able to tolerate metformin should continue using it, but know there are alternative or additive benefits available with plant extracts that also activate AMPK without metformin’s side effect concerns.

It may not yet be possible to fully restore AMPK to youthful ranges. Promoting optimal AMPK activation with drugs or nutrients provides intriguing potential to partially reverse this aspect of degenerative cell aging.

References


With age, our bifidobacteria levels decline to as little as 5%, creating gut imbalance.¹

Increasing bifidobacteria levels enhances digestion and carbohydrate metabolism.

Strawberry flavored FLORASSIST® Prebiotic Chewable, helps restore healthy bifidobacteria levels in as little as 14 days using XOS prebiotic fiber.²

1,000 mg of XOS (xylooligosaccharides) per prebiotic chewable.

References
New AMPK Formula at Sharply Reduced Price

Waist Management

The plant compounds in the new AMPK Metabolic Activator provide powerful support for youthful levels of AMPK activity, an enzyme that fights belly fat and promotes metabolic health.

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Item #02207 • 30 vegetarian tablets

NOTE: This new one-per-day formula will replace the current AMPK Activator that requires three capsules a day. A full description of its improved benefits will be published in a future issue of Life Extension Magazine®. It is also costs 20% less than current AMPK Activator.

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

ActivAMP® is a registered trademark of Gencor.

This supplement should be taken in conjunction with a healthy diet and regular exercise program. Individual results may vary and are not guaranteed.

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NEXT-GENERATION

Glucose-Insulin MANAGEMENT

**Glycemic Guard™** contains maqui-berry and clove extract.

These plant extracts help maintain healthy after-meal blood glucose levels and insulin response, and promote healthy HbA1c levels.

ITEM # 02122 • 30 vegetarian capsules • Retail price $42 • **Super Sale price $28.35** • 4 bottles $25.20 each

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

Delphinol™ is a registered trademark of MNL. Clovinol™ is a registered trademark of Akay USA LLC.
SUPPORT ARTERIAL HEALTH

Now With a Highly Purified, Natural MK-7

Provides all-trans form of MK-7.

Just one daily softgel of Super K provides:

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For full product description and to order Super K with Advanced K2 Complex, call 1-800-544-4440 or visit www.LifeExtension.com

Optimize your vitamin K and help keep calcium in your bones and out of blood vessels.

Vitamin K1, vitamin K2 (MK-4), and vitamin K2 (MK-7) can also be found in Once-Daily Health Booster. If you take Health Booster, you do not need additional Super K with Advanced K2 formula.

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.

These statements have not been evaluated by the Food and Drug Administration. These products are not intended to diagnose, treat, cure, or prevent any disease.
A 2017 article in the journal *Frontiers of Immunology* described influenza as a leading cause of catastrophic disability in older adults.¹

For some older adults, these infections, which are most common in the depths of winter, can be life-threatening.

Influenza and pneumonia are responsible for more than 57,000 US deaths annually.²

Conventional authorities recommend that older adults get a flu vaccine every year. But because of age-related decline in the immune system (called *immune senescence*), flu vaccines may not be enough to fight off viral infections on their own.³⁻⁵

Searching for an innovative way to reduce the risk of colds and flu, scientists have demonstrated that a specially formulated *probiotic cocktail* offers *targeted* prevention. It works to boost the body’s immune defenses against the common cold and flu.⁶⁻⁸

Published studies show that these good bacteria significantly reduce the risk of getting upper respiratory tract infections, including colds and flus. And in those who do get sick, these probiotics reduce the severity and duration of the illness.

While anyone can benefit from additional immune support during cold and flu season, this potent probiotic defense is especially critical for elderly and immune-compromised individuals wishing to avoid potentially serious complications.
Probiotics Offer Powerful Anti-Flu Defense

While probiotics promote immune balance and strength, scientists have found that a specific blend of unique probiotics is especially effective at blocking flu, cold, and other respiratory viruses.

Supporting the Body’s Secretory Immune System

Colds and flu are often treated with medications designed to reduce only the symptoms of these respiratory infections. These drugs can’t activate the body’s own immune response to fend off invading bacteria or viruses.

That’s what makes probiotics different. Probiotics provide defense against the common cold and flu by activating the body’s own immune response.

The immune system makes proteins called antibodies that fight bacteria, viruses, and toxins. One of the most common antibodies, called secretory IgA (immunoglobulin A), is found in mucous membranes. IgA acts as the body’s built-in security system within mucous membranes that line the nose and upper respiratory tract. When IgA levels are adequate, these antibodies can prevent cold and flu viruses from entering the body through the nasal mucous and respiratory tract.

Aging Makes the Flu Virus Potentially Deadly

The influenza virus can have a devastating impact on aging individuals.

At least 90% of the flu-related deaths every year involve people over 65. The flu virus can also boost the risk of secondary bacterial infections and can worsen preexisting medical problems.

Most of those hospitalized for flu infections are older adults. For this group, lengthy hospital stays pose additional health risks.

In an effort to prevent the flu—and all of the risks associated with it—many older adults dutifully get a flu vaccine every winter. The problem is that the claimed effectiveness of the flu vaccine among aging adults is exaggerated.

A very recent study found that the vaccine’s effectiveness decreases as the degree of frailty (as measured by the Frailty Index) increases. And while the vaccine works in 70%-90% of young adults, that number drops to 17%-53% in older adults.

Fortunately, there’s a way to boost your body’s own defenses against the cold and flu—and it begins by taking care of your gut. Maintaining a healthy, balanced gut microbiome provides people of all ages with surprisingly strong protection against potentially deadly viruses such as cold and flu.

Gut Bacteria Modulate Your Immune System

It’s only been in recent years that scientists have come to recognize the importance of gut bacteria in modulating the immune system. More than 70% of the human immune system resides in the gut.

In addition, the intestinal immune system contains more antibody-producing cells than the rest of the body put together. As a result, fluid secreted from the digestive system (such as mucus and saliva) is as rich as breast milk in health-supporting and disease-preventing factors.

A poorly functioning immune system is at the root of many conditions that aggressively target aging adults. For example, too little immune response makes us vulnerable to the infections that claim the lives of so many older adults. Yet a poorly balanced (overactive) immune system can produce chronic inflammation—contributing to a litany of age-related disorders such as diabetes, cancer, and metabolic syndrome.

Probiotics help restore the balance of your gut microbiome, and can strengthen its ability to interact with your immune system in many ways. These friendly bacteria stimulate a healthy immune system, boosting populations of cells that seek out and destroy infecting organisms and cancers.
Unique Probiotic Blend
Blocks Respiratory Infections

Of the six novel strains of probiotics that make up this respiratory infection-blocking cocktail, five strains were tested together in one clinical study:8

- *L. plantarum* (LP 01-LMG P-21021),
- *L. plantarum* (LP 02-LMG P-21020),
- *L. rhamnosus* (LR 04-DSM 16605),
- *L. rhamnosus* (LR 05-DSM 19739), and
- *B. lactis* (BS 01-LMG P-21384).

In a clinical trial during cold and flu season, 250 volunteers were randomly assigned to receive either a placebo or a mixture with these five probiotic strains. Over a period of 90 days, subjects reported daily on all diseases affecting their respiratory system, including cough, colds, bronchitis, or pneumonia, and how long they lasted. They also described their symptoms and the severity of the symptoms.8
Researchers classified these symptoms according to flu-like syndromes (those accompanied by fever), influenza-like illnesses, bronchitis-like diseases, upper respiratory tract infections, common cold, and cough without other symptoms.

Analysis of the data showed that taking these five strains of probiotics dramatically prevented both colds and flu, while also reducing the symptoms and duration of colds in those who did get sick. There were 16 cases of flu in the placebo group, compared to just 3 in the probiotic group.

In addition, taking the probiotic resulted in:

- **35% reduction** in the number of colds
  (20 episodes vs. 31 episodes)
- **22% reduction** in cold duration
  (4.7 days vs. 6 days)
- **39% reduction** in cough duration
  (4.5 days vs. 7.3 days)
- **25% reduction** in the number of days of acute upper respiratory infections
  (4.6 days vs. 6.1 days)

A similar study found that the probiotic cocktail resulted in a **48% decrease** in the number of flu episodes. And the number of days with flu symptoms dropped by a significant **55%**.

Fortifying the Probiotic Cocktail

Another group of scientists identified a sixth probiotic strain that provides further immune-stimulating effects, specifically among aging adults at risk for respiratory infections:

- **B. subtilis CU1**.

Researchers have very recently hypothesized that *Bacillus subtilis* generates potent probiotic effects, including "the production of antimicrobials, stimulation of the immune system, and overall enhancement of gut microflora." Of all *Bacillus* bacteria, *B. subtilis* is the species known to produce the most antimicrobial compounds. *B. subtilis* CU1 is a newly identified strain of this species, and it has been described as "an effective probiotic in healthy elderly subjects."

*B. subtilis* CU1 creates a natural protective shield that resists the acid in the stomach, which helps the probiotic stay alive until it reaches nonacidic conditions, lower in the digestive tract. This probiotic strain can stimulate IgA secretion, which provides a critical mechanism for preventing respiratory infections.

Scientists conducted a human clinical trial among healthy older adults during flu season in France. For the study, adults 60-74 years old were randomly assigned to receive either *B. subtilis* CU1 or a placebo. Participants
For aging adults, viral cold or flu infections can cause catastrophic disability and lead to bacterial infections such as pneumonia. Flu and pneumonia kill over 57,000 Americans each year.

Robust defenses against respiratory infection require optimal secretory immunity, which depends in large part on antibodies known as IgA.

Six specific strains of orally ingested probiotic bacteria have been shown to stimulate the body’s production of IgA, which protects the delicate mucous membranes, and ultimately helps prevent the virus replication cycle.

Human studies demonstrate that using these six strains of bacteria can reduce the incidence of colds and flu-like illnesses, an effect largely attributable to enhanced levels of IgA.

- 45% decrease in respiratory infections, and
- 45% increase in concentrations of IgA in subjects’ saliva.

The increase in IgA levels and the corresponding decrease in respiratory infections prompted the authors to attribute these effects to the ability of *B. subtilis CU1* to enhance systemic—as well as intestinal and respiratory mucosal—immune responses.

No significant side effects were observed in either group.

A later study was conducted specifically to evaluate the safety of *B. subtilis* CU1. Analysis of both *in vitro* and clinical studies demonstrated that this strain is non-pathogenic and non-toxicogenic. The study concluded that this strain of *B. subtilis* is "safe and well-tolerated during repeated consumption in healthy elderly subjects" and is "therefore considered safe and suitable for use as a probiotic ingredient."

These studies provide compelling evidence that these six probiotic strains specifically enhance the body’s immune defense against upper respiratory tract infections—a particular risk for older adults who have reduced immune response.

**Summary**

For aging adults, viral cold or flu infections can cause catastrophic disability and lead to bacterial infections such as pneumonia. Flu and pneumonia kill over 57,000 Americans each year.

Robust defenses against respiratory infection require optimal secretory immunity, which depends in large part on antibodies known as IgA.

Six specific strains of orally ingested probiotic bacteria have been shown to stimulate the body’s production of IgA, which protects the delicate mucous membranes, and ultimately helps prevent the virus replication cycle.

Human studies demonstrate that using these six strains of bacteria can reduce the incidence of colds and flu-like illnesses, an effect largely attributable to enhanced levels of IgA.

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**What Should You Do?**

Most of our readers take a probiotic supplement for digestive and other health benefits.

For winter months, you may consider switching to an immune-specific probiotic that contains many of the same beneficial bacterial strains, plus additional ones that have shown robust results in recent clinical trials.
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
MacuGuard® Ocular Support provides lutein, trans-zeaxanthin, and meso-zeaxanthin to help maintain structural integrity of the macula and retina.1–5

Alpha-carotene is included based on new evidence that it helps support the macular pigment.1

People supplementing with saffron showed an improvement in vision as measured by them seeing an average of two additional lines on the eye chart commonly used by doctors to test vision.1

This formula provides the optimal dose of saffron along with cyanidin-3-glucoside to support healthy vision.6–8

MacuGuard® Ocular Support with Saffron
Item #01992 • 60 softgels

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Each bottle lasts for two months.

References

For full product description and to order MacuGuard® Ocular Support, call 1-800-544-4440 or visit www.LifeExtension.com

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Neuro-Mag® Magnesium L-Threonate was specifically formulated by MIT scientists to be uniquely absorbable by brain and nerve cells.

**Neuro-Mag® Magnesium L-Threonate**
Item #01603 • 90 vegetarian capsules

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

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For full product description and to order Neuro-Mag® Magnesium L-Threonate or Neuro-Mag® Magnesium L-Threonate Powder, call 1-800-544-4440 or visit www.LifeExtension.com

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FLORASSIST® Immune Health
Probiotic Blend for Optimal Immune Support

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.

ITEM # 02124 • 30 vegetarian capsules • Retail price $26 • Super Sale price $17.55 • 4 bottles $16.20 each

For full product description and to order FLORASSIST® Immune Health, call 1-800-544-4440 or visit www.LifeExtension.com

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Anti-Aging Mechanisms of
Scientists are discovering new ways that NAD\textsuperscript{+} facilitates healthy longevity.\textsuperscript{1-3}

NAD\textsuperscript{+} levels markedly decline with age, creating an energy deficit that decreases the body’s ability to retain youthful function.\textsuperscript{4}

To give you an idea how impactful NAD\textsuperscript{+} can be, by age 50 a typical person may have only half the NAD\textsuperscript{+} they did in youth. By age 80, NAD\textsuperscript{+} levels drop to only 1\% to 10\% expressed in youth.

Deficiency of NAD\textsuperscript{+} predisposes us to accelerated aging and impedes our ability to fully benefit from resveratrol.

Fortunately, it is easy to restore your cellular NAD\textsuperscript{+} to higher ranges.

As a co-factor in cell energy transfer, NAD\textsuperscript{+} plays a critical role in regulating aging processes.

NAD\textsuperscript{+} is the acronym for nicotinamide adenine dinucleotide.

Found in virtually all living cells, NAD\textsuperscript{+} is essential to sustaining life.\textsuperscript{4}

A fascinating aspect of NAD\textsuperscript{+} is its dual role in protecting against factors that age us. This includes mitigating chemical stress, inflammation, DNA damage, and failing mitochondria.

At the same time, NAD\textsuperscript{+} promotes longevity by facilitating DNA repair and providing cellular benefits associated with caloric restriction and exercise.\textsuperscript{5}

In other words, while a decline in NAD\textsuperscript{+} levels may negatively influence lifespan, restoring NAD\textsuperscript{+} is increasingly being viewed as a cutting-edge tool to promote longevity.

There is growing evidence that supplementing with a vitamin-like precursor of NAD\textsuperscript{+} called nicotinamide riboside can promote longevity in life forms ranging from simple worms to mammals like mice.\textsuperscript{5-11}

One study showed an average 5\% increase in the lifespan of old mice—even though supplementation did not begin until the mice were nearing the end of their natural lifespan (24 months).\textsuperscript{11}

That would be the equivalent of gaining nearly an additional four years of life based on today’s average human expectancy of 78.8 years.\textsuperscript{12}

A rigorous scientific review of NAD\textsuperscript{+} reveals that its longevity benefits arise from eight different, but interrelated, functions.

This article briefly summarizes each anti-aging mechanism played by NAD\textsuperscript{+} in your body.
Anti-Aging Mechanism #1:
**NAD<sup>+</sup> May Contribute to Longer Telomeres**

NAD<sup>+</sup> is required for functioning of the sirtuin proteins that contribute to longevity—and specifically to maintaining the length of critical telomeres.

Telomeres are stretches of repetitive DNA strands that cap the ends of chromosomes. Like the burning of a fuse, telomeres at the ends of our chromosomes steadily shorten every time a cell replicates itself. Once telomeres reach a critically short length, cell renewal virtually stops, leading to accelerated aging or death of the cell.\(^\text{13}\)

Telomere shortening is both a marker of cellular aging and a predictor of shortened lifespan.\(^\text{14}\)

Researchers have been searching for drugs and other interventions that might lengthen telomeres, in order to extend lifespan and/or health span. To date, exercise and weight loss have been reliably shown to be effective at telomere lengthening.\(^\text{15-17}\)

Certain other nutrients, such as resveratrol, may activate sirtuins and contribute to extending lifespan, but emerging evidence suggests sirtuins function best with an ample supply of NAD<sup>+</sup>.

**Conclusion:** The possibility of extending telomere length with NAD<sup>+</sup> holds out hope for slowing the aging process and improving longevity.

---

Anti-Aging Mechanism #2:
**NAD<sup>+</sup> Promotes DNA Repair**

Even though DNA is protected by its chromosomal shelter, it is highly vulnerable to damage.

This can lead to broken DNA strands and mutations in crucial genes. Accumulated DNA damage contributes to the aging process and can result in specific lifespan-shortening diseases like cancer and poor immune function.\(^\text{18}\)

When DNA is damaged, it activates an enzyme known as PARP-1 that carries out DNA repair within cells.\(^\text{19}\) To carry out its function, PARP-1 consumes enormous amounts of NAD<sup>+</sup>. As NAD<sup>+</sup> is depleted, the ability of PARP-1 to repair DNA is significantly hindered.\(^\text{19-28}\)

The good news is that replenishing NAD<sup>+</sup> to cells can restore DNA repair and prevent cell death under stress.\(^\text{26,29}\) In two different animal models of neurodegenerative disease, increasing cellular NAD<sup>+</sup> reduced the severity of the disorder, normalized neuromuscular function, delayed memory loss, and extended lifespan.\(^\text{30}\)

**Conclusion:** Improving DNA repair with NAD<sup>+</sup> may slow cellular aging, reduce the persistence of cancer-causing mutations, and play an important role in preventing inflammatory conditions such as atherosclerosis.\(^\text{31,32}\)

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Life Sustaining Benefits of NAD<sup>+</sup>

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<th>Chromosome Stability</th>
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With advanced age, cell NAD<sup>+</sup> levels plummet to near zero. Normal aging may one day be classified as “NAD<sup>+</sup> deficiency syndrome.” Fortunately, there are proven ways to boost NAD<sup>+</sup> levels.
Anti-Aging Mechanism #3: 
**NAD⁺ Modulates Immune-Cell Signaling**
As we age, our immune cells begin to lose their focus. Some become overactive, contributing to autoimmune disease, while others slow down, which increases the risk of infection. This process, called 
**immunosenescence**, is intimately related to mitochondrial function and energy balance, both of which depend on NAD⁺ activity.

Intracellular levels of NAD⁺ regulate immune and inflammatory pathways, including the cytokine TNF-alpha, a critical signaling molecule. Conclusion: Adequate intracellular NAD⁺ is vital for youthful cellular energy, a critically important factor in fending off immunosenescence and maintaining defenses against infections and autoimmune disease.

Anti-Aging Mechanism #4: 
**NAD⁺ Induces Energy-Intensive Enzymes**
A universal feature of aging is the loss of cellular energy, which results in diminished ATP levels and inadequate cellular fuel necessary to power our body. One cause of this energy loss is a breakdown in the efficiency of the **electron transport chain**, the main pathway through which we extract energy from food (and of which NAD⁺ is an essential component). Disorders ranging from obesity and diabetes to bone loss have been associated with loss of this vital pathway.

Studies now show that restoring electron transport chain function by raising levels of NAD⁺ is a rapid and efficient means of promoting the essential enzymes involved in energy extraction and sustaining youthful cell function. This helps to reduce physiological decline and provides protection from age-related disease.

Anti-Aging Mechanism #5: 
**NAD⁺ Promotes Chromosome Stability**
Our chromosomes are complex structures housing our DNA. Access to DNA strands for “reading out” genetic instructions requires biochemical control of those proteins to make sure each gene functions properly. But like any complex molecular structure, chromosomes can become unstable. Eventually, this triggers errors in the ways our genes are interpreted—which ultimately contributes to deleterious changes in cell function and structure. Aging is accelerated in the presence of increased chromosome instability.

## What You Need to Know

**Restore Cellular Energy with NAD⁺**

- NAD⁺ is required for proper cellular energy utilization, but its levels decline with age.
- It is also required for eight fundamental processes, each of which contributes to accelerated aging when NAD⁺ levels drop.
- NAD⁺ is unstable and cannot be used as a supplement, but nicotinamide riboside is a useful precursor to NAD⁺ that is capable of restoring cellular NAD⁺ levels.
- Studies show that nicotinamide riboside supplementation can slow cellular aging and improve many of the metabolic defects common to the aging process, including obesity, diabetes, cardiovascular disease, and neurodegenerative conditions.
- Supplementation with nicotinamide riboside offers a way of supporting essential body systems.

**What You Need to Know**

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- Supplementation with nicotinamide riboside offers a way of supporting essential body systems.
The enzymes involved in sustaining stable chromosomal structures require NAD⁺ in order to function properly.

In animal models showing that NAD⁺ contributes to longevity, a major factor has been shown to be sufficient availability of the nutrient.⁴⁶,⁵⁰,⁵¹ And studies show that when enzymes that require NAD⁺ are inactive, chromosome structure suffers and cells replicate abnormally.⁵⁰

**Conclusion:** NAD⁺ supplementation is a promising cutting edge strategy to improve chromosome stability, a treatment that may slow down cellular aging (senescence) and lower the risk of cancer.

**Anti-Aging Mechanism #6:**

**NAD⁺ Is a Neurotransmitter**

Neurotransmitters are brain chemicals that relay signals between nerve cells. In doing so, they help regulate body-wide functions such as mood, appetite, and stress.

NAD⁺ has been found to meet all criteria for a neurotransmitter.⁵²,⁵³

Evidence for NAD⁺’s neurotransmitter function has now been found in intestinal and blood vessel smooth muscles, as well as in the brain itself.⁵²

**Conclusion:** Ample NAD⁺ nutrition appears essential for sustaining brain health.

**Anti-Aging Mechanism #7:**

**NAD⁺ Activates Sirtuins**

Proteins called sirtuins are major regulators of cellular aging because they influence fundamental functions such as DNA repair and inflammatory responses. They also influence whether cells enter a replicative cycle or instead die a programmed death (apoptosis).⁵³

Compounds that activate sirtuins are eagerly sought as chemical “fountains of youth.” Familiar supplements like resveratrol and quercetin have been evaluated as promising sirtuin activators.²,⁵⁴-⁵⁶

NAD⁺ is required for sirtuins to function.⁵⁷,⁵⁹

**Conclusion:** Sirtuin activation has shown great promise in fighting cardiovascular disease and preserving aging brain function, but these longevity-promoters cannot function without sufficient NAD⁺.⁴,⁵⁴

**Anti-Aging Mechanism #8:**

**NAD⁺ Supports Energy Production**

NAD⁺ was first discovered as an important part of the process that channels chemical energy from foods to the ATP fuel our cells require. Recent studies have revealed that NAD⁺ is itself a form of “energy currency” similar to ATP.⁶⁰
NAD⁺ is also a functional signaling molecule in processes related to energy production, including PARP-1 and sirtuins. When DNA damage occurs, PARP-1 consumes large quantities of NAD⁺, leading to reduced energy production. In addition, high levels of NAD⁺ can activate sirtuins, permitting them to carry out their metabolic and stress-protective responses and contributing to longevity.²³

**Conclusion:** Supporting efficient energy production and adequate ATP levels requires consistent and abundant NAD⁺. This is critical because waning energy supplies contribute to the aging process.

**How to Boost NAD⁺**

NAD⁺ is biologically unstable, which makes it unsuitable for oral supplementation. Fortunately, there’s a solution.

About a decade ago, researchers discovered that the compound *nicotinamide riboside* is rapidly converted by natural cellular enzymes into *active* NAD⁺.

Studies show that supplementing with nicotinamide riboside is an effective means of raising cellular NAD⁺ levels.⁶,²²,⁶¹

Nicotinamide riboside is readily available for oral supplementation, and it is highly bioavailable.⁶² These benefits make nicotinamide riboside the leading oral candidate to boost cellular NAD⁺, and research is revealing just how effective it is.⁶³

**The Metabolic Benefits of Boosting NAD⁺**

*Nicotinamide riboside* boosts NAD⁺ and appears useful in preventing diseases associated with abnormal energy utilization. These include obesity, diabetes, and atherosclerosis, which are components of *metabolic syndrome*.

A mouse study revealed that prediabetic mice given *nicotinamide riboside* have better glucose tolerance, less weight gain and liver damage, and slower development of fatty livers. Similarly, in diabetic mice, nicotinamide riboside markedly reduced blood sugar, weight gain, and liver fat, while also preventing diabetic nerve damage.⁶⁴

*Nicotinamide riboside* is especially beneficial in combatting nonalcoholic fatty liver disease (NAFLD), which is considered the liver manifestation of metabolic syndrome. Interventions that reduce NAFLD generally improve all-around metabolic health.

Studies in animal models of NAFLD have shown that nicotinamide riboside supplementation corrects biochemical and microscopic liver changes in mice fed a high-fat diet.⁶⁵,⁶⁶

In another study of obesity induced by a high-fat diet, supplementation with nicotinamide riboside increased NAD⁺ levels, activated sirtuins, and protected against the oxidative stresses and other damage induced by the diet (many of NAD⁺’s longevity mechanisms mentioned above).²²
Additional NAD⁺ Benefits

Brain tissue is highly sensitive to alterations in NAD⁺ levels. A mouse study showed that supplementation with nicotinamide riboside increased NAD⁺ levels in the brain, slowed cognitive decline in mice with Alzheimer’s, and enhanced the plasticity in neurons that underlies learning and memory. Regular exercise is a panacea for most of the age-accelerating processes in our bodies. Recent studies are showing that nicotinamide riboside helps improve exercise performance by improving mitochondrial dynamics and muscle function.

And in animals that had undergone removal of part of their livers, researchers showed that nicotinamide riboside supplementation promoted new DNA synthesis, cell replication, and increased liver mass—a vivid demonstration of its healing powers.

Summary

NAD⁺ beneficially enhances eight core cellular anti-aging mechanisms.

When these cell functions are impaired, the consequence is accelerated aging that contributes to disorders as diverse as Alzheimer’s and osteoporosis.

Restoring cell NAD⁺ levels has been shown to preserve youthful function—and even reverse some age-induced deterioration.

Nicotinamide riboside has been shown not only to restore NAD⁺ levels in tissues, but also to provide more NAD⁺ activity than can be obtained from diet alone.

Supplementation with nicotinamide riboside can slow cellular aging and improve many metabolic defects common to degenerative processes, including diabetes, declining heart function and neurodegenerative conditions.

References

5. Polsak B, Milisav I. NAD⁺ as the Link Between Oxidative Stress, Inflammation, Caloric Restriction, Exercise, DNA Repair, Longevity, and Health Span. Rejuvenation Res. 2016.


Cognitex® with Pregnenolone & Brain Shield®

Cognitex® is designed to improve cerebral performance and supports brain and nervous system function.

Scientifically formulated Cognitex® contains validated ingredients shown at two weeks to improve:

- Spatial short-term memory 42%
- Recall 15%
- Recognition 11%
- Attention 12%
- Visual learning 33%
- Activities of daily living by over 10%

* J Diet Suppl. 2011 Jun; 8(2):158-68

Caution: Do not take this product if you have breast cancer, prostate cancer, or other hormone-sensitive diseases. If you are taking anticoagulant or anti-platelet medications, or have a bleeding disorder, consult with your health care provider before taking this product.

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BOOST BRAIN PERFORMANCE

Cognitex® with Pregnenolone & Brain Shield®
(Gastrodin)
Item #01897 • 90 softgels

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For full product description and to order Cognitex® with Pregnenolone & Brain Shield®, 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.
Optimized NAD⁺ Cell Regenerator™ combines 250 mg of nicotinamide riboside with resveratrol and other plant extracts.

For resveratrol to deliver functional results, it requires NAD⁺.

NAD⁺ levels plummet with age but increase in response to nicotinamide riboside.

For those already taking resveratrol, we also offer NAD⁺ Regenerator™ that provides 250 mg of nicotinamide riboside.

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Optimized NAD⁺ Cell Regenerator™
Item #02145 - 30 vegetarian capsules

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NAD⁺ Cell Regenerator™
Item #02144 - 30 vegetarian capsules

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For full product description and to order NAD⁺ Cell Regenerator™ or Optimized NAD⁺ Cell Regenerator™ with Resveratrol, call 1-800-544-4440 or visit www.LifeExtension.com

For more information about resveratrol and other plant extracts, visit www.ChromaDexPatents.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.
Few people consistently eat enough plant foods to protect against age-related decline. Commercial multivitamins do not provide vital plant components needed for good health. Life Extension Mix™ is superior to other multi-vitamins—partly because it provides a broad array of fruit and vegetable extracts. Rounding this out are high-potency vitamins, minerals, botanical extracts, and more.

When Life Extension Mix™ was launched in 1983, it provided an efficient way to obtain critical nutrients in one formula. Life Extension Mix™ has been upgraded over the past 34 years to reflect new findings in the scientific literature. During Super Sale, the full dose can be obtained for as little as $1.20 a day! Life Extension Mix™ now provides ashwagandha extract, that is demonstrating new health benefits you will soon learn about.

The new Life Extension Mix™ requires only 12 capsules/day (compared with 14 in its previous version) or just 8 tablets/day compared to previous 9 tablets!

For full product description and to order your supply of LIFE EXTENSION MIX™, call 1-800-544-4440 or visit www.LifeExtension.com

**The Most Complete Multivitamin**

**BioActive Vitamins, Minerals, and Vegetable/Fruit Extracts**

### Vegetable-Fruit Complex

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<tr>
<td>Broccoli concentrate blend</td>
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### Water-Soluble Vitamins and Enzymatic Activators

| Vitamin C (ascorbic acid, calcium, magnesium & niacinamide ascorbates, ascorbyl palmitate, acerola extract) | 1,000 mg |
| Folate (as L-5-methyltetrahydrofolate calcium salt) | 400 mcg  |
| Biotin                                           | 3,000 mcg|
| Trimethylglycine (TMG)                            | 100 mg   |
| Vitamin B1 (thiamine HCI)                         | 125 mg   |
| Vitamin B2 (riboflavin, riboflavin-5'-phosphate)  | 50 mg    |
| supplying: riboflavin 5'-phosphate               | 2 mg     |
| Vitamin B3 (niacinamide, niacin, niacinamide ascorbate) | 190 mg   |
| Vitamin B5 (D-calcium pantothenate)              | 600 mg   |
| supplying: pantethine                            | 5 mg     |
| Vitamin B6 (as pyridoxal 5'-phosphate, pyridoxine HCI) | 105 mg   |
| supplying: pyridoxal 5'-phosphate                | 100 mg   |
| Vitamin B12 (methylcobalamin)                     | 600 mcg  |
| Inositol                                         | 250 mg   |

### Fat-Soluble Vitamins

| Vitamin A (as beta-carotene and acetate)          | 5,000 IU |
| Vitamin D3 (cholecalciferol)                      | 2,000 IU |
| Vitamin E (D-alpha tocopheryl succinate and D-alpha tocopherol) | 100 IU   |
| Natural mixed tocopherols (producing gamma, delta, alpha, and beta tocopherol) | 60 mg    |

### Amino Acid Complex

| N-acetyl-L-cysteine | 600 mg |
| Taurine             | 200 mg |

### Mineral Complex

| Magnesium (as magnesium oxide, arginate, citrate, taurinate, glycinate, ascorbate) | 420 mg |
| Calcium (as Caspartate, D-Calcium pantothenate, Ca-D-glucarate, dicalcium phosphate) | 140 mg |
| Selenium (from Se-methyl L-selenocysteine) | 25 mcg |
| Selenium (from SelenoExcell® high selenium yeast) | 25 mcg |
| Selenium (from sodium selenite) | 150 mcg |
| Zinc (as zinc citrate, L-OptiZinc® zinc mono-L-methionine sulfate) | 35 mg |
| Boron (as boron amino acid chelate) | 3 mg |
| Copper (as copper bisglycinate chelate triacses*) | 1 mg |
| Chromium as Crominex® 3+ chromium stabilized with Capros® and PrimaVie® Shilajit) | 500 mcg |
| Potassium (as potassium citrate) | 35 mg |
| Molybdenum (as molybdenum amino acid chelate) | 125 mcg |
| Manganese (as manganese gluconate, citrate) | 1 mg |
| Iodine (potassium iodide) | 150 mcg |

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**Here’s how customers can obtain Life Extension Mix™ at substantial savings:**

The retail price of a four-week supply of the new **Life Extension Mix™** (240 tablets) is **$74**. The price for one bottle during **Super Sale** is **$49.95**. (Item #02255)

If a customer buys four bottles, the price is reduced to **$43.20** per bottle.

When a customer buys 10 bottles during **Super Sale**, the price goes down to just **$37.80 per bottle**.

**Fat-Soluble Vitamins**

- Vitamin A (as beta-carotene and acetate) 5,000 IU
- Vitamin D3 (cholecalciferol) 2,000 IU
- Vitamin E (D-alpha tocopheryl succinate and D-alpha tocopherol) 100 IU
- Natural mixed tocopherols (producing gamma, delta, alpha, and beta tocopherol) 60 mg

**Amino Acid Complex**

- N-acetyl-L-cysteine 600 mg
- Taurine 200 mg

**Mineral Complex**

- Magnesium (as magnesium oxide, arginate, citrate, taurinate, glycinate, ascorbate) 420 mg
- Calcium (as Caspartate, D-Calcium pantothenate, Ca-D-glucarate, dicalcium phosphate) 140 mg
- Selenium (from Se-methyl L-selenocysteine) 25 mcg
- Selenium (from SelenoExcell® high selenium yeast) 25 mcg
- Selenium (from sodium selenite) 150 mcg
- Zinc (as zinc citrate, L-OptiZinc® zinc mono-L-methionine sulfate) 35 mg
- Boron (as boron amino acid chelate) 3 mg
- Copper (as copper bisglycinate chelate triacses*) 1 mg
- Chromium as Crominex® 3+ chromium stabilized with Capros® and PrimaVie® Shilajit) 500 mcg
- Potassium (as potassium citrate) 35 mg
- Molybdenum (as molybdenum amino acid chelate) 125 mcg
- Manganese (as manganese gluconate, citrate) 1 mg
- Iodine (potassium iodide) 150 mcg

For full product description and to order your supply of **LIFE EXTENSION MIX™**, 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.
Clinical trials have focused on the cardiovascular benefits of omega-3 fatty acids derived from fish oil.

More recent data show the biological effects that omega-3s confer extend beyond cardiovascular issues and impact virtually every aspect of our health.

A meta-analysis published last year found that the highest consumption of omega-3s from fish oil was associated with a 14% reduction in the risk of dying from any cause, compared to the lowest category of consumption.1

Fish-oil benefits range from improved cognition to reduction of metabolic disorders.

In this article, we describe recent studies that evaluate the effects of fish oil on human health and longevity.
Fish Oil Reduces Death Rates

In 2017, a study was published that looked at the effects of fish-oil ingestion on human mortality rates. The implications from this report pertain to us all.

This analysis revealed a significant 14% reduction in the risk of dying from any cause in the group consuming the highest, versus the lowest amount of omega-3 fish oil.

Epidemiologists call this “all-cause mortality,” and it serves as an important metric in evaluating the overall effect of any intervention on lifespan.1

To study the longer-term effects of omega-3 consumption, the researchers combined data from more than one million subjects whose fish and fish-oil consumption had been evaluated in 23 separate studies. A separate sub-analysis of six studies involving over 400,000 participants yielded information on omega-3 fats from fish, specifically.1

The researchers undertook this study to resolve lingering questions. Regular consumption of the major omega-3s in fish oil (EPA + DHA) has been found to reduce specific health threats like heart arrhythmias, and risk factors for disease and death, like endothelial dysfunction, lipid disturbances, and inflammation.2

Data on all-cause mortality, however, had been clouded by differences in study design and populations.1

In this 2017 published analysis, researchers found a modest but significant 6% reduction in all-cause mortality risk among those eating the most fish compared with those having the lowest fish consumption.

That’s encouraging, but not everyone can manage the US government recommendations of two fish servings per week.3

For this reason, the researchers also evaluated the pooled data from six of the 23 studies relating to intake of the most relevant components of fish, the omega-3s EPA and DHA.1

They found a greater impact against the risk of dying from any cause among those subjects consuming the most omega-3s. They showed that all-cause mortality risk was 14% lower in those consuming the most EPA/DHA. This is more than double the figure calculated for fish consumption alone.1

Further analysis revealed a 7% reduction in overall risk of dying for each additional 200 mg of fish oil consumed per day.1

From this enormous study, it is clear that people who consume more fish oil are at substantially lower risk of dying from any cause—a worthwhile finding in its own right.

But people die from specific causes that include cardiovascular disorders, obesity, diabetes, fatty liver, cancer, neurodegenerative diseases, and even major depression.

Underlying these degenerative conditions are pathological processes like inflammation, which we know is strongly associated with most age-related illnesses.

Here, we examine specific ailments that rob us of life quality, and, when severe enough, of life quantity as well.

Anti-Inflammatory Fats

Studies have shown that omega-3 fatty acids like EPA and DHA have benefits in metabolic disorders such as obesity and diabetes, in neurological disorders like depression and Alzheimer’s, as well as in cancer and autoimmune disease.

Omega-3s favorably affect this wide variety of conditions because they reduce the body’s overall burden of inflammation.4

Chronic inflammation plays a key role in the diseases associated with aging.5 By combatting inflammation, omega-3s help us combat numerous age-related issues.

This is especially evident in metabolic disorders.
Metabolic Disorders

Metabolic syndrome is a cluster of conditions that includes some combination of high blood pressure, belly fat, high blood sugar, and abnormal lipid profiles. Metabolic syndrome is associated with a sharp increase of risk for heart disease, stroke, and diabetes.6

Omega-3 supplements show remarkable effects on the causes—and the consequences—of metabolic syndrome. And one of the main driving forces behind metabolic syndrome is obesity.

Obesity is a major risk factor for chronic illnesses, in large part because in obese individuals, fat cells churn out massive amounts of inflammation-inducing proteins (called cytokines).8 These cytokines play a role in promoting insulin resistance as well as two related diseases: non-alcoholic fatty liver disease and type II diabetes.9,12

Omega-3 oils from fish exert beneficial effects against obesity. A study published in 2016 concluded that fish-oil supplementation reduced waist circumference and blood pressure.13,14

Human studies confirm that supplementing with omega-3s each day may reduce weight, body mass index (BMI), waist/hip ratio, and total fat mass—when combined with sensible diet and exercise.15,16

What You Need to Know

The Many Benefits of Fish Oil

- Fish oils, rich in anti-inflammatory omega-3 fats, are well-established as cardioprotective nutrients.
- New evidence supports the benefits of omega-3 supplementation in a wide range of metabolic disorders, including obesity, diabetes, metabolic syndrome, and fatty liver disease.
- Omega-3s have been shown to help with depression and some types of dementia, perhaps largely through their powerful anti-inflammatory effects.
- Even cancer, autoimmune disease, and kidney disorders are showing signs of responding favorably to omega-3 supplements.
- Like many inflammation-fighting strategies, fish oil may work best before major clinical disease is evident, highlighting the importance of prevention.
Omega-3s achieve these effects through mechanisms that include enhancing oxygen consumption (indicating increased fuel-burning), boosting levels of the protective signaling molecule adiponectin (which mitigates insulin resistance and inflammation), and favorably modulating the gut microbiome. Type II diabetes is a common consequence of obesity, because the inflammation it causes leads to insulin resistance, high blood sugar, and worsening obesity—creating a vicious cycle.

Fish-oil supplementation has been shown to have remarkable benefits in people with type II diabetes. These include decreasing fasting blood sugar, markers of sustained high blood sugar (e.g., hemoglobin A1c), and insulin requirements, as well as reducing episodes of dangerously low blood sugar.

Fatty Liver Disease

Non-alcoholic fatty liver disease (NAFLD) is a major consequence of obesity and diabetes that occurs when fat cells build up in the liver causing massive amounts of inflammation. When not properly controlled, NAFLD can progress to non-alcoholic steatohepatitis (NASH), a more serious condition in which the liver becomes damaged or scarred. Human studies show that supplementing with omega-3s has substantial benefits in patients with the condition. For example, omega-3s have been found to significantly improve liver blood flow, decrease deposits of liver fat, reduce liver enzyme levels in the blood (a marker of liver-cell injury), and lead to significant increases in insulin sensitivity.

Not All Fish-Oil Preparations Are the Same

Quality counts with all supplements, but it is especially critical when considering fish-oil. The sources, processing, shipping, and final concentration of fish-oil products are critical indicators of their quality—and many fall short. Before choosing a fish-oil supplement, you should consider two important categories:

1. Concentration and value
2. Freshness and sustainability

As an example, a readily-available commercial “natural fish oil” supplement sold at a major US pharmacy chain offers an enormous jar of softgels at an apparently reasonable price. But if you take a closer look, you’ll see that the recommended dose contains 3,600 mg of “total fish oil,” but only 1,080 mg of “total omega-3” fats—and there are no details about exactly how much EPA and DHA is present. That means that just 30% of the daily dose may be composed of beneficial EPA/DHA.

To achieve desired intake, you would need to take six large softgels of the commercial product, risking fishy burps and other unpleasant side effects. In addition, few major fish-oil distributors reveal their geographical location, the amount of processing, or the environmental impact of their operations. Many processing plants are located far from the harbors where fresh fish are brought. And few fish-oil operations are owned or operated by the fishermen who bring home the harvest, limiting their personal and ethical investments in the product.

A High-Quality Fish Oil

A partnership between a “lipid technology” expert and the two largest fishing companies in Chile (a major source of ocean fish worldwide) began active production in 2012. This partnership has a pilot processing plant on-site, where fishing boats arrive daily to unload the freshest possible catch. The operation has a tiny ecological footprint and is in compliance with the very latest sustainable fisheries recommendations and certifications.

Achieving a high concentration of the active EPA and DHA forms of omega-3 is a priority. At their new seaside plant, fish are harvested, and oil is extracted with a process called selective crystallization, which achieves final concentrations of EPA and DHA in the range of 60% to 85% of the product (compared with 30% in most commercial products). This high concentration means smaller softgels are packed with more essential omega-3 fatty acids.

A daily dose of the new fish-oil composition (two softgels, taken twice daily with meals), provides a total 3,580 mg of fish oil that supplies 1,500 mg EPA and 1,000 mg DHA. That means 70% of the daily dose is composed of the beneficial omega-3 fats. Omega-3s are a virtual necessity for sustaining heart, brain, and overall body health. Choose fish oil as selectively as you would choose fish for the table—wholesome, sustainably harvested, and fresh.
Studies also show an over 98% reduction in the risk of having more severe liver disease after treatment with DHA, compared with a placebo group.27,28

One study also showed that omega-3 supplementation not only slowed the progression of NAFLD to NASH, but reversed some of the structural damage that had already occurred in the liver.29 This is a landmark finding, considering this type of liver damage is considered irreversible.

Finally, in a 2017 review of clinical trials in which NAFLD was treated with fish-oil supplementation, 12 separate trials reported decreased liver fat or other markers of NAFLD. The authors suggested that longer treatment duration and improved patient compliance may be important factors for success.30

**Powerful Brain Protection**

Omega-3s play vital roles in the brain's very structure and function.31-34

The amount of omega-3 fats in the brain dwindles as we age.35 This leads to losses of brain plasticity, which is the ability to rapidly form new connections and retain new impressions and memories.33 It is also correlated with the diminished ability to use glucose as fuel—an energy deficit that has been linked to mental slowing and neurological impairment.34

The good news is that supplementing with omega-3s can favorably alter brain structure and function. And what's more, supplementing with omega-3s improves age-related conditions associated with inflammatory changes, such as memory impairments and Alzheimer's.36-38

**Combat Cognitive Impairment**

Cognitive impairment, dementia, and neurodegenerative diseases are now recognized as inflammatory conditions.

The inflammatory changes may begin years—perhaps decades—before symptoms occur,36-38 which reinforces the importance of supplementing with fish oil before major symptoms arise.

For example, in a study of adults with mild cognitive impairment (which often precedes dementia), a daily supplement of 720 mg EPA/480 mg DHA improved basic cognitive aptitude, speed of perception, and working memory compared with people receiving a placebo.39

In a study of healthy adults between 50 and 75 years old, supplementation with 1,320 mg EPA/880 mg DHA daily for 26 weeks improved memory performance and ability to recall object locations.38

**Late-Breaking Findings on Omega-3 Fats**

New studies on omega-3 fats suggest still more mechanisms of action—and ultimately more roles for these versatile nutrients in preventing disease and promoting good health. Here is a summary of their findings:

- The long-chain omega-6 and omega-3 fatty acids are molecular precursors of the endocannabinoid signaling compounds.37 The brain-signaling endocannabinoid system is involved in regulation of appetite, pain sensation, mood, and memory.58
- Blood levels of total omega-3 and DHA fats are strongly correlated with diversity in the gut microbiome, the intestinal community of microbes that is intimately related to our health.59 Greater diversity is nearly always associated with greater disease resistance and better health.
- In a further exploration of relationships between omega-3 fats and the microbiome, researchers leveraged omega-3’s anti-inflammatory powers, coupling them with a probiotic formulation to reduce the inflammation-induced side effects of chemotherapy.60 In a group of patients with colorectal cancer, this approach improved quality of life, relieved some chemotherapy side effects, and reduced key markers of inflammation.
Defeat Depression

Depression comes in many different forms and can arise for any number of reasons. Studies consistently show that omega-3s have benefits against depression, regardless of the cause.

For example, one study evaluated the impact of omega-3s on women with major depression associated with menopause. After eight weeks of taking 930 mg EPA/750 mg DHA daily, the average standardized depression score fell by 56%.

Even more compelling data from this same study showed that 45% of participants reported feeling normal and experiencing no depression by the end of the trial. As an added benefit, the women experienced a reduction in the frequency of hot flashes with supplementation.

In a more recent study, young adults with symptoms of depression were randomly assigned to take either a placebo or 1,000 mg EPA/400 mg DHA daily. After just 21 days, scores on the depression inventory (a self-reported test that measures the severity of depression) fell significantly in supplemented subjects, but not in the placebo group. This study found that 67% of the patients taking omega-3s “no longer met the criteria for being depressed.”

A human and an animal study both suggest that the antidepressant effects of fish oil/omega-3s may be a result of anti-inflammatory activity.42,43

Additional Omega-3 Benefits

The ability of omega-3 fats/fish oil to fight inflammation and induce favorable gene expressions in various tissues is now attracting the attention of researchers in virtually all fields of medicine. Here are just a few highlights of some recent studies:

- **Cancer** is highly dependent on inflammatory changes for its promotion once a malignant cell has developed.44-46 Animal and human studies are revealing multiple ways in which omega-3 fats may quell cancer-associated inflammation, with far-reaching effects, in colorectal, breast, pancreatic, and blood system cancers.47-50

- **Autoimmune diseases** are a group of destructive disorders characterized by out-of-control inflammation and the immune system attacking one’s own tissues. These conditions are relatively common in the elderly. Current treatments are less than adequate, often requiring high doses of immunosuppressive drugs. A pair of studies has shown impressive results of fish oil/omega-3 supplementation in patients with rheumatoid arthritis, a notoriously painful autoimmune disease for which conventional treatments can be highly problematic.51-53

- **Chronic kidney disease** and its progression are closely linked with high levels of inflammation, making it an ideal target for omega-3 intervention. Two recent papers examined the role of omega-3 supplementation in chronic kidney disease. One showed that omega-3 fats were an effective solution for one of the most frustrating and even disabling symptoms of this disease, chronic itching, also known as pruritus. In another study, omega-3 supplementation resulted in longer telomeres, which are the longevity-associated chromosomal “clocks” that shorten as we age.54,55

These findings are almost certainly the tip of a very large iceberg, as researchers pursue potential benefits of omega-3s in a host of inflammation-related disorders.
Summary

Peer-reviewed published studies continue to document the anti-inflammatory value of omega-3 supplements in some of the most troubling symptoms and chronic diseases of aging. Metabolic disorders such as obesity, diabetes, and fatty liver are yielding to treatment with omega-3s, as are numerous brain-related conditions including major depression and dementia. Evidence is also accumulating about roles of omega-3s in inflammation-dependent conditions such as cancer, autoimmune disease, and chronic kidney disease.

Supplementing with fish oil ensures you remain on the higher end of the omega-3 scale that has been shown to reduce human mortality rates, along with many chronic conditions of older age. ●

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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Green Tea Protects Against Colorectal Cancer

Colorectal cancers are the third most common cancer that affects both men and women, and the second leading cause of cancer-related deaths in the US.¹

The numbers of deaths have been declining in recent years, thanks to early screenings and colonoscopies.

More can be done to help prevent the 50,000 deaths attributable to colorectal cancer yearly.²

One of the most promising discoveries is that green tea and its most active polyphenol constituent, epigallocatechin gallate (EGCG) has potent actions against colorectal cancer.

In the past year, new research findings have been published on green tea’s effects on colorectal cancer.

Together, these studies tell a compelling story about green tea’s potential cancer-preventive properties.
Researchers decided to pool data from dozens of studies that evaluate green-tea consumption and the risk for colorectal cancers.\(^3\) Published in 2017, this ambitious study combined 29 separate epidemiological studies, with a total of more than 1.6 million individuals.

This meta-analysis had two main findings:

- First, it showed that green tea consumption is associated with protection against colorectal cancers, demonstrating a 7% overall reduction in risk.\(^3\)
- The second finding showed that among female green-tea drinkers, for every cup per day of tea consumed, colorectal cancer risk was reduced by 32%. This established a dose-response relationship—meaning the more you drink, the more protection you get.\(^3\)

This large study helps clarify green tea’s association with colorectal cancer protection in humans.

**Animal Studies Show Cancer Reduction**

In an effort to better understand the impact of green tea on reducing the risk of colon cancer, researchers designed two studies with mice. Both sought to determine whether green tea reduced the presence of tumors in the colon.

The scientists conducting the first study had already shown that a green tea polyphenol extract significantly inhibited the formation of precancerous lesions in the colon.\(^4\)

Next, they wanted to assess green-tea extract’s impact on colorectal tumors themselves. To determine this, they treated rats with a chemical that induces colorectal cancer.\(^4\) The rats were also fed a high-fat diet, which is known to promote colorectal cancers.

Half the animals were supplemented with green-tea polyphenol extracts for 34 weeks, while the other half served as unsupplemented controls.\(^4\)

The study showed that, while most of the control animals developed colorectal tumors, significantly fewer of the supplemented rats did.\(^4\)

And of the supplemented animals that did develop tumors, there were 55% fewer tumors in each animal,

- the tumors were 45% smaller,
- and the tumors that did develop were more likely to be benign than malignant.\(^4\)

In addition to these direct impacts on tumors, the green-tea polyphenol extract had numerous other anti-cancer benefits.

For example, the supplemented animals had significantly lower levels of pro-inflammatory signaling molecules, lower expression of a tumor-promoting gene regulator called beta-catenin, and higher levels of tumor-cell death.\(^4\)

This study establishes that green tea polyphenols prevent inflammation-promoted colorectal cancers in a standard animal model.

---

**Colorectal Cancer by the Numbers**

The most recent year that comprehensive statistics on colorectal cancers are available is 2014, when:

- Nearly 140,000 people were diagnosed with colorectal cancer, including:
  - 73,396 men
  - 66,596 women
- 51,651 Americans died of colorectal cancer, including:
  - 27,134 men and
  - 24,517 women

The good news is that rates of both colorectal cancer incidence and mortality have been gradually falling, but only by around 3% per year overall.\(^1\) This is largely attributable to increasing rates of screenings and colonoscopies.
Diminishing the Diet/Cancer Connection

The second animal study demonstrated a property of green-tea extract that is particularly important for today’s American population because it diminishes the impact that poor diet has on cancer.5

Once again, the mice in this study were given a cancer-inducing chemical and then treated with a green-tea extract. This study found that green-tea extract reduced the occurrence of precancerous lesions.

And it was found to be even more effective in the group of mice fed a typical western diet high in fat and simple sugars. It also prevented weight gain and fasting glucose elevations only in that “poor diet” group. This was a key finding because these kinds of poor dietary choices are linked to increased cancer risk through increased insulin production and chronic inflammation.6,7

So green-tea extracts appear capable of helping to overcome the harmful impact of poor dietary habits on the promotion of colorectal cancers—truly encouraging news.

Study Affirms Green Tea’s Colorectal Cancer Prevention

A new study not only validates the findings from epidemiological and animal studies, it also provides insight into how green tea protects against colorectal cancers.

First, in a basic lab study, researchers showed that the green tea polyphenol EGCG suppressed the activity of deadly colorectal cancer stem cells.8

Like all stem cells, cancer stem cells are extremely robust. And because they divide infrequently, they are relatively resistant to chemo- and radiation therapies. Cancer stem cells are widely held to be responsible for the recurrence of treated cancers, functioning in essence as malignant “seeds” that can restart the malignant process even after the bulk of a tumor has been destroyed.9,11

The way EGCG suppressed cancer stem cells was by downregulating a fundamental signaling pathway called Wnt/beta-catenin.8 This pathway is crucial in controlling the development of stem cells into functioning cells in tissues. Abnormal activation of the Wnt/beta-catenin pathway is a potent cancer promoter.12,13

This pathway is already a target for pharmaceutical drug developers. Now, the authors of this study suggest that EGCG’s ability to suppress this signaling pathway could make it a promising agent for colorectal cancer intervention.8

Follow the Logic

It’s nearly impossible to perform a human study demonstrating direct reduction in cancer occurrence because it would be unethical to expose human subjects to cancer-inducing chemicals. But scientists often use logic chains to draw strong conclusions about the likelihood that a substance—in this case, green tea—will have similar protective effects in humans as demonstrated in animal studies.

The logic here is powerful:

1. People who drink larger amounts of green tea have lower rates of cancer than those who drink less.

2. Animals that are given green tea and then exposed to cancer-causing chemicals develop fewer and smaller cancers when treated with green-tea extracts.
3. Those green tea-treated animals demonstrate significant reductions in known tumor-promoting pathways and signaling molecules that occur in humans as well.

4. Humans supplemented with green tea extracts demonstrate similar changes in the identical pathways, indicating a reduction in colorectal cancer risk produced by green tea.

Summary

Evidence has been growing for years that green tea and its principal constituent, EGCG, have cancer-preventive effects.

Recent published studies now provide compelling evidence not only that such an effect exists, but also showing how it works.

In addition to regular screening, green-tea extracts appear capable of reducing the risk of colorectal cancer.

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

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Lentils are seeds that grow in pods, and are a part of the legume family of foods, which also includes peanuts, beans, peas, and chickpeas. They come in a variety of shapes and colors and are a staple in the cuisine of Asia and the Middle East. Often eaten in soups, salads, and stews, lentils are a remarkably nutritious food and it’s a good idea to include them in a healthy diet regimen due to their numerous health benefits. For instance...

**Weight Management**

Lentils are a good food for weight-loss, because they are abundant in soluble fiber, which helps satisfy hunger and keeps you feeling full.

Research has consistently found a link between high consumption of pulses (seeds, including lentils) and healthy body weight. Pulse intake is inversely related to obesity risk and a high body mass index.1

**Blood Sugar**

The fiber content also helps stabilize blood glucose levels by slowing absorption of carbohydrates, as well as promoting regularity and keeping constipation and irritable bowel syndrome at bay.2,3

**Gut Bacteria**

Moreover, the soluble fiber provided by lentils helps promote the growth of healthy bacteria that are essential for the digestive tract.3

Black, brown, and green lentils are the varieties that provide the most fiber, because they come with intact husks.

**Cholesterol Reduction**

A review of 26 US and Canadian studies that included a total of more than 1,000 subjects found that a three-quarter-cup serving of legumes such as lentils was linked to a significant 5% reduction in LDL cholesterol.4

Doctors such as internist Robert Graham, MD, have expressed enthusiasm for the results.

"By making a small dietary change, such as consuming one serving a day of beans, chickpeas, lentils, and peas—as most of the world does already—we can make a modest risk reduction in our incidence of heart disease by lowering our 'bad cholesterol' LDL, especially in men," said Dr. Graham.

**References**

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Wellness Profile

Lisa Bartoli, DO, specializes in putting people back in motion.

From her days working with Olympic athletes to her clinic in New York City, Dr. Bartoli has built an innovative practice treating musculoskeletal pain and sports injuries. Her comprehensive approach to pain management earned her a position as medical director and team physician for USA Women’s Rugby, where she helped elite Olympic athletes prevent injuries and rehabilitate from injuries. Now in private practice, she has adapted her approach to treat a whole new group of patients: “regular” people dealing with pain and injury.

“My practice is all about maintaining function, whether it’s an elite athlete or a 90-year-old patient,” Bartoli says. “My treatment approach is influenced by my osteopathic training and my fellowship training in integrative medicine. We’re taught to view patients from a mind, body, and spiritual perspective. We look at the whole patient and help them be successful.”

Lisa Bartoli (far left) at the 2016 Rio Olympics with sports-medicine colleagues Jared Siegmund and Nicole Titmas. The trio worked with the US women’s rugby team.
Wellness Profile

Acute Injuries and Long-Term Protection

Patients who show up in Dr. Bartoli’s office are often suffering from an acute, sports-related injury—or the recurrent symptoms of an old injury that has cropped back up and is causing trouble.

In this situation, many doctors turn first to powerful painkillers and anti-inflammatories. But Dr. Bartoli is careful not to take drastic steps that would interfere with the body’s natural healing processes.

“For an acute musculoskeletal injury, we try to avoid NSAIDs for the first 72 hours,” she said. “You want that inflammatory cascade. It’s a natural part of the healing process and it’s important.”

Instead, she’ll use homeopathic topical treatments like Traumeel® or Topricin®, arnica-based creams that quickly relieve soreness, or acupuncture to reduce the immediate pain and let the body begin healing on its own.

Once those first 72 hours pass, Dr. Bartoli begins to design a longer-term treatment plan. The goal is to empower patients to take control of their own healing process and to “graduate” them out of her care. As Dr. Bartoli said, although she loves her patients, she would like to see “less of them.” Her patients feel the same.

Her approach to rehabilitation is aimed at controlling an old enemy that will be familiar to any reader of Life Extension®: inflammation. The first step is often to recommend an anti-inflammatory diet based on whole foods and avoiding foods that include processed sugar or other things known to contribute to inflammation.

“Many of my patients are living with inflammation, and we have to get that under control,” she says. “The first thing I do is look at the diet.”

She also has favorite supplements she uses to tamp down inflammation, including fish oil, turmeric, curcumin, ginger, and tart-cherry extract. She discovered tart cherry’s anti-inflammatory powers during her days working with women’s rugby. It was recommended for use by Team USA Sport Dietician Shawn Heuglin.

“They loved it,” she said. “They’d line up after practice for their tart cherry and they felt it sped up their recoveries.”

Fish oil is also a critical part of any anti-inflammatory program. Rich in EPA and DHA, fish oil has been proven in thousands of studies to reduce inflammatory markers and help reduce the risk of developing inflammatory diseases including coronary artery disease.

Finally, she’s a big believer in massage and acupuncture, an ancient practice that relies on the placement of tiny needles along pressure points and energy pathways in the body to relieve muscle strain and reduce inflammation.

“Acupuncture is my secret weapon,” she says. “It really helps and can make a huge difference in difficult cases.”

Dr. Bartoli avoids prescribing long-term opioids, joking that she is the “queen of old-school medicine.” In recent years, opioid prescriptions have skyrocketed as unscrupulous pharmaceutical companies have pushed doctors to expand the list of conditions for which they prescribe these powerfully addictive drugs. Today, almost anyone can secure a prescription for OxyContin®, Percocet®, or any of the other opiates.
“I have fewer than five patients who are on narcotics all the time,” she said. “With all of the addiction, the tools I use have positioned me well to reduce acute pain and lessen reliance on opiates.” This includes over-the-counter painkillers like acetaminophen (Tylenol®) and ibuprofen and naproxen, but she cautions against taking extra doses of acetaminophen, which can cause serious liver damage at higher doses, and long-term use of NSAID’s like ibuprofen and naproxen.

### The Problems with Modern Exercise

There are a lot of ways to end up in Dr. Bartoli’s office. Just living in New York City, where she practices, has its fair share of risks, with high curbs, heavy doors, old buildings and lots of stairs. But one of the quickest ways is to jump on any of the super-intense workout crazes that have been sweeping the fitness world over the past few years.

“People shouldn’t overdo it,” she said. “Everybody needs exercise, but people need to figure out what form they can tolerate.”

When asked what kind of exercise people should be extra careful around, she ticks off a number of popular exercise trends that have resulted in many different injuries in her patients. This includes kettle bells, hot yoga, and especially crossfit training. All of these are known for pushing people to their physical limit or have a tendency to rely on volume over form. One study in the *Orthopaedic Journal of Sports Medicine* found that the overall injury rate for crossfit athletes is approximately 20%.*

Dr. Bartoli is quick to point out, however, that she “loves weights.”

As a former athlete herself, Bartoli walks every day and lifts weights regularly. She recommends that everyone should lift weights, whether they’re 12 or 80 years old.

“But form is paramount,” she said. “Weight lifting is all about form, form, form. It has to be perfect. You should spend the money to receive some good instruction and program development by a certified trainer. You should go slowly at first and take days off in between workouts or body parts to allow recovery. The goal is to go forward, never backward, and injury sets you back.”

Like so many successful doctors, Dr. Bartoli practices what she preaches. Not only does she get regular weight-bearing exercise, along with doing yoga and walking every day, she strives for a clean diet with a robust nutritional profile. She describes herself as a pesca vegetarian who eats only fish and vegetables. She eats seasonally and locally whenever possible, sourcing fresh vegetables through her co-op, and puts “tons of olive oil on everything.”

She also does the occasional medical cleanse.

“I’ll pull a few things out of my diet, like peanuts and tomatoes, and get some local honey to help with allergies,” she says. “I’ll do this for two or three weeks, and then gradually reintroduce foods over a few weeks.”

Whether she’s rehabbing her own sports injuries or designing multifaceted programs for patients, it’s exactly this type of focus on the whole person that makes it possible for Dr. Bartoli to help all of her patients—whether they’re Olympic athletes or elderly patients who can no longer navigate stairs—regain their function and recover faster.

### Reference


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Jim Mellon and Al Chalabi are successful investors and entrepreneurs whose interest in longevity research and its related technologies led them to write their new book, *Juvenescence: Investing in the Age of Longevity*.

The two are so excited about the potential in this area that, along with several other partners, they have started a company called *Juvenescence*, named after their book, with the mission of finding diagnostic and therapeutic agents to treat aging and diseases associated with aging.

In *Juvenescence*, the authors put forth the proposition that the research community is on a fast track to properly understanding the metabolic pathways involved in cellular aging. Dr. Greg Bailey, a cofounder of the company, writes in the forward that the book will “tell you about the scientists and companies who are working on these products as well as outlining the key pathways.”

The book shines a light on recent scientific progress in understanding the key molecular causes of aging, and explains why this understanding is essential to the development of effective therapeutics.

In their interview with *Life Extension*, Mellon and Chalabi outline some of the general ideas that make longevity research such a promising field, and touch on a few specific areas of interest.
LE: Let’s start with the basic idea of aging. What exactly is it?

JM & AC: Aging is rigorously described as senescence, the progressive degradation of bodily functions. Sir Peter Medawar, a British pioneer in aging research in the 1940s, described aging as an “unsolved problem of biology.” Medawar proposed that some genetic mutations only have deleterious effects late in life and are not “selected out” by evolution, as evolution is concerned primarily with reproductive fitness and not necessarily with the prolongation of life. He suggested that increasing age features a decline in the strength of natural selection.

LE: You mentioned senescence. Could you describe that process in cellular terms?

JM & AC: Molecules become unbound, genes become inefficient, waste products (cellular debris) build up and we (and other organisms) die. Organisms of all types accumulate damage to cells, tissues, organs, and indeed to all basic molecules, causing genomic instability to set in. Along with this comes shortening of the telomeres, reduced mitochondrial function (limiting energy production), the depletion of the potency of stem cells, and impaired intracellular networks.

LE: How do you feel about the prospects for longevity?

JM & AC: We really can—and probably will—live much longer than most people think is feasible. Science is advancing so rapidly that it is hard to comprehend the full implications of many of these recent discoveries, so we have tried to distill the ones we’re familiar with into our book.

We have spent a year researching, interviewing, collating, filtering, pleading, harassing, and reading, as well as driving 7,000 miles around the US. Finally, we have arrived at our one central conclusion: The current pause in rising lifespans in some developed countries, including in the UK and the US, is only temporary. Babies born today are likely to live well over 100, and probably a lot longer than that.

Techniques which are available to us beyond those of the fairly obvious admonitions concerning diet, sleep, exercise, and the avoidance of sugar and tobacco could carry most adults alive today to well over 100. Those techniques are building a bridge to a new world.

LE: What do you foresee as being on the horizon?

JM & AC: This new world is one where drugs, genetic engineering, cellular enhancements, and organ replacements, amongst other interventions, will add decades to our potential lifespan, taking most people much closer to the maximal life length that only a few supercentenarians currently enjoy.

The bridge that is being built is one made partly of drugs and therapies that address the main diseases of aging, namely cardiovascular disease, cancer, neurodegeneration, diabetes and respiratory disease.

In addition, the development of therapies to remove senescent cells, to restore cellular activity, to improve hormonal balance and to enhance mobility in older people is proceeding apace. If people can hold on to healthy life for the next decade or so, the chances are that they will eventually start to gain more than one year of life expectancy for each year that they live. The old nostrums about three score and ten, about being “illderly” in old age and of the inevitability of a preordained early expiration while in a diseased state are quickly being debunked.

LE: You seem to think the field of anti-aging medicine is about to really take off. Why?

JM & AC: First, the research tools available to scientists are improving rapidly, particularly in the field of genomic sequencing, in the management of big data, and in the use of non-animal models to get scientific answers much faster than by conventional means.

Second, because so much information has now been discovered about the pathways, genes, and proteins that are implicated in aging and so much chemistry has been done on what might interfere with them, the trials of therapies designed to influence lifespan are imminent. Some compounds which might influence lifespan are available right now, even if anti-aging properties can’t yet be definitively claimed for them.

One of the problems of aging research is that people live a long time and trials involving humans have to be designed over long periods, making them expensive and time-consuming. That’s why alternative models of aging are so useful and computer simulations are becoming increasingly vital to getting to the important points of discovery.

Scientists in the field of biomedical gerontology (longevity and anti-aging) have been working hard to identify the many genes and pathways that are implicated in aging and in determining which ones are more important than others. A great deal of progress has been made here, and such things as mTOR, IGF-1/insulin signaling, Sestrins, FOXO3A, sirtuins, ApoE, CETP, daf-2, and
AMPK, to name a few, are now revealed as being important to the aging process.

**LE:** Could you expand a little on AMPK and its activation via metformin?

**JM & AC:** Metformin is an anti-diabetic drug that increases insulin sensitivity as well as activating the enzyme AMPK (adenosine monophosphate activated kinase), thereby positively modulating glucose levels and levels of circulating lipids in the body. It also seems to regulate a variety of processes relating to aging.

AMPK seems to play a critical role in the regulation of our energy balance, particularly in restoring mitochondrial function. Exercise and caloric restriction have an effect in activating AMPK, as does metformin. AMPK also appears to inhibit the mTOR pathway, which is an important clue to metformin’s role in anti-aging. And mTOR has been linked to several age-related diseases such as cancer, cardiovascular disease, and Alzheimer’s.

**LE:** One area of research that you find promising is parabiosis, the practice of joining a young organism to an older one.

**JM & AC:** Tom Rando of Stanford University announced in 2005 that heterochronic (different stages of development) parabiosis, where two mice of different ages were conjoined by surgery, restored the livers and muscles of the older one. The positive effect of blood transfusions from young to old may be because older people have a lesser supply of blood stem cells in their bone marrow than the supply that younger people enjoy. These blood stem cells are progenitors for our red and white blood cells, and so a diminished quantity of them leads to anemia and a weakening of the immune system.

Additional benefits to the older subject include improved cardiac muscle tissue, enhanced cognition and what is known as remyelination (bolstering the sheaths of axons in the central nervous system). There is no doubt that regeneration occurs in the older animal during this process, which is encouraging for longevity research.
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Michael Ozner, MD

REDUCING THE RISK OF HEART DISEASE

Michael Ozner was named one of the top cardiologists in America, and has written multiple books including the best-selling *The Complete Mediterranean Diet* and *Heart Attack Proof*.

Dr. Ozner has focused his career on eradicating heart disease, America’s number one killer. His research on the benefits of the Mediterranean diet and his emphasis on prevention first has saved millions of lives. In this interview, Dr. Ozner gives an assessment of our next steps in conquering heart disease.

**LE:** Heart disease is still the number-one killer in America, even with all the billions spent on cardiac prevention and medications. What is the next step for reducing this devastation?

**MO:** Our priority needs to be how we can prevent heart disease in the first place, instead of focusing on treatment of existing disease. By the time a patient is referred for cardiac catheterization or open-heart surgery, there has already been a failure in the system. We need to focus much earlier, when the disease process is silent and the damage cascade has yet to begin. If we can do this, we can finally notch significant...
victories in the battle against cardiovascular disease—including heart attack and stroke. Cardiovascular disease remains the leading cause of death in the United States, but it’s also largely preventable. We’re only going to prevent this disease if we start early enough.

LE: Where do we begin?

MO: It’s amazing how much of our current thinking on lipid control is based on outdated science. The problem is that the approach of current medicine misses the boat when it comes to diagnosis of those at risk of heart attack. We’ve had a major shift in our recent cholesterol guidelines, toward risk and away from cause. This was not a move in the right direction, because it’s better to go after the cause, not just try to reduce the risk when disease becomes entrenched. You have to identify the enemy as early as possible to get at the root of the matter. The enemy in this case is not actually cholesterol—which is vital for health—but the type and number of cholesterol-carrying particles, called lipoproteins, floating in the bloodstream. If the bloodstream is laden with an increasing number of atherogenic (atherosclerosis-producing) lipoproteins, eventually these lipoproteins may infiltrate the artery wall, setting off an immune-system response that can lead to arterial disease and possibly heart attack and stroke. If we want to get to the root cause, we need to reduce the number of atherogenic lipoproteins.

LE: Most people would assume that their physician is requesting this type of information in their annual blood tests during their physical.

MO: Well, they’re not. Most physicians order a basic lipid panel that includes total cholesterol, LDL cholesterol, HDL cholesterol and triglycerides. Although this basic panel is helpful in evaluating risk, we need to dig deeper and look at the number of potentially harmful (atherogenic) particles. The good news is that we already have the technology to accurately measure the number of dangerous lipoproteins—even if it’s not in wide use. The apolipoprotein B (apo B) blood test is used to measure the number of potentially dangerous particles that can lead to the atherosclerotic process. A second test, the LDL-P test, can also be used since it measures the total number of LDL particles. Either of these two relatively inexpensive tests provides a much more accurate assessment of cardiac risk than our current focus on LDL cholesterol.

LE: Can you tell us more about the importance of testing for apo B?

MO: Because of the obesity epidemic, insulin resistance and diabetes, there’s often discordance between LDL cholesterol numbers and apolipoprotein B levels. If your LDL cholesterol (LDL-C) is perfectly normal, but you have too many apo B particles crashing the artery wall, you can still drop dead of a heart attack. Multiple large scale clinical trials have shown that measurement of particle number (apo B or LDL-P) is superior to total cholesterol or LDL-C in predicting heart-attack risk. Once we accept that measuring apo B gives a better indication of cardiac risk we can then take the next logical step: driving those numbers down to prevent heart disease in the first place. The good news is that we are able to lower elevated cholesterol and apo B levels with a healthy lifestyle and medications (if necessary) and thereby reduce the risk of heart attack and stroke.
**LE:** Besides particle numbers, what role does high blood pressure play as a risk factor for heart disease?

**MO:** High blood pressure is an important risk factor for cardiac health, but again, there's significant controversy over the current guidelines.

**LE:** Have there been studies supporting the reduction of blood pressure levels below these guidelines?

**MO:** The recent SPRINT trial showed that getting blood pressure lower than current guidelines translates to decreased overall cardiovascular mortality, mainly driven by a significant reduction of stroke risk.

The SPRINT trial was published in the *New England Journal of Medicine.* This rigorous study compared the rate of cardiac events among almost 10,000 nondiabetic patients with high blood pressure who were separated into two treatment groups. The first group was aggressively treated, with a treatment goal of reducing blood pressure to 120 mmHg, while the second group followed the current guidelines of aiming for 140 mmHg. At the end of the five-year follow-up period, the conclusions were clear. SPRINT showed that among adults with hypertension but without diabetes, lowering systolic blood pressure to a target goal of less than 120 mmHg resulted in significantly lower rates of fatal and nonfatal cardiovascular events and death from any cause. This remains controversial within the cardiology community—with many cardiologists continuing to aim for the older standards. However, during my recent symposium (*Cardiovascular Disease Prevention 2017*), a general consensus emerged that a target goal of systolic BP less than 130 mmHg was acceptable, until further trials confirm the SPRINT conclusions.

**Note:** Based upon published population-based data on cardiovascular outcomes, Life Extension® believes an optimal blood pressure target is 115/75 mmHg. However, rapid and aggressive blood pressure reduction in patients with kidney disease, as well as older patients, should be avoided. Older patients usually do not tolerate rapid, aggressive blood pressure reduction, and may require higher blood pressure for optimal organ perfusion (e.g. kidney, brain). Frequent monitoring, including blood tests for kidney function and electrolyte levels (e.g. potassium), should accompany aggressive blood pressure control with prescription Rx medications.

Once again, we know how to reduce and prevent elevated blood pressure through a combination of diet, exercise, stress management, weight control, proper sleep and medications. The challenge is getting the medical community to accept that previous guidelines aren’t stringent enough and help educate patients about getting dangerously elevated blood pressure under control long before a heart attack, stroke, or heart failure occurs.

**LE:** What role do certain supplements, such as fish oil or omega-3 fatty acids, play in achieving heart health?

**MO:** Omega-3 fatty acids reduce inflammation, lower blood pressure, lower resting heart rate, reduce triglycerides, improve insulin sensitivity, and reduce the risk of arrhythmias and sudden cardiac death. You need only look at Japan for proof, where people eat much more coldwater fish on average and have higher blood levels of omega-3 fatty acids and much lower levels of cardiac disease.

Ultimately, it’s important to test your blood for omega-3 fatty acid levels using the omega-3 index, which measures for the levels of EPA and DHA in red blood cells. We need to do better in spreading the message on the importance of omega-3 fatty acids. The average American has an omega-3 index of 4% to 5%, compared to an average omega-3 index of 9% to 10% in Japan. I recommend aiming for an omega-3 index of 8% to 10%.

**LE:** We are in the middle a diabetes epidemic, which is a direct path to heart disease. What role does insulin resistance play in the prevention strategy?

**MO:** Numerous clinical studies have been published in prominent medical journals showing a clear link between insulin resistance and cardiometabolic disease. Even with this increased awareness, we’re still doing a poor job of recognizing insulin resistance. Once again, the issue is that we aren’t catching this insidious disease process early enough but waiting until it’s already advanced. Many people go to the doctor and get a fasting blood glucose level test, and if it’s normal, they think they’re fine. We know that’s not necessarily true. In fact, a normal blood glucose reading might actually mean that the pancreas beta-cells, where insulin is produced, are working overtime to produce enough insulin to clear excess glucose from the blood. This can lead to “beta-cell strain” and, if left unchecked, can result in beta cell dysfunction and ultimately beta-cell failure, which can lead to insulin-dependent type II diabetes.

Prediabetes is generally diagnosed when the fasting blood-glucose measures between 100 mg/dL and 125 mg/dL. Readings over 125 mg/dL indicate type II diabetes.
Ask The Doctor

If you wait until you have pre-diabetes, you have done harm to your insulin-producing beta cells. It only makes sense to catch people before they have prediabetes. To identify issues before blood glucose levels start to rise, you can measure fasting insulin levels. If they’re elevated, it suggests the pancreas is overproducing insulin to maintain normal blood glucose levels. The earlier we intervene with lifestyle changes (diet and exercise) to prevent the progression to diabetes, the better.

LE: Right along with insulin resistance is the obesity epidemic that carries risk factors for so many diseases. Aside from being unattractive, excess weight, especially belly fat, is extremely harmful. Can you discuss this connection?

MO: The issue of insulin resistance is closely related to an area of intense interest among cardiovascular researchers: adiposopathy, or the accumulation of “sick fat.” This condition starts with a flawed lifestyle—especially a diet high in sugar and refined starches, saturated and trans fats, and highly processed food. This unhealthy dietary pattern combined with a lack of exercise results in excessive fat production in the liver. This excess fat is then carried to the fat (adipose) cells for storage.

As people eat a high-fat and high-sugar diet, their triglycerides often rise. Elevated triglycerides are stored in fat cells (adipocytes) and as these cells begin to swell and increase in size, adipocyte dysfunction and insulin resistance result. Over time, this leads to increased mobilization of free fatty acids that are released into the bloodstream and have a harmful effect on the liver, pancreas, arteries and other organs.

We know adiposopathy often begins in the belly, with accumulated belly fat. So one of the best diagnostic tests is measurement of waist circumference. Men with a waist circumference greater than 40” and women with a waist circumference greater than 35” are at greater risk. Like so many of the issues we have discussed, the best approach to adiposopathy is to prevent it in the first place. And lifestyle is always the first and most important step.

LE: Increasingly, we are seeing products in the supermarket that are labelled with “plant sterols” that claim to lower cholesterol. What are your thoughts on this?

MO: This is a very controversial topic. Consumers need to be aware of the science and not fall for the hype. You are correct, plant sterols (phytosterols) occur naturally in plants and have become increasingly popular as a way to lower cholesterol. They are added to certain foods (e.g. margarine, yogurt, fruit juices) which advertise plant sterols as a natural way to reduce harmful cholesterol levels.

It turns out that for many people, plant sterols can be toxic and actually promote heart disease over the long-term. The issue is the function of two sterol transporters called ABCG5 and ABCG8. These two transporters work to transport plant sterols out of the cells that line the gut and back into the gut lumen so they can be excreted. If there is a genetic defect in ABCG5 and ABCG8, these plant sterols can enter the bloodstream and have a potentially devastating effect on the arteries, including accelerated atherosclerosis and premature heart attack.

This disease was already well known in children who were born with significant defects in the transporters called ABCG5 and ABCG8. These two transporters work to transport plant sterols out of the cells that line the gut and back into the gut lumen so they can be excreted. If there is a genetic defect in ABCG5 and ABCG8, these plant sterols can enter the bloodstream and have a potentially devastating effect on the arteries, including accelerated atherosclerosis and premature heart attack.

This disease was already well known in children who were born with significant defects in the transporters. Children with this condition often develop premature heart attacks as teenagers and young adults. The discovery that many adults also have a mild mutation, however, expanded the universe of people who could be adversely affected by sterol accumulation.

This doesn’t mean people should avoid eating a wide variety of fruits and vegetables, which naturally contain a small amount
Ask The Doctor

The consensus among many sterol researchers is to avoid excess plant sterols added to food or supplements for the purpose of cholesterol lowering.

**LE:** This seems like an extremely clear road map for avoiding heart disease. Both physicians and the public need to be partners in this endeavor.

**MO:** That's absolutely correct. We already know much of what we need to know to prevent millions of Americans from suffering and dying of heart disease. The sad truth is that our lifestyles are killing us. We don't get enough exercise, our diets are highly processed, calorie-dense and nutrient-depleted. We're stressed out and often suffer from sleep disorders, and we are suffering from epidemic rates of metabolic disorders like insulin resistance and diabetes.

We need to become proactive in our battle against heart disease. Everyone should develop a heart disease prevention strategy with their personal treating physician—don't wait until cardiovascular disease strikes and then hope that medications or surgery can bail you out. The second major step is convincing the medical community to emphasize the role of therapeutic lifestyle intervention in maintaining heart health. In addition, clinicians need to use the proper blood biomarkers to identify metabolic derangements that can be corrected before disease becomes established.

Considering the high cost of surgery and expensive invasive procedures, prevention is extremely cost effective, both for individuals and medical systems. When I see the work **Life Extension** is doing by educating the population, that is an enormous step forward and a great contribution.

There is currently a revolution in medicine among the lay public. People want to know how they can stay healthy without having to take multiple pills every day or undergo risky and expensive surgical procedures. And we know how. It's about prevention. This is evidence-based medicine. It's not hype. It works. We know how to keep people out of the hospital.

**For further information and videos on heart disease prevention, visit Dr. Ozner’s website at www.drozner.com**

Michael Ozner, MD, FACC, FAHA, is one of America’s leading advocates for heart disease prevention. Dr. Ozner is a board-certified cardiologist, a fellow of both the American College of Cardiology and the American Heart Association, medical director of Wellness and Prevention at Baptist Health South Florida, a well-known regional and national speaker in the field of preventive cardiology, and a member of **Life Extension**’s Scientific Advisory Board. He is symposium director for Cardiovascular Disease Prevention, an annual international meeting dedicated to the treatment and prevention of heart attack and stroke. He was the recipient of the 2008 American Heart Association Humanitarian Award and was elected to Top Cardiologists in America by the Consumer Council of America. Dr. Ozner is also the author of *The Great American Heart Hoax, Heart Attack Proof,* and *The Complete Mediterranean Diet.*

If you have any questions on the scientific content of this article, please call a Life Extension® Wellness Specialist at 1-866-864-3027.
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  - Immune Senescence Protection Formula™
  - Krill Oil High Omega-3
  - Krill Oil High Omega-3 with Enhanced Mitochondrial Support™
  - NK Cell Activator™
  - Optimized Garlic
  - Optimized Quercetin
  - Peony Immune
  - ProBoost Thymic Protein A
  - Reishi Extract Mushroom Complex
  - Standardized Cistanche
  - Ten Mushroom Formula®
  - Zinc L-Lysinate

- **Inflammation Management**
  - 5-LOX Inhibitor with AprèsFlex®
  - Advanced Bio-Curcumin® with Ginger & Turmeric
  - Black Cumin Seed Oil
  - Black Cumin Seed Oil with Bio-Curcumin®
  - Boswellia
  - Comfort Max™
  - Cytokine Supress™ with EGCG
  - Sandaracopin
  - Specially-Coated Bromelain
  - Super Bio-Curcumin®
  - Zyflamend® Whole Body

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

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

- **Liver Health & Detoxification**
  - Anti-Alcohol with HepatoProtection Complex
  - Calcium D-Gluconate
  - Chlorella
  - Chlorophyll
  - European Milk Thistle
  - Glutathione, Cysteine & C
  - HepatoPro
  - Liver Efficiency Formula
  - N-Acetyl-L-Cysteine
  - PectaSol-C®
  - Silmarin
  - SODzyme® with GluSODin® & Wolfberry

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

- **Nutritional Supplements**
  - Anti-Inflammatory Formula
  - Brain Health Formula
  - Cardio-vascular Health Formula
  - Digestive Health Formula
  - Immune Health Formula
  - Joint Health Formula
  - Liver Support Formula
  - Muscular-Skeletal Health Formula
  - Pain Management Formula
  - Respiratory Health Formula
  - Skin Health Formula
  - Sleep Support Formula
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**SUBTOTAL OF COLUMN 1**

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<td>BIOSIL® • 1 fl oz</td>
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<td>BIS(GLIC°) • 60 mg, 100 capsules</td>
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**SUBTOTAL OF COLUMN 2**

DEDUCT AN ADDITIONAL 10% ON ALL PRODUCTS DURING SUPER SALE

TO ORDER CALL: 1.954.766.8433 or 1.800.544.4440 | TO ORDER ONLINE VISIT: www.LifeExtension.com

RECEIVE 25% OFF THE RETAIL PRICE OF ALL PRODUCTS

FEBRUARY 2018

SUPER SALE SAVINGS ON ALL PRODUCTS
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### COSMESIS

- Advanced Anti-Glycation Peptide Serum • 1 oz
- Advanced Growth Factor Serum • 30 ml
- Advanced Lightening Cream • 1 oz
- Advanced Peptide Hand Therapy • 4 oz
- Advanced Triglycine Peptide Serum • 1 oz
- Advanced Under Eye Serum with Stem Cells • .33 oz
- Amber Self Microdermabrasion • 2 oz
- Anti-Aging Face Oil • 1 oz
- Anti-Aging Mask • 2 oz
- Anti-Aging Rejuvenating Face Cream • 2 oz
- Anti-Aging Rejuvenating Scalp Serum • 2 oz
- Anti-Glycation Serum with Blueberry & Pomegranate Extracts • 1 oz
- Antioxidant Facial Mist • 2 oz
- Anti-Redness & Adult Blemish Lotion • 1 oz

### SUBTOTAL OF COLUMN 3

### SUBTOTAL OF COLUMN 4

- Collagen Boosting Peptide Serum • 1 oz
- DNA Repair Cream • 1 oz
- Environmental Support Serum • 1 fl. oz
- Essential Plant Lipids Rejuvenative Serum • 1 oz
- Eye Lift Cream • 0.5 fl. oz
- Face Rejuvenating Antioxidant Cream • 2 oz
- Healing Formula All-in-One Cream • 1 oz
- Healing Vitamin K Cream • 1 oz
- Hyaluronic Facial Moisturizer • 1 oz
- Hyaluronic Oil-Free Facial Moisturizer • 1 oz
- Hydrating Antioxidant Face Mist • 4 oz
- Lifting & Tightening Complex • 1 oz
- Melatonin Cream • 1 oz
- Mild Facial Cleanser • 8 fl. oz
- Multi Stem Cell Skin Tightening Complex • 1 oz
- Neck Rejuvenating Antioxidant Cream • 2 oz
- Renewing Eye Cream • 1/2 oz
- Resveratrol Anti-Oxidant Serum • 1 oz
- Skin Firming Complex • 1 fl. oz
- Skin Lightening Serum • 1/2 oz
- Skin Stem Cell Serum • 1 oz
- Skin Tone Equalizer • 0.4 fl oz
- Stem Cell Cream with Alpine Rose • 1 oz
- Tightening & Firming Neck Cream • 2 oz
- Triple Action Vitamin C Cream • 1 oz
- Ultimate Microdermabrasion • 8 fl. oz
- Ultra Eyelash Booster • 0.25 oz (2 units $39)
- Ultra Lip Plumper • 1/3 oz
- Ultra Wrinkle Relaxer • 1 oz
- Under Eye Refining Serum • 1/2 oz
- Under Eye Rescue Cream • 1/2 oz
- Vitamin C Serum • 1 oz
- Vitamin D Lotion • 4 oz
- Vitamin E Essential Cream • 1 oz
- Youth Serum • 1 oz

### DEDUCT AN ADDITIONAL 10% ON ALL PRODUCTS DURING SUPER SALE

- 7-KETO® DHEA Metabolite • 25 mg, 100 caps
- 7-KETO® DHEA Metabolite • 100 mg, 60 veg. caps
- DHA (Vegetarian) • 30 veg. softgels
- DHEA • 25 mg, 100 tablets (Dissolve in mouth)
- DHEA • 15 mg, 100 caps
- DHEA • 50 mg, 60 caps
- DHEA • 100 mg, 60 veg. caps

### TO ORDER ONLINE VISIT: www.LifeExtension.com
## Item No. | Product | Your Price
---|---|---
01358 | DIGEST RC* • 30 tablets | 19.95
02021 | DIGESTIVE ENZYMES (Enhanced Super) • 60 veg. caps | 22.00
02022 | DIGESTIVE ENZYMES w/PROBIOTICS (Enhanced Super) • 60 veg. caps | 28.00
01671 | D, L-PHENYLALANINE • 500 mg, 100 veg. caps | 18.75
01540 | DMAE Bitartrate • 150 mg, 200 veg. caps | 18.00
01570 | DNA PROTECTION FORMULA • 60 veg. caps | 34.00
01931 | DOG MIX • 100 grams powder | 18.00
02006 | DOPA-MIND™ • 60 veg. tabs | 44.00
00321 | DR. PROCTOR'S ADVANCED HAIR FORMULA • 2 oz | 39.95
00320 | DR. PROCTOR'S HAIR SHAMPOO • 8 oz | 24.95

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## Item No. | Product | Your Price
---|---|---
01997 | ENDOThelial DEFENSE™ w/OMEGANATE COMPLETE and CordiART® • 60 softgels | 68.00
00997 | ENDOThelial DEFENSE™ w/GLISODIN* • 60 veg. caps | 54.00
02200 | EPA/DHA (Clearly) • 120 softgels | 30.00
01937 | EPA/DHA (Mega) • 120 softgels | 20.00
02009 | ESOPHACOL™ • 120 chewable tablets | 20.00
01737 | ESOPHAGEAL GUARDIAN (Berry flavor) • 60 chewable tablets | 36.00
01042 | EUROPEAN LEG SOLUTION DIOSSIN 95 • 600 mg, 30 veg. tabs | 20.00
01706 | EXTRAORDINARY ENZYMES • 60 caps | 26.00
02008 | i(CALIFORNIA ESTATE) EXTRA VIRGIN OLIVE OIL • 500 ml (16.9 fl. oz) | 33.00
01514 | EYE PRESSURE SUPPORT W/MIRTGENOL® • 30 veg. caps | 38.00

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## Item No. | Product | Your Price
---|---|---
00965 | FAST-ACTING JOINT FORMULA • 30 caps | 29.00
01717 | FAST-C® W/DIHYDROQUERCETIN • 120 veg. tabs | 26.00
01664 | FEMMENESSENCE MACAPOSE™ • 120 veg. caps | 34.99
02125 | FLORASSIST® GI w/PHAGE TECHNOLOGY • 30 liquid veg. caps | 33.00
01821 | FLORASSIST® HEART HEALTH • 60 veg. caps | 32.00
02124 | FLORASSIST® IMMUNE HEALTH • 30 veg. caps | 26.00
02120 | FLORASSIST® ORAL HYGIENE • 30 lozenges | 20.00
01825 | FLORASSIST® BALANCE • 30 liquid veg. caps | 32.00
02000 | FLORASSIST® MOOD • 60 caps | 33.00
02203 | FLORASSIST® PREBiotic • Natural Strawberry, 60 chewable tabs | 20.00
01920 | FLORASSIST® THROAT HEALTH • 30 lozenges | 20.00
01913 | FOLATE HIGH POTENCY (Optimized) • 5,000 mcg, 30 veg. caps | 18.00
01939 | FOLATE (Optimized) • 1,000 mcg, 100 veg. tablets | 15.00
01842 | FOLATE + VITAMIN B12 (BioActive) • 90 veg. caps | 12.00
01544 | FORSKOLIN • 10 mg, 60 veg. caps | 16.00
01513 | FUCOIDAN W/MARITECH® 925 (Optimized) • 60 veg. caps | 36.00

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## Item No. | Product | Your Price
---|---|---
05142 | JARRO-DOPHILUS® PROBIOTIC FOR WOMEN • 30 enteric-coated veg. caps | 27.95
00056 | JARRO-DOPHILUS® EPS • • 60 veg. caps | 23.95
02034 | K W/ADVANCED K2 COMPLEX (Super) • 90 softgels | 30.00
01600 | KRILL HEALTHY JOINT FORMULA • 30 softgels | 32.00
01050 | KRILL OIL (Jarrow®) • 60 softgels | 33.35
00316 | KYOLIC® GARLIC FORMULA 102® • 200 veg. caps | 27.45
00789 | KYOLIC® RESERVE • 600 mg, 120 caps | 28.95
01681 | LACTOFERRIN • 60 caps | 44.00

---

**Deduction:**
- 10% on all products during the Super Sale
- 25% on the retail price of all products

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**Subtotal of Column 5**

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**Subtotal of Column 6**
**SUBTOTAL OF COLUMN 7**

RECEIVE 25% OFF THE RETAIL PRICE OF ALL PRODUCTS

SUPER SALE SAVINGS ON ALL PRODUCTS

FEBRUARY 2018
<table>
<thead>
<tr>
<th>ITEM No.</th>
<th>PRODUCT</th>
<th>Retail Each $</th>
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<tbody>
<tr>
<td>01397</td>
<td>POMI-T™ • 60 veg caps</td>
<td>35.00</td>
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<td>05577</td>
<td>POTASSIUM IODIDE • 130 mg, 14 tabs</td>
<td>6.95</td>
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<tr>
<td>01500</td>
<td>PQG CAPS • 10 mg, 30 veg caps</td>
<td>18.00</td>
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<tr>
<td>01647</td>
<td>PQG CAPS • 20 mg, 30 veg caps</td>
<td>32.00</td>
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<tr>
<td>00302</td>
<td>PREGNENOLONE • 50 mg, 100 caps</td>
<td>26.00</td>
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<tr>
<td>00700</td>
<td>PREGNENOLONE • 100 mg, 100 caps</td>
<td>30.00</td>
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<tr>
<td>00373</td>
<td>PRELAX® NATURAL SEX FOR MEN® • 60 tablets</td>
<td>52.00</td>
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<tr>
<td>00525</td>
<td>PROBOOST™ THYMIC PROTEIN A • 30 packets</td>
<td>66.60</td>
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<tr>
<td>01441</td>
<td>PROGESTAR-CARE® • 4 oz cream</td>
<td>36.39</td>
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<tr>
<td>02029</td>
<td>PROSTATE FORMULA (Uma Natural) • 60 softgels</td>
<td>38.00</td>
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<tr>
<td>01909</td>
<td>PROSTAPOLY™ (Triple strength) • 30 softgels</td>
<td>28.00</td>
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<tr>
<td>01742</td>
<td>PROTEIN-ISOALE (Whey) Vanilla • 403 grams</td>
<td>30.00</td>
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<td>01743</td>
<td>PROTEIN-ISOALE (Whey) Chocolate • 437 grams</td>
<td>30.00</td>
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<tr>
<td>01770</td>
<td>PROTEIN CONCENTRATE (New Zealand Whey) Vanilla</td>
<td>30.00</td>
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<td>01771</td>
<td>PROTEIN CONCENTRATE (New Zealand Whey) Chocolate</td>
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<td>02127</td>
<td>PROTEIN (PLANT) COMPLETE &amp; AMINO ACID COMPLEX</td>
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<tr>
<td>01812</td>
<td>PROVINAL® PURIFIED OMEGA-7 • 30 softgels</td>
<td>27.00</td>
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<tr>
<td>01676</td>
<td>PS CAPS (Phosphatidylserine) • 100 mg, 100 veg caps</td>
<td>54.00</td>
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<td>01508</td>
<td>PTEROPURE® Pterostilbene • 50 mg, 60 veg caps</td>
<td>32.00</td>
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<tr>
<td>01209</td>
<td>PUMPKIN SEED EXTRACT (Water-soluble) • 60 veg caps</td>
<td>20.00</td>
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<td>01637</td>
<td>PYCNOGENOL® FRENCH MARITIME PINE BARK EXTRACT</td>
<td>64.00</td>
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<tr>
<td>01217</td>
<td>PYRIDOXAL 5'-PHOSPHATE • 100 mg, 60 veg caps</td>
<td>22.00</td>
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**Q. R**

<table>
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<tr>
<th>ITEM No.</th>
<th>PRODUCT</th>
<th>Retail Each $</th>
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<tbody>
<tr>
<td>01393</td>
<td>RED YEAST RICE (Blueberry) • 600 mg, 60 veg caps</td>
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<tr>
<td>00805</td>
<td>REGIMINT • 60 enteric-coated tabs</td>
<td>19.95</td>
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<td>01708</td>
<td>REISHI EXTRACT MUSHROOM COMPLEX • 60 veg caps</td>
<td>30.00</td>
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<tr>
<td>01446</td>
<td>REJUVENEX® BODY LOTION • 6 oz</td>
<td>24.00</td>
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<tr>
<td>01621</td>
<td>REJUVENEX® FACTOR FIRMING SERUM • 1.7 oz</td>
<td>65.00</td>
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<tr>
<td>01220</td>
<td>REJUVENEX® (ULTA) • 2 oz</td>
<td>52.00</td>
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<tr>
<td>00679</td>
<td>REJUVENIGHT® (ULTA) • 2 oz</td>
<td>39.95</td>
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<tr>
<td>01410</td>
<td>RESERVATROL W/PTEROSTILBENE • 100 mg, 60 veg caps</td>
<td>36.00</td>
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<tr>
<td>02030</td>
<td>RESERVATROL (Optimised) • 60 veg caps</td>
<td>46.00</td>
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<tr>
<td>00889</td>
<td>RHODIOLA EXTRACT • 250 mg, 60 veg caps</td>
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<tr>
<td>01900</td>
<td>RIBOGEN™ FRENCH OAK WOOD EXTRACT</td>
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<tr>
<td>00972</td>
<td>(D) RIBOSE POWDER • 150 grams</td>
<td>27.50</td>
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<tr>
<td>01473</td>
<td>(D) RIBOSE TABLETS • 100 veg caps</td>
<td>32.00</td>
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<tr>
<td>02169</td>
<td>RAINFROST 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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**S**

<table>
<thead>
<tr>
<th>ITEM No.</th>
<th>PRODUCT</th>
<th>Retail Each $</th>
</tr>
</thead>
<tbody>
<tr>
<td>01432</td>
<td>SAFRON W/SATIREAL® (Optimized) • 60 veg caps</td>
<td>36.00</td>
</tr>
<tr>
<td>01935</td>
<td>SAMA (S-ADENOSYL-METHIONINE) 200 mg, 30 enteric coated tablets</td>
<td>25.00</td>
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<tr>
<td>01933</td>
<td>SAMA (S-ADENOSYL-METHIONINE) 400 mg, 30 enteric coated tablets</td>
<td>36.00</td>
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<tr>
<td>01934</td>
<td>SAMA (S-ADENOSYL-METHIONINE) 400 mg, 60 enteric coated tablets</td>
<td>66.00</td>
</tr>
<tr>
<td>01740</td>
<td>SEA-IODINE™ • 1,000 mcg, 60 veg caps</td>
<td>8.00</td>
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<tr>
<td>01879</td>
<td>SE-METHYL L-SELENOCYSTEINE • 200 mcg, 90 veg caps</td>
<td>11.00</td>
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<tr>
<td>00318</td>
<td>SERRAFLAZYM® • 100 tablets</td>
<td>18.00</td>
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<tr>
<td>01938</td>
<td>SHADE FACTOR™ • 120 veg caps</td>
<td>44.00</td>
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<tr>
<td>02110</td>
<td>SHADE FACTOR™ SUNSCREEN LOTION • 4 fl. oz</td>
<td>20.00</td>
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<td>02118</td>
<td>SHADE FACTOR™ SUNSCREEN SPRAY • 6 fl. oz</td>
<td>22.00</td>
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<tr>
<td>01884</td>
<td>SILYMARIN • 100 mg, 90 veg caps</td>
<td>14.00</td>
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<tr>
<td>01249</td>
<td>SINUS CLEANSER • 4 oz. bottle</td>
<td>25.00</td>
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<tr>
<td>01219</td>
<td>SKIN CARE COLLECTION ANTI-AGING SERUM • 1.75 fl. oz</td>
<td>60.00</td>
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<tr>
<td>01212</td>
<td>SKIN CARE COLLECTION BODY LOTION • 6 oz</td>
<td>28.00</td>
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<tr>
<td>01230</td>
<td>SKIN CARE COLLECTION DAY CREAM • 1.65 fl. oz</td>
<td>50.00</td>
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<td>02131</td>
<td>SKIN CARE COLLECTION NIGHT CREAM • 1.65 fl. oz</td>
<td>39.00</td>
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<td>01586</td>
<td>SKIN RESTORING PHYTOCERAMIDES w/LIPOHWEAT® 30 liquid veg caps</td>
<td>25.00</td>
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<tr>
<td>00961</td>
<td>SODZYMEx® w/GLISODIN® &amp; WOLFBEERY • 90 veg caps</td>
<td>28.00</td>
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<tr>
<td>00657</td>
<td>SOLARSHIELD® SUNGLASSES</td>
<td>12.99</td>
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<tr>
<td>01097</td>
<td>SOY EXTRACT (ULTRA) • 150 veg caps</td>
<td>76.00</td>
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<td>01649</td>
<td>SOY ISOFLAVONES (SUPER ABSORBABLE) • 60 veg caps</td>
<td>28.00</td>
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<tr>
<td>00432</td>
<td>STEVIA® (Better) • 100 packets, 1 gram each</td>
<td>9.95</td>
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<tr>
<td>00438</td>
<td>STEVIA® ORGANIC LIQUID SWEETENER (Better) • 2 oz</td>
<td>11.00</td>
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<tr>
<td>01476</td>
<td>STRONTIUM • 750 mg, 90 veg caps</td>
<td>20.00</td>
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<tr>
<td>01778</td>
<td>SUPER SÉLENIUM COMPLEX • 200 mcg, 100 veg caps</td>
<td>14.00</td>
</tr>
</tbody>
</table>

**T**

<table>
<thead>
<tr>
<th>ITEM No.</th>
<th>PRODUCT</th>
<th>Retail Each $</th>
</tr>
</thead>
<tbody>
<tr>
<td>02023</td>
<td>TART CHERRY W/CHERRYPURE® 60 veg caps</td>
<td>20.00</td>
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<tr>
<td>01827</td>
<td>TAURINE • 1,000 mg, 90 veg caps</td>
<td>13.00</td>
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<tr>
<td>01918</td>
<td>TEAR SUPPORT w/MAQUIBRIGHT® • 60 mg, 30 veg caps</td>
<td>18.00</td>
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<tr>
<td>00133</td>
<td>L-TAURINE POWDER • 100 grams</td>
<td>20.00</td>
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<tr>
<td>13685</td>
<td>TEN MUSHROOM FORMULA™ • 120 veg caps</td>
<td>41.55</td>
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<td>01304</td>
<td>THEALAFVIN STANDARDIZED EXTRACT • 30 veg caps</td>
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<td>01883</td>
<td>(L) THEANINE • 100 mg, 60 veg caps</td>
<td>24.00</td>
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<td>00388</td>
<td>Teralac® PROBIOTICS • 30 caps</td>
<td>47.55</td>
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<td>00668</td>
<td>THYROID FORMULA (Metabolic Advantage™) • 100 caps</td>
<td>21.95</td>
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<tr>
<td>00349</td>
<td>TMG POWDER • 50 grams</td>
<td>14.00</td>
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<tr>
<td>01859</td>
<td>TMG • 500 mg, 60 liquid veg caps</td>
<td>13.00</td>
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</tbody>
</table>

**SUBTOTAL OF COLUMN 9**

**SUBTOTAL OF COLUMN 10**

**FEBRUARY 2018**

**TO ORDER ONLINE VISIT: www.LifeExtension.com**

**DEDUCT AN ADDITIONAL 10% ON ALL PRODUCTS DURING SUPER SALE**

**SUPER SALE SAVINGS ON ALL PRODUCTS • OFFER ENDS JANUARY 31, 2018**

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

<table>
<thead>
<tr>
<th>ITEM No.</th>
<th>PRODUCT</th>
<th>Retail Each</th>
<th>1 Unit Each</th>
<th>4 Unit Each</th>
<th>10 Unit Each</th>
<th>QTY Total</th>
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</thead>
<tbody>
<tr>
<td>01400</td>
<td>TOCOTRIENOLS (Super-absorbable) • 60 softgels</td>
<td>30.00</td>
<td>22.50</td>
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<tr>
<td>01278</td>
<td>TOOTHPASTE • 4 oz ( Mint tube)</td>
<td>9.50</td>
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<tr>
<td>01917</td>
<td>TRANQUIL TRACT™ • 60 veg. caps</td>
<td>52.00</td>
<td>39.00</td>
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<tr>
<td>01468</td>
<td>TRIPLE ACTION CRUCIFEROUS VEGETABLE EXTRACT 60 caps</td>
<td>24.00</td>
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<td>01469</td>
<td>TRIPLE ACTION CRUCIFEROUS VEGETABLE EXTRACT w/RESERVOIR • 60 veg. caps</td>
<td>32.00</td>
<td>24.00</td>
<td>22.20</td>
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<td>02003</td>
<td>TRIPLE ACTION THYROID • 60 veg. caps</td>
<td>36.00</td>
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<td>01803</td>
<td>TRI SUGAR SHIELD™ • 60 veg. caps</td>
<td>36.00</td>
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<tr>
<td>01386</td>
<td>TRUFIBER™ • 180 grams</td>
<td>32.95</td>
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<td>01389</td>
<td>TRUFLORA® PROBIOTICS • 32 veg. caps</td>
<td>42.95</td>
<td>32.21</td>
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<td>01722</td>
<td>L-TRYPTOPHAN • 500 mg, 90 veg. caps</td>
<td>33.00</td>
<td>24.75</td>
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<tr>
<td>01721</td>
<td>TRYPTOPHAN PLUS (Optimized) • 90 veg. caps</td>
<td>32.00</td>
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<tr>
<td>02216</td>
<td>TWO-PER-DAY • 60 tablets</td>
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<td>02215</td>
<td>TWO-PER-DAY • 120 tablets</td>
<td>21.00</td>
<td>15.75</td>
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<tr>
<td>02217</td>
<td>TWO-PER-DAY • 60 caps</td>
<td>12.00</td>
<td>9.00</td>
<td>8.00</td>
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<td>02214</td>
<td>TWO-PER-DAY • 120 caps</td>
<td>24.00</td>
<td>18.00</td>
<td>16.00</td>
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<td>00326</td>
<td>L-TYROSINE • 500 mg, 100 tablets</td>
<td>13.50</td>
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<tr>
<td>01921</td>
<td>URIC ACID CONTROL • 60 veg. caps</td>
<td>24.00</td>
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<td>00213</td>
<td>VANADYLSULFATE • 7.5 mg, 100 veg. tablets</td>
<td>15.00</td>
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<td>VENOFLOW™ • 30 veg. caps</td>
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<td>00408</td>
<td>VENOTONE • 60 caps</td>
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<td>01327</td>
<td>VINPOCETINE • 10 mg, 100 veg. tablets</td>
<td>18.00</td>
<td>13.50</td>
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<td>00372</td>
<td>VITAMIN B3 NIACIN • 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 (Panthenolic Acid)</td>
<td>11.00</td>
<td>8.25</td>
<td>7.50</td>
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<tr>
<td>01535</td>
<td>VITAMIN B6 • 250 mg, 100 veg. caps</td>
<td>12.50</td>
<td>9.38</td>
<td>8.25</td>
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<tr>
<td>00361</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 w/DIHYDROQUERCETIN 1,000 mg, 60 veg. tablets</td>
<td>10.00</td>
<td>7.50</td>
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<td>00927</td>
<td>VITAMIN C w/ DIHYDROQUERCETIN 1,000 mg, 250 veg. tablets</td>
<td>27.00</td>
<td>20.25</td>
<td>18.00</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>
<td>19.00</td>
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<tr>
<td>01736</td>
<td>VITAMIN C-MAGNESIUM CRYSTALS (EFFERVESCENT) 180 grams</td>
<td>20.00</td>
<td>15.00</td>
<td>13.50</td>
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<tr>
<td>01732</td>
<td>VITAMIN D3 • 2,000 IU, 1 fl. oz, Mint flavor</td>
<td>28.00</td>
<td>21.00</td>
<td>18.75</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>
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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-IODINETM • 5,000 IU, 60 caps</td>
<td>14.00</td>
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<tr>
<td>00984</td>
<td>VITAMIN D3 LIQUID • 2,000 IU, 1 fl. oz</td>
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<td>21.00</td>
<td>18.75</td>
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<td>02040</td>
<td>VITAMINS D AND K W/SEA-IODINETM • 60 caps</td>
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<td>01863</td>
<td>VITAMIN E (Natural) • 400 IU, 90 softgels</td>
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<tr>
<td>01936</td>
<td>VITAMIN K2 (Low dose) • 45 mcg, 90 softgels</td>
<td>18.00</td>
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<tr>
<td>01902</td>
<td>WAIST-LINE CONTROL™ • 120 veg. caps</td>
<td>42.00</td>
<td>31.50</td>
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### SUBTOTAL OF COLUMN 12

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<th>ITEM No.</th>
<th>PRODUCT</th>
<th>Retail Each</th>
<th>1 Unit Each</th>
<th>4 Unit Each</th>
<th>10 Unit Each</th>
<th>QTY Total</th>
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<tbody>
<tr>
<td>01919</td>
<td>X-R SHIELD • 90 veg. caps</td>
<td>15.00</td>
<td>11.25</td>
<td>9.75</td>
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<tr>
<td>00409</td>
<td>XYLWHITETM MOUTHWASH • 16 oz</td>
<td>10.00</td>
<td>7.50</td>
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</tbody>
</table>

### BOOKS

33998 THE RIGHT TO TRY by Dan Buettner • 2016 26.99 20.24
33885 THE BLUE ZONES SOLUTION by Dan Buettner • 2015 26.00 19.50
33877 THE TRUTH ABOUT MEN AND SEX by Abraham Morgentaler, MD, FACS • 2015 16.99 12.74
33875 DOCTORED: THE DISILLUSIONMENT OF AN AMERICAN PHYSICIAN by Darcy Olsen • 2016 26.00 19.50
33874 MISSING MICROBES by Martin J. Blaser, MD • 2014 28.00 21.00
33873 EATING ON THE WILD SIDE by Jo Robinson • 2014 16.00 12.00
33870 DISEASE PREVENTION AND TREATMENT, EXPANDED FIFTH EDITION (Hardcover) • 2014 69.95 39.95 36.00
33865 THE RESTORATION OF THE HUMAN BODY [IN 7 PARTS] by Sergey A. Dzugan, MD, PhD • 2014 29.95 22.46
33862 I'M TOO YOUNG FOR THIS by Suzanne Somers • 2013 26.00 19.50

### SUBTOTAL OF COLUMN 11

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* * * Due to license restrictions, this product is not for sale to customers outside of the USA.
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† † 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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7 Illogical Position of American Heart Association
The American Heart Association states that there is a “lack of scientific research” to support use of fish oil in the general population. We refute this irrational position.

50 Anti-Aging Effects of NAD⁺
Restoration of NAD⁺ has been shown in lab experiments to increase lifespan by the human equivalent of 4 years.

62 More Reasons to Take Fish Oil
Fish oil is associated with 14% reduced human mortality along with protection against neurodegeneration, metabolic disorders, and persistent inflammation.

26 Reverse Major Factor in Degenerative Aging
AMPK facilitates life-extending functions and reduces abdominal fat. Two plant compounds help restore youthful AMPK activity.

40 Probiotics Fight Winter Flu
An innovative probiotic cocktail boosts the body’s immune defenses against winter cold and flu while reducing the severity of an attack.

75 Green Tea Protects Against Colorectal Cancer
Recent studies show that green tea blocks formation of colorectal-cancer stem cells. Green tea extract was found to reduce colorectal cancer risk in humans.