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28 ARTERIAL PLAQUE RUPTURE
Sudden heart attack or stroke can be caused by acute rupture of soft arterial plaque. A human study published in December 2016 corroborates previous clinical research showing dramatic reductions in markers of atherosclerosis, along with stabilizing rupture-prone arterial plaque.

49 RESEARCH UPDATE: COQ10 FIGHTS STATIN-INDUCED DIABETES
Cholesterol-lowering drugs known as statins can increase risk of type II diabetes. New findings reveal how coenzyme Q10 can help protect against statin-induced insulin resistance.

54 COMBAT SUGAR TOXICITY
When sugar (glucose) reacts with the body’s proteins, the resulting tissue glycation accelerates aging. There are a number of strategies that reduce toxic glycation reactions and help overcome their consequences.

66 THE RIGHT EXERCISE INHIBITS COGNITIVE DECLINE
Exercise enhances brain function as we age. Strength-training exercise can boost cognition and fight memory decline.

7 SHOULD YOU EAT BEFORE A BLOOD TEST?
Up until now, people have been told to fast for 8 to 12 hours prior to having their blood drawn. Newly published medical data indicates a more realistic reading may be obtained when blood is drawn 2 to 6 hours after a normal meal.

19 IN THE NEWS
Triglycerides increase kidney disease risk; vitamin D protects brain cells; painkillers linked to heart failure; resveratrol improves ulcerative colitis; and vitamin D deficiency ups risk of bladder cancer.

77 SUPER FOODS: OATS
Providing more soluble fiber than any other grain, oats have shown a vast range of health benefits that include lower LDL cholesterol, increased satiety, reduction in blood pressure, and a lower risk of colorectal cancer.

79 ASK THE DOCTOR: DR. SCOTT FOGLE—INNOVATIVE NEUROTRANSMITTER TEST
Healthy neurotransmitter levels ensure optimal brain function. In this interview, Dr. Scott Fogle describes an innovative new test that can measure neurotransmitter levels and how to help rebalance these valuable brain messengers.

87 WELLNESS PROFILE: MICHAEL RAY GARVIN—WORLD’S MOST JACKED ATHLETE
Former NFL player Michael Ray Garvin is a dedicated power-trainer who has been a supplement-user since the age of 14. In his books, The World’s Most Jacked Athlete and Jacked Athlete Supplement Manual, trainer, author, and speaker Garvin describes his essential supplements for athletic health.

95 AUTHOR INTERVIEW: CASE REPORT ON SUCCESSFUL MULTIMODEL APPROACH TO FIGHTING LEUKEMIA
In his new book, N of 1, Glenn Sabin documents his remarkable journey from a bleak diagnosis of “incurable” chronic lymphocytic leukemia—through two decades of his unique program of diet, exercise, stress reduction, herbs, and supplements—to tests now showing no trace of leukemic cells at all.
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As We See It

Annual blood testing is the most effective way of detecting imbalances in time to take corrective actions. Countless lives have been spared since people started checking their blood before serious illness develops.

Until recently, the consensus was that people had to fast for 8 to 12 hours prior to having their blood drawn. Before describing studies indicating that fasting may not be required, let’s look at this issue from a practical standpoint.

Most people eat throughout the day and are never in a fasting state. The only exception is the 8-12 hour period prior to a blood test. Results obtained when blood is drawn during this fasting period may not reflect what’s in your blood under normal conditions. This can lead to a false sense of security.

For instance, glucose and triglyceride levels increase after you eat. As it relates to disease risk, how quickly they come down after you finish a meal is important.

Some data suggest that after-meal blood levels of glucose and triglycerides are more accurate predictors of disease risk.1-4

Fasting and non-fasting blood sugar levels impact health and longevity. As you’ll learn in this article, many aging individuals suffer sugar-inflicted damage despite fasting glucose being “normal.”

Triglycerides rise in the blood after a meal and can remain dangerously high for many hours.

If one fasts 8-12 hours before a blood draw, triglycerides may appear artificially low compared to where they may be during typical non-fasting periods. This again can create a false sense of security regarding your cardiovascular risk.

Some people neglect having their blood tested because they cannot fast for an 8-12 hour period.

The encouraging news is that for many individuals, a more realistic reading may be obtained when blood is drawn 2-6 hours after a normal meal is consumed.

This article provides a novel rationale for what may become the new optimal time to have your blood drawn.
As We See It

If you are a participant in a clinical study to assess the effects of a drug on blood fat or sugar levels, it is important for you to not eat for 8-12 hours before your scheduled blood draw.

The reason fasting is important in this instance is to provide researchers with consistent data on the compound they are testing amongst a large study group.

From the standpoint of optimizing your health, you are not part of a study group. Your purpose for having blood tests is to identify hidden risk factors that are correctable before you are stricken with illness or sudden death.

Some credentialed physicians have concluded that individuals do not need to fast before their blood is drawn. They point to studies showing that cholesterol and LDL levels are not significantly altered in most people based on when their blood is drawn (fasting or non-fasting).5,7

In addition, emerging data suggests that after-meal blood levels of triglycerides and glucose may be more important indicators of disease risk than corresponding fasting levels.1,4

What Are Triglycerides?

Like other types of fats, triglycerides are carried in the bloodstream by lipoproteins. Triglyceride-rich lipoproteins contribute to the build-up of plaque in our arteries (atherosclerosis).

The fats we consume in our diet are mainly composed of triglycerides. Therefore, following a fatty meal, blood levels of triglycerides will rise.8

High triglyceride levels increase heart attack and ischemic stroke risk.9,10

Post-prandial (after-meal) disorders are characterized by fat (and glucose) that persists in the bloodstream many hours after eating. Postprandial disorders are major causes of heart disease and stroke.11,12

As you eat a meal of, say, steak, buttered rolls, and cream in your coffee, fats contained in these foods are absorbed into your circulatory system.

Six hours later, the remnants of your meal should be history. Clearance of fat present in your meal ought to be quick and efficient. After six hours, high levels of absorbed lipids should not be in your bloodstream.

In some people, however, meal remnants (lipoproteins) persist in the blood many hours later. The longer they stick around, the more opportunity they have to trigger growth of atherosclerotic plaque.

Clinical studies show that postprandial triglyceride-rich lipoproteins (like VLDL cholesterol) are powerful instigators of coronary plaque, carotid plaque, and aneurysms of the aorta.11,13,14

After-Meal Triglycerides Affect Lipoproteins

Triglycerides are a principal component of postprandial lipoproteins like VLDL.25

Post-meal increases in lipids appear in the blood soon after you begin eating, but usually dissipate by the time your blood is drawn in a “fasting” state (8-12 hours later).

Postprandial disorders are therefore frequently overlooked, and rarely enter into a doctor’s assessment of vascular disease risk. Although their presence may not be apparent from a fasting blood sample, elevated increases in postprandial lipoproteins can be a critically important risk factor for vascular disease.

The danger of after-meal remnants remaining in your blood is one reason why Life Extension® is now suggesting that people consider having their blood drawn 2-6 hours after a normal meal, be it breakfast or lunch. The box on the next page describes some of the mechanisms by which high levels of postprandial lipoproteins damage our arteries.
Elevated fasting triglycerides can serve as an indirect index of increased postprandial lipoproteins.26 If fasting triglycerides are high, postprandial lipoproteins are likely to be present. If after-meal triglycerides are high, this is an even stronger indicator of greater postprandial lipoproteins.

Simply put, the higher your triglycerides, the more likely postprandial lipoproteins are also present, potentially putting you at risk for atherosclerotic disease. However, fasting triglycerides may not be the best way of assessing your atherosclerotic risk. Some people can have fasting triglyceride levels of less than 100 mg/dL, yet still have dangerously high daily levels of postprandial lipoproteins.20

Having your blood drawn in a non-fasting state may provide a better snapshot of what your blood consists of on a normal day.

On blood samples drawn 4-6 hours after a meal, triglycerides over 250 mg/dL indicate a postprandial lipoprotein problem.27,28

**FDA’s Absurd Position**

We at Life Extension® have argued for the past four decades that optimal triglyceride levels are under 100 mg/dL. The American Heart Association in recent years concurs with our position.

Until a federal judge intervened, the FDA was able to claim that triglyceride levels between 200-499 mg/dL had not been proven to increase vascular disease risk.

I wrote a detailed rebuttal to the FDA’s unscientific position in the May 2016 edition of this publication. Relying on federal government health guidelines can be analogous to living in the medical Dark Ages.

**A Hidden Cause of Vascular Disease**

When lipoproteins like VLDL and chylomicrons linger in the blood for many hours after eating, they are afforded ample opportunity to exert damaging effects on vascular structures. Here are some mechanisms in which high after-meal fats (lipoproteins) accelerate atherosclerosis:

- **Postprandial lipoproteins** block the artery-relaxing agent known as nitric oxide, while increasing the artery constrictor called endothelin. This induces endothelial dysfunction,12,15 which contributes to the formation of atherosclerotic plaque.16
- **Postprandial lipoproteins** increase blood levels of cellular adhesion molecules, allowing inflammatory white blood cells to more readily adhere and gain entry to the arterial wall, which also leads to atherosclerotic plaque formation.17
- **Postprandial lipoproteins** activate blood clotting by increasing factors that both promote blood clotting (thrombosis) and inhibit clot breakdown.18
- **Postprandial lipoproteins** trigger the formation of a cascade of other abnormal lipoprotein particles that contribute to heart and vascular disease, such as small, dense lipoprotein (small LDL) particles.19
- **Postprandial lipoprotein** particles insert themselves into atherosclerotic plaque, fueling its growth.20
- Carotid ultrasound studies show that people with elevated postprandial lipoproteins have more carotid plaque than people who do not, independent of their cholesterol values.21,22
- **Postprandial lipoproteins** predict a greater likelihood of coronary atherosclerotic plaque. People with excessive postprandial (after-meal) abnormalities experience more rapid arterial plaque growth.23,24
Impact of After-Meal Glucose

We’ve published many articles in Life Extension Magazine® about the lethal impact of high after-meal blood sugar levels.

When blood sugar spikes too high after eating and remains elevated, this presents a significant mortality risk factor. These kinds of surges in after-meal glucose (sugar) are associated with prediabetes and diabetes. 

Reducing after-meal glucose levels has the potential to help prevent many common aging disorders.

Elevated glucose promotes cardiovascular disease and is associated with an increased risk of dementia, cancer, worse outcomes in cancer patients, and accelerated aging. 

Researchers have found that increased two-hour postprandial (after-meal) glucose is an independent risk predictor for cardiovascular and all-cause death. During this postprandial period, blood sugar spikes can acutely impair blood flow through vital arteries. This can ultimately lead to heart attack or stroke.

**After-meal** surges in blood sugar directly impair the arteries’ ability to respond to the heart’s demand for an immediate increase in blood flow.

This is one reason that diabetics have such a high prevalence of cardiovascular disorders. But even if you don’t have diabetes, a “normal” fasting blood sugar measurement doesn’t protect you against the harmful effects of after-meal glucose spikes.

People who have normal fasting glucose, but whose glucose levels remain high two-hours after a sugar-laden test drink are diagnosed with “impaired glucose tolerance.” The risk for cardiovascular disease rises sharply in those with impaired glucose tolerance.

One study found that people with impaired glucose tolerance had a 34% higher risk of dying from any form of cardiovascular disease, with a specific 28% greater risk of dying from coronary heart disease.

Diabetic men with the highest after-lunch blood sugar levels are more than twice as likely to have a cardiovascular event, compared with those with lower levels. In women, that figure rose to a startling 5.5-fold increase.

In non diabetic people with metabolic syndrome, every increase in after-meal blood sugar of 18 mg/dL raised the risk of cardiovascular death by 26%.

These data clearly show that assessing one’s glucose status two or more hours after a normal meal provides critically important information as to one’s underlying disease risk.

**Cancer and Brain Shrinkage**

High-normal blood glucose and elevated insulin increases risk of breast cancer.

Glucose provides fuel for rapidly dividing cancer cells, while insulin promotes tumor growth through multiple pathways.

In a 19-year study, researchers found that participants with impaired fasting glucose of 100 mg/dL or greater had a 49% greater risk of cancer death.

Those with after-meal glucose above 199 mg/dL had 52% increased cancer death risk. Elevated glucose levels markedly increase an individual’s risk of dying from cancer.

Glucose levels deemed “high-normal” result in reduced brain volume. A study of 249 volunteers (age early 60s) demonstrated that blood glucose in the high-normal range results in significant brain shrinkage. This shrinkage occurs in regions of the brain involved in memory and other critical functions.

What may surprise you is that it did not require very “high” glucose levels to cause brain shrinkage. The people in this study classified as having “high” fasting blood sugar levels were below...
Blood cell counts and assessments of liver and kidney function are unlikely to be significantly affected based on when you ate prior to a blood draw.

When it comes to homocysteine, however, there may be an advantage to having your blood drawn several hours after you eat as opposed to an overnight fast.

The precursor to homocysteine in the blood is the amino acid methionine. Those who ingest red meat often have sharp spikes in homocysteine levels throughout the day, but returned to baseline levels the next morning (after an overnight fast). This study has profound implications as it relates to assessing the vascular risk of homocysteine. Numerous studies associate high homocysteine with greater incidence of heart attack and stroke. Yet there are inconsistent findings when attempts to lower homocysteine are taken.

A huge overlooked confounding factor is that men who consume a lot of red meat may have elevated homocysteine throughout the day, but it drops to normal the next morning. This would drastically affect the findings of human studies whereby blood draws occur after an overnight fast.

In this case, men who suffered elevated homocysteine almost every day would show normal readings each morning.
would seriously distort the study analysis because men with elevated homocysteine during the day would be placed in the same group whose homocysteine was lower all day. These men with high daily homocysteine are not in safe ranges. They merely measured artificially low because of the overnight fast.

For those who consume a lot of red meat, consider having your blood tested 2-6 hours after the meal while also taking your usual homocysteine-lowering supplements such as folate (5-MTHF form) along with vitamins B2, B6 and B12.

What You Should Do

Standard blood tests are usually done in the fasting state.

Yet a number of studies show that elevated after-meal blood levels of triglycerides and glucose are dangerous. Ditto for homocysteine that may test normal after an overnight fast, but elevate during a day of high meat ingestion.

Fasting glucose levels alone do not identify individuals with an increased risk of glucose-related disease because they do not detect dangerous after-meal glucose spikes.

The current method of drawing blood only when “fasting” may not adequately measure an individual’s average glucose, triglyceride, homocysteine and postprandial lipoprotein status over the course of a typical day.

By definition, fasting blood tests are conducted eight or more hours after your last meal. This method of only testing blood when in an artificial “fasting” state may not account for vital risk markers specific to you as an individual. In other words, after each meal, your blood sugar and triglycerides will rise, but should return to normal several hours afterwards.

Depending on the consistency and frequency of meals consumed, an individual may silently sustain tissue injuries throughout a typical day that are not detected when blood is drawn after an 8-12 hour fast.

Conventional dogma is difficult to change, even when common sense and compelling science indicates a better approach.

Based on an accumulating volume of data, consider having your next blood draw in a non-fasting state, as close as possible to what you typically eat and drink on most days (including physical exercise).

Blood Test Super Sale

In 1996, we initiated a low-cost service whereby our members could directly request their own blood tests.

Once a year, we sharply discount the price of our comprehensive Male or Female Blood Test Panels. This enables readers of this magazine to ascertain their disease risk status and initiate preemptive measures before acute illness strikes.

Glucose, homocysteine, and triglycerides are included in these tests, along with a hemoglobin A1C test to help assess long-term glucose control.

As you can readily see on the next page, the large number of tests including sex hormone status provides a comprehensive review of one’s underlying health.

The retail price for these individual tests can be quite high at commercial labs. We offer them for only $199 during the annual Blood Test Super Sale.

As with any purchase, blood tests qualify for Reward Dollars that lower your future cost of supplements.

Upon receiving your order, we immediately send a requisition and list of blood draw stations in your area. You can usually walk in for your blood draw at a time convenient to you. This year we are advising that most people consider having their blood draw done 2-6 hours after a typical meal.

We understand that many of you may want to continue having your blood drawn in a fasting state. The conclusion of a 2016 study showing that fasting is not routinely required prior to lipid testing stated:

“We recommend that non-fasting blood samples be routinely used for the assessment of plasma lipid profiles... non-fasting and fasting measurements should be complementary but not mutually exclusive.”

Whether you have your blood drawn while fasting or non-fasting, our Wellness Specialists are available to assist you in understanding the results, which come back very quickly nowadays.

To order the Male or Female Blood Test Panel at these discounted prices, call 1-800-208-3444 (24 hours/day).

For longer life,

William Faloon
Unlike commercial blood labs that test only a few risk factors, Life Extension®’s Male and Female Blood Test Panels measure a wide range of blood markers that predispose people to age-related diseases. Just look at the huge number of parameters included in the Male and Female Blood Test Panels:

**MALE PANEL**

**LIPID PROFILE**
- Triglycerides
- Total Cholesterol
- LDL (low-density lipoprotein)
- HDL (high-density lipoprotein)

**CARDIAC MARKERS**
- Homocysteine
- C-Reactive Protein (high sensitivity)

**METABOLIC PROFILE**
- Glucose
- Hemoglobin A1c
- Kidney function tests: creatinine, BUN, uric acid, BUN/creatinine ratio
- Liver function tests: AST, ALT, LDH, GGT, bilirubin, alkaline phosphatase
- Blood minerals: calcium, potassium, phosphorus, sodium, chloride, iron
- Blood proteins: albumin, globulin, total protein, albumin/globulin ratio

**COMPLETE BLOOD COUNT (CBC)**
- Red Blood Cell count including: hemoglobin, hematocrit, MCV, MCH, MCHC, RDW
- White Blood Cell count including: lymphocytes, monocytes, eosinophils, neutrophils, basophils
- Platelet count

**CANCER MARKER**
- PSA (Prostate Specific Antigen)

**HORMONES**
- Free and Total Testosterone
- DHEA-S
- Estradiol (an estrogen)
- TSH (thyroid function)
- Vitamin D (25-hydroxyvitamin D)

**FEMALE PANEL**

**LIPID PROFILE**
- Triglycerides
- Total Cholesterol
- LDL (low-density lipoprotein)
- HDL (high-density lipoprotein)

**CARDIAC MARKERS**
- Homocysteine
- C-Reactive Protein (high sensitivity)

**METABOLIC PROFILE**
- Glucose
- Hemoglobin A1c
- Kidney function tests: creatinine, BUN, uric acid, BUN/creatinine ratio
- Liver function tests: AST, ALT, LDH, GGT, bilirubin, alkaline phosphatase
- Blood minerals: calcium, potassium, phosphorus, sodium, chloride, iron
- Blood proteins: albumin, globulin, total protein, albumin/globulin ratio

**COMPLETE BLOOD COUNT (CBC)**
- Red Blood Cell count including: hemoglobin, hematocrit, MCV, MCH, MCHC, RDW
- White Blood Cell count including: lymphocytes, monocytes, eosinophils, neutrophils, basophils
- Platelet count

**HORMONES**
- Progesterone
- Estradiol (an estrogen)
- Free and Total Testosterone
- DHEA-S
- TSH (thyroid function)
- Vitamin D (25-hydroxyvitamin D)

**Blood Test Super Sale • March 27 through June 5, 2017.**

Retail price: $400
Your Price: $199

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

Then—at your convenience—you can visit one of the blood-drawing facilities provided by LabCorp in your area or at the Life Extension Nutrition Center in Ft. Lauderdale.

Blood testing services are available only in the continental United States and Anchorage, AK. Not available in Maryland. Restrictions apply for residents of MA, NY, NJ, RI, and PA.


FIVE EASY STEPS FOR ORDERING BLOOD TESTS:

1. Call 1-800-208-3444 to discuss and place your order with one of our knowledgeable Wellness Specialists. This order form can also be faxed to: 1-866-728-1050. Online orders can also be placed at www.LifeExtension.com/labtesting
2. After your order is placed, you will be mailed either a requisition form to take to your local LabCorp Patient Service Center or a Blood Draw Kit, whichever is applicable. (Please note: If a blood draw kit is used, an additional local draw fee may be incurred.)
3. Have your blood drawn.
4. Your blood test results will be mailed, emailed, or faxed directly to you by Life Extension.
5. Take the opportunity to discuss the results with one of our knowledgeable Wellness Specialists by calling 1-800-226-2370; or review the results with your personal physician.

IT’S THAT SIMPLE!
DON’T DELAY! CALL TODAY!

For Our Local Customers:
For those residing in the Ft. Lauderdale, Florida, area, blood-draws are also performed at the Life Extension Nutrition Center from 9:00 am to 2:00 pm Monday through Saturday. Simply purchase the blood test and have it drawn with no wait! Our address is:
5990 NORTH FEDERAL HIGHWAY, FT. LAUDERDALE, FL, 33308-2633

Terms and Conditions
This blood test service is for informational purposes only and no specific medical advice will be provided. National Diagnostics, Inc., and Life Extension contract with a physician who will order your test(s), but will not diagnose or treat you. Both the physician and the testing laboratory are independent contractors and neither National Diagnostics, Inc., nor Life Extension will be liable for their acts or omissions. Always seek the advice of a trained health professional for medical advice, diagnosis, or treatment. When you purchase a blood test from Life Extension/National Diagnostics, Inc., you are doing so with the understanding that you are privately paying for these tests. There will be absolutely no billing to Medicare, Medicaid, or private insurance.
This panel looks at vascular inflammatory biomarkers, the NMR Liproprofile® directly measures LDL particle size and number as well as HDL particle number, total cholesterol, and triglycerides. It also provides a calculation of one’s risk of insulin resistance by assessing abnormalities in lipoprotein markers.

**ADVANCED OXIDIZED LDL PANEL***(LC100035)**

This panel looks at vascular inflammatory biomarkers, beginning with lifestyle choices to the development of metabolic and cardiovascular disease as well as the formation of vulnerable plaque. The panel contains the following tests: F2-Isoprostanes, Myeloperoxidase and Oxidized LDL.

This test requires samples to be shipped to the lab on dry ice for customers using a Blood Draw Kit and will incur an additional $35 charge. If the customer is having blood drawn at a LabCorp facility, this extra charge does not apply.

**DIABETES MANAGEMENT PROFILE – COMPREHENSIVE (LC100040)**

Hemoglobin A1C • Glucose • Insulin • Lipid Panel • Glycmark

With Your Healthy Rewards, you earn LE Dollars back on every purchase you make — including blood tests! See [www.LifeExtension.com/Rewards](http://www.LifeExtension.com/Rewards) for details.

This is NOT a complete listing of LE blood test services. Call 1-800-208-3444 for additional information.
Maintain Healthy Blood Sugar Levels

Tri Sugar Shield® contains natural ingredients that help:

- Maintain already healthy blood sugar levels
- Promote insulin sensitivity
- Support healthy glucose metabolism

To order Tri Sugar Shield®, call 1-800-544-4440 or visit www.LifeExtension.com

Tri Sugar Shield®
Item #01803
60 vegetarian capsules

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For additional product information visit www.lifeextension.com/Vitamins-Supplements/item01803/Tri-Sugar-Shield

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.
Kidney Disease Risk Raised by High Triglycerides and Low HDL

A study published online in *Diabetes Care* has found an association between high levels of triglycerides, low levels of HDL (“good” cholesterol) and increased risk of diabetic kidney disease.*

The observational retrospective study, conducted by a team headed by Giuseppina T. Russo, MD, PhD, of Italy’s University of Messina, involved 15,362 diabetes patients. The subjects started at baseline with kidney function tests in the normal range and LDL cholesterol no higher than 130 mg/dL.

The study found a correlation between high triglyceride levels at or above 150 mg/dL and a 26% increased risk of reduced kidney function as measured by low eGFR (estimated glomerular filtration rate).

In addition, scientists saw increased risk of kidney disease in those that had low levels of HDL (the good cholesterol). Individuals with lower-than-normal HDL experienced a 27% increased risk of low eGFR.

*Editor’s Note:* The study’s authors state that, “In a large population of outpatients with diabetes, low HDL-C and high TG levels were independent risk factors for the development of diabetic kidney disease over four years.”

* *Diabetes Care.* 2016 Dec;39(12):2278-87.
In The News

Low Vitamin D Linked to Cognitive Decline

Vitamin D has long been thought to protect against loss and damage of the brain’s neurons, and new research confirms that idea.∗

A study from Duke University has found an association between low levels of vitamin D and an increased risk of impairment and cognitive decline in elderly subjects.

More than 1,200 participants 60 years or older from the Chinese Longitudinal Health Longevity Survey were involved in the first large-scale prospective research in Asia. Baseline vitamin D levels were measured at the beginning of the study and cognitive abilities were observed over the next two years.

The results showed that those with lower vitamin D were about twice as likely to show significant indications of cognitive decline over the course of the study. Participants’ gender and specific age had no bearing on the results.

Editor’s Note: This study should prompt further research into the precise mechanism by which vitamin D protects neurons, as it could lead to the discovery of treatments and interventions to fight the growing rate of cognitive decline seen in the elderly.

Resveratrol has Benefits for Ulcerative Colitis

The Archives of Medical Research reported the outcome of a randomized pilot study that found a benefit for supplementing with resveratrol in adults with ulcerative colitis, a disease which causes painful inflammation and sores in the colon and rectum.*

The study included 56 participants diagnosed with active mild to moderate disease. Subjects were randomized to receive 500 mg of resveratrol or a placebo daily for six weeks. At the end of the study, participants who received a placebo experienced a decrease in the antioxidant SOD (superoxide dismutase) and an elevation in MDA (malondialdehyde, a marker of oxidative stress) in comparison with levels measured prior to the intervention.

However, among those who received resveratrol, MDA was significantly lower and total antioxidant capacity and SOD were higher compared to pretreatment levels and to levels measured in the placebo group at the end of the study.

Treatment with resveratrol was associated with decreased disease activity and improved quality of life compared to the placebo group.

Editor’s Note: Ulcerative colitis “can occur and develop notably as a result of oxidative stress by reactive oxygen species,” according to the authors of the report.

Popular Painkillers Raise Risk of Heart Failure

A study based on healthcare databases in four countries has found that the use of over-the-counter painkillers such as piroxicam, diclofenac, and naproxen can lead to a significantly higher risk of being hospitalized with heart failure.*

Researchers analyzed medical records from Italy, Germany, the Netherlands and the United Kingdom of close to 10 million adults who had taken nonsteroidal anti-inflammatory drugs (NSAIDs). They found that those subjects’ chances of being admitted to a hospital with heart failure were, on average, 19% higher compared with people who avoided the medications.

Cardiology professor Gunnar Gislason of Copenhagen University Hospital observed, “Even a small increase in cardiovascular risk is a concern for public health... NSAIDs are widely available over the counter. This practice further fuels the common misconception that they are harmless drugs that are safe for everyone.” Gislason believes access to NSAIDs should be restricted.

The medical director of the British Heart Foundation, Professor Peter Weissberg, recommends that patients only take “the lowest effective dose for the shortest possible time.”

*BMJ. 2016 Sep 28;354:i4857.
Decreased Vitamin D and Elevated Bladder Cancer Risk

The conclusion of a systematic review reported at the Society for Endocrinology annual conference in Brighton, England, adds evidence to an association between vitamin D deficiency and an increased risk of bladder cancer.*

Dr. Rosemary Bland and colleagues reviewed seven studies whose subjects ranged in number from 112 to 1,125. Five of the studies found associations between decreased serum 25-hydroxyvitamin D levels and a higher risk of bladder cancer. Additionally, higher vitamin D levels were associated with improved bladder cancer outcomes and survival.

To investigate their hypothesis, the team evaluated the expression of vitamin D signaling components and synthesis of the active form of vitamin D in human transitional epithelial cells, which line the bladder. They discovered that the cells have the capacity to activate and respond to vitamin D, which then stimulates an immune system response.

Editor’s Note: “More clinical studies are required to test this association, but our work suggests that low levels of vitamin D in the blood may prevent the cells within the bladder from stimulating an adequate response to abnormal cells,” Dr. Bland explained. “As vitamin D is cheap and safe, its potential use in cancer prevention is exciting and could potentially impact the lives of many people.”

ArthroMax® Herbal Joint Formula

Promotes Joint Comfort and Cartilage Health

ArthroMax® Herbal Joint Formula contains plant extracts that have been shown to support the comfort of weight-bearing joints, such as hips and knees—and help support their cartilage structure as well.

Just two daily capsules of this new herbal formula provide:

Mobile-Ease™ Proprietary Blend 900 mg (white mulberry, Chinese skullcap, cutch tree)

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To order ArthroMax® Herbal Joint Formula, call 1-800-544-4440 or visit www.LifeExtension.com

CAUTION: Consult your healthcare provider before use if you are taking medication or have a medical condition. Do not use if pregnant, lactating, or under age 18.

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.
PROSTATE HEALTH
The best way to keep You in the picture.

As a man ages, maintaining a healthy prostate is key. We created Ultra Natural Prostate to help you maintain prostate health, so you can focus on what’s important. With over a dozen natural ingredients, this supplement promotes healthy prostate function, supports easier urination, inhibits inflammatory factors, and encourages natural division of prostate cells. Ultra Natural Prostate. The most comprehensive prostate health supplement.

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

For a complete list of ingredients, dosage and use, important cautions and references, go to www.LifeExtension.com.
To order either of the Rich Rewards® Antioxidant Coffees call 1-800-544-4440 or visit www.LifeExtension.com.

Rich Rewards® Breakfast Blend
Item #01609 • 12 oz bag

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Rich Rewards® Decaffeinated Roast
Item #01610 • 12 oz bag

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Most of a coffee bean’s polyphenol content is destroyed during the roasting process. Among the most beneficial of these polyphenols is chlorogenic acid, a potent inhibitor of the glucose-6-phosphatase enzyme that stimulates excess gluconeogenesis.

A Patented Organic Roast
Life Extension’s Rich Rewards® Breakfast Blend and Decaffeinated Roast are made using a patented, 100% natural process called HealthyRoast®. Rich Rewards® consists of 100% USDA certified organic arabica coffee beans.

Savory Taste Without Stomach Upset
The HealthyRoast® process also preserves special, naturally occurring compounds in coffee that soothe your stomach.

Tasty Decaf
With Rich Rewards® Decaffeinated Roast, you can limit your caffeine intake without compromising on flavor. The caffeine is removed through a chemical-free water process. It delivers the full flavor, aroma, and body of the arabica bean. Rich Rewards® Breakfast Blend contains up to 87% more chlorogenic acid than conventional decaffeinated coffees. Rich Rewards® Decaffeinated Roast contains up to 187% more chlorogenic acid than conventional decaffeinated coffees.

Comparison of Conventional Coffee to Life Extension’s Rich Rewards® Blend

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<th>Chlorogenic Acid</th>
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<td>Conventional Coffee (Decaffeinated)</td>
<td>46 mg</td>
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* US Patent 6,723,368.
**Vitamin D3**

*For Heart Health, Strong Bones, Skin Health, and a Vital Immune System*

Find the Formula That’s Right for You!
A simple, cost-effective blood test can help you identify your individual vitamin D needs. Life Extension’s huge selection of vitamin D supplements allows you to customize your dosage.

To order Vitamin D3 supplements, call 1-800-544-4440 or visit www.LifeExtension.com

---

**Vitamin D3 • 1,000 IU**
Item #01751 • 250 softgels
Ideal for smaller individuals who also obtain 2,000-3,000 IUs in a multi-formula

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**Vitamin D3 • 5,000 IU**
Item #01713 • 60 softgels
Ideal for most people who take a multi-formula that contains 2,000-3,000 IUs of vitamin D

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**Vitamin D3 • 5,000 IU With Sea Iodine™**
Item #01758 • 60 capsules
With 1,000 mcg iodine, this is ideal for those who may be iodine-deficient due to a salt-restricted diet

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**Vitamin D3 • 7,000 IU**
Item #01718 • 60 softgels
For individuals who need higher levels, including those who weigh over 180 pounds

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**Vitamin D3 • 2,000 IU (Natural Mint Flavor)**
Item #01732 • 1 ounce
Great for traveling or for those who have trouble swallowing a softgel or capsule

(Also available without mint. Item #00864)

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

*If you have a thyroid condition or are taking anti-thyroid medications, do not use without consulting your health care practitioner.*

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.
Arterial Plaque Rupture

Most people are aware that a buildup of plaque in coronary arteries leads to heart disease, the cause of more American deaths than any other ailment.

But few know that not all arterial plaque is the same. There is hard (calcified) plaque and soft (noncalcified) plaque.

Although both pose a risk, the soft kind is a ticking time bomb. When soft plaque suddenly breaks loose, it can trigger a clot blockage large enough to cause acute heart attack or stroke.

Because soft plaque is unstable and causes no symptoms until it pops without warning, someone with atherosclerosis may feel fine, have a normal EKG, and pass a stress test—and later that same day have a plaque rupture, resulting in sudden death.

Researchers have identified two natural compounds that target arterial plaque and atherosclerosis. Together, they have been shown to boost stability of deadly soft plaque to help prevent a plaque rupture, while also slowing and even regressing the accumulation of soft and hard arterial plaque.¹
Arterial Plaque—The Hidden Killer

Rupture-prone arterial plaques are more common than people realize.

In one cadaver study, advanced lesions, defined as rupture plaque or at least one vulnerable plaque were present in 100% of the hearts examined—regardless of the individuals' cause of death.2,3

Arterial damage can initiate in childhood and slowly progress with normal aging.4 Atherosclerosis—from the Greek words for “hard paste”—is an inflammatory condition in which the interior of the arteries becomes stiff, clogged, damaged, and dysfunctional.5,7

When the delicate lining of the inner arteries becomes damaged, low-density lipoprotein (LDL) and fibrinogen adhere and begin to trap other components.

As it builds up, plaque may cause the arterial wall to remodel and ultimately internally rupture, allowing a blood clot to form.8 Arterial clots (thrombosis) can block local blood flow completely, or they may break free and cause dangerous blockages elsewhere.

Plaque Stability: A Key Factor in Preventing Fatalities

When seeking to reduce atherosclerotic risk, there is more to it than just prevention of plaque formation, as most of the danger posed by plaque occurs when it becomes unstable.

Early in this process, plaques are soft on the inside, making them vulnerable to rupture, like a kernel of corn being heated until it explodes into much larger popcorn. Fortunately, the surfaces of soft plaques are covered with hard fibrous caps that face the blood flow.

As long as these plaques remain thick, they are stable, meaning they are firm enough not to pose a major risk of rupturing.2,9 Over time, however, this cap begins to thin and weaken, making the plaque more vulnerable to rupturing. The result is a deadlier, much more unstable, softer type of plaque that may lead to ischemic stroke or heart attack.

The effects of atherosclerosis vary, depending on which arteries in the body narrow and become clogged with plaque. If the arteries that bring oxygen-rich blood to the heart are affected, the result can be coronary artery disease, chest pain, or heart attack. If the arteries to the brain are affected, the result can be a transient ischemic attack (TIA) or a stroke. If the arteries in the arms or legs are affected, peripheral artery disease can occur. And at any point in the body, a deadly bulge in the artery wall—an aneurysm—can develop.

This is why scientists have long sought a way to safely lower acute cardiovascular risk not only by reducing plaque but by stabilizing soft plaques.

The December 2016 issue of the journal Minerva Cardioangiologica published a controlled clinical study demonstrating the plaque stabilizing effects of a dual-extract plant formula.

This study showed a standardized extract from the French maritime pine combined with an extract of the Centella asiatica plant stabilized soft plaques, boosting the odds that they will stay put and not suddenly rupture. These two nutrients also demonstrated reversal of the number and size of arterial plaque deposits that progress to atherosclerosis.1

This 2016 study confirmed earlier evidence demonstrating the arterial protective properties of these two nutrients.

Before examining this compelling clinical evidence, let’s examine each compound separately.

Centella Asiatica Stabilizes Soft Plaque

Also known as gotu kola, Centella asiatica contains triterpenoid compounds that help stabilize soft plaque by improving the synthesis of collagen,10-13 a component of the thick caps that hold soft plaque in place.10,14 This Asian aquatic plant also helps stop the progression of plaque buildup by reducing the adhesion of monocytes, immune system cells that promote atherosclerosis.15

In a previous human study, participants with high-risk (soft) plaque took 60 mg of an extract of Centella asiatica three times daily. After 12 months, their carotid-artery plaque was denser (harder) by an average of 30%.14

Phase two of this same study used the same dose but in a randomized, placebo-controlled trial. Carotid-artery plaque stability significantly improved. MRI scans showed reduced blood flow to the brain in 17% of controls but only in 7% of the Centella asiatica group. And supplemented subjects experienced 41% fewer cardiovascular events.14
A similar placebo-controlled study of individuals with high-risk (soft) plaque in their femoral (main leg) arteries found that 60 mg of an extract of Centella asiatica three times daily produced a 63% harder plaque—indicating a lower rupture risk—in just 12 months. Critically, plaque size increased 23% in controls while supplemented patients showed zero plaque-size increase.10

Let’s now examine standardized extract from the French maritime pine, a compound that reduces atherosclerosis progression.

**French Maritime Pine Extract Inhibits Plaque Accumulation**

Standardized extract from French maritime pine contains procyanidins and phenolic acids16,17 shown to slow atherosclerosis.18 It achieves this by reducing production of fat cells and inflammatory signaling molecules that contribute to plaque formation.19,20

Lab studies show that standardized extract from French maritime pine improves arterial endothelial function by stimulating an enzyme (eNOS) that produces nitric oxide, the signaling molecule that maintains arterial elasticity. This increase in nitric oxide not only improves blood flow but also decreases platelet aggregation and stickiness to vessel walls, reducing the risks of blood clots and enlarging plaques.21

A placebo-controlled human trial demonstrated that 200 mg of standardized extract from French maritime pine daily for eight weeks improved endothelial function in coronary artery disease patients, helping to limit atherosclerosis progression. Flow-mediated dilation—a measure of how much arteries dilate in response to blood-flow changes—was improved 32% in the supplemented group contrasting with no significant change in the controls. Also, only supplemented subjects experienced a 7% drop in isoprostanes, a marker of how much oxidized fat is present and overall oxidative stress.22

Scientists then studied individuals with only borderline issues with blood pressure, blood lipids, and blood sugar; with no obvious atherosclerotic changes in their blood vessels and no existing coronary artery disease—reflecting the situation of most people that have not developed any clinically relevant disease but had definitive risk factors, making them ideal candidates for a preventive intervention. All 93 volunteers continued any medical treatment for symptoms, but half also took 150 mg of standardized extract from French maritime pine daily. Flow-mediated dilation in supplemented subjects improved 66%—after only 12 weeks.23

Scientists then produced a formulation combining standardized extracts from French maritime pine and Centella asiatica, leading to compelling clinical trials.

**What You Need to Know**

**How to Prevent a Deadly Plaque Rupture**

- While hard plaque in the arteries limits blood flow, soft or noncalcified plaque can suddenly break loose and cause a blood clot large enough to cause a deadly heart attack or stroke.

- The natural compound Centella asiatica stabilizes the hard, thick cap on atherosclerotic plaques, which slashes the risk of a plaque rupture. Standardized extract from French maritime pine slows progression of atherosclerotic plaques.

- Clinical research demonstrates that, when combined, these two supplements reduce the size, number, and instability of deadly soft plaques, while slowing and even regressing plaque accumulation.
### Dual-Extract Formulation Targets Atherosclerosis

One clinical trial enlisted individuals ages 45 to 60 who appeared healthy with no cardiovascular risk factors or symptoms and with plaques that did not narrow their arteries more than 50% (class IV). Each group was assigned a different supplement regimen daily along with lifestyle, diet, education, and exercise recommendations. Ultrasound was used to measure plaques that had progressed from class IV to class V (blocking over 50% of an artery). After 30 months, the percentage of plaques progressing from class IV to V was:

- **21.3%** in controls, which followed only diet and lifestyle recommendations. (This was the worst performing group as it showed more than 20% had progressive arterial narrowing.)
- **16.6%** with 100 mg aspirin or ticlopidine (an antiplatelet drug) for aspirin-intolerant subjects,
- **8.4%** with 50 mg standardized extract from French maritime pine alone,
- **5.3%** with 100 mg standardized extract from French maritime pine alone,
- **4.0%** with 100 mg standardized extract from French maritime pine plus 100 mg aspirin (or ticlopidine), and
- **1.1%** with 100 mg standardized extract from French maritime pine plus 100 mg extract of *Centella asiatica*. (This was best performing group as it showed less than 2% had progressive inner arterial narrowing.)

Plaque progression in volunteers taking both compounds was an impressive 95% lower than in controls. Next, subjects with advanced atherosclerosis—at least one arterial lesion considered class V—but without symptoms were assigned to the same dosages as previously. Class V involves an instance of over-50% blockage without symptoms, while class VI also involves symptoms such as numbness, tingling, pain, or other, more serious cerebral or lower-limb symptoms. After 42 months, the percentage with plaques progressing from class V to VI was:

- **48%** in controls (worst performers in this study),
- **21%** with aspirin or ticlopidine,
- **11%** with 100 mg standardized extract from French maritime pine plus aspirin,
- **10%** with 100 mg standardized extract from French maritime pine alone, and
- **6.5%** with 100 mg standardized extract from French maritime pine plus 100 mg extract of *Centella asiatica* (best performers in this study).

Compared to controls, the standardized extracts from the French maritime pine plus *Centella asiatica* group showed a **7.4-fold reduction** in the risk of developing cardiovascular-disease symptoms—and a nearly **four-fold reduced risk** of being hospitalized for a full-blown cardiovascular event.

### Latest Human Trial Results

The study published in December 2016 added to the clinical evidence demonstrating the compelling effects of this dual-nutrient formula in stabilizing soft arterial plaques—to help prevent a potentially lethal **plaque rupture**—and in blocking the progression of **plaque accumulation** in aging arteries.

Scientists set out to evaluate the stability of carotid plaques, before and after three months of supplementation, in 50 symptom-free volunteers with arterial plaque stenosis of less than 50% (class IV), high oxidative stress, and with a mean age of 61.5 years.
Two natural compounds have been identified that target arterial plaque and atherosclerosis. Standardized extract from French maritime pine has been demonstrated to slow the progression of atherosclerotic plaques, while extracts of Centella asiatica have been found to preserve the hard, thick cap on atherosclerotic plaques—slashing the risk of a plaque rupture.

Clinical evidence now demonstrates that, taken together, these two supplements reduce the size, number, and instability of deadly soft plaques to help prevent plaque rupture—while also slowing and even regressing the accumulation of both soft and hard plaque.

Half of the patients were given 150 mg of standardized extract from French maritime pine along with 225 mg of an extract of Centella asiatica, daily for three months. They also received standard management care, as did the control group.1

Supplemented patients showed significant improvement on the plaque stability index compared to controls. They also experienced a substantial increase in the “white component” of their plaque based on ultrasound imaging, indicating improved plaque density and “a significant reduction in possible events.” Critically, their plaques were also decreased in length, height, and number. The scientists noted that free radicals in the supplemented group’s plasma were significantly reduced, indicating a decrease in oxidative stress. No supplement-related, adverse events were observed.

By contrast, there were no significant improvements in any of these endpoints for those receiving only standard plaque management.

The study concluded that these “...plant extracts could be a safe option for prevention of cardiovascular events for patients with carotid plaques.”

Summary

Not all arterial plaque is the same. Hard (calcified) plaque limits blood flow—but soft (noncalcified) plaque is a ticking time bomb that can suddenly break loose and trigger a clot large enough to cause a fatal heart attack or stroke.

References

1. Luzzi R, Belcaro G, Ippolito E. Carotid plaque stabilization induced by the supplement association Pycnogenol(R) and centella asiatica (Centellicum(R)). Minerva Cardioangiol. 2016;64(6):603-9.

Blood Test May Detect Presence of Soft Plaque

Published data suggests an association between elevated high-sensitivity CRP and soft plaque burden. A low-cost blood test called C-reactive protein can help identify those at risk for soft, rupture-prone arterial plaque.

Life Extension® long ago published data showing that people with low CRP blood levels (that often correspond to reduced chronic inflammation) have markedly lower rates of cancer and stroke.27,28

A high-sensitivity C-reactive protein (CRP) test is included in the Male and Female Blood Test Panels that many readers of this publication have performed annually.

These comprehensive blood tests can be ordered for just $199 during the annual Blood Test Super Sale that ends June 5, 2017.

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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.
The Risk of Arterial Plaque

Years of elevated cholesterol, chronic inflammation, and other factors often result eventually in atherosclerosis—the thickening and narrowing of arteries that leads to coronary heart disease (heart attack), stroke, and peripheral vascular disease.\(^6\) Research in recent years has produced a vastly more sophisticated understanding of the processes leading up to devastating arterial blockage by plaque lesions.

The foundation of plaque lesions begin even before the teen years with the development of fatty streaks—regions of increased fat in the walls of arteries.\(^5,25,26\) Initially, the small damaged fatty-streak areas trigger a "healing" response—as if the streak areas were a wound—attracting inflammatory cells that ingest and store excess fats.\(^21\)

Eventually, arterial plaque begins to take shape as a core of fats develops outside of inflammatory cells.\(^5,26\) These plaques become less stable over time, making them more vulnerable to rupture, which leads to heart attacks and strokes.

Whatever will slow the progression of early fatty deposits into complete plaque lesions is beneficial. Because soft plaques are unstable and can rupture, whatever can be done to stabilize these soft plaques makes the risk of a sudden catastrophic heart attack or stroke much less likely.

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For a complete list of ingredients, dosage and use, important cautions and references, go to 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.
Few people consistently eat enough **plant** foods to protect against common age-related decline. Commercial multivitamins do not provide vital plant components needed for good health. Life Extension Mix™ is superior to other multivitamins—partly because it provides a remarkably broad array of **fruit** and **vegetable** extracts. Rounding out the superiority is a comprehensive list of **vitamins**, **minerals**, **amino acids**, and more.

When Life Extension Mix™ was introduced in 1983, it provided the most efficient way to obtain higher-potency nutrients. Life Extension Mix™ has been upgraded over the past **33 years** to reflect many findings in the scientific literature. Life Extension Mix™ is the most comprehensive, high-potency daily multivitamin.

### LIFE EXTENSION MIX™

**315 TABLETS** • ITEM #02155

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The tablet version of Life Extension Mix™ contains **190 mg** of niacin and **1 mg** of copper. There is an extra-niacin version that provides **336 mg** of niacin at no additional charge (02157). Niacin maintains healthy cholesterol, triglyceride, and fibrinogen levels in those within normal ranges. Those with underlying liver disease sometimes cannot tolerate niacin. The suggested dose is 9 tablets per day in divided doses with meals.

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The encapsulated version of Life Extension Mix™ used by many customers provides **1 mg** of copper. These capsules are also available without copper (02166). The suggested dosage is 14 capsules per day in divided doses with meals.

### LIFE EXTENSION MIX™

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The powder version of Life Extension Mix™ contains **1 mg** of copper. This powder version is also available without copper (02166). The suggested dose is three scoops per day in divided doses with meals.

To order your supply of LIFE EXTENSION MIX™, call **1-800-544-4440** or visit [www.LifeExtension.com](http://www.LifeExtension.com)

References

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Arterial Protect provides a combination of patented and tested ingredients documented to support the body’s ability to control arterial plaque formation.

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Non-GMO

Reference

Note: Do not change dosing or discontinue cardiovascular medications unless advised to do so by your physician.

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The human mouth is teeming with bacteria that can cause dental cavities and more serious gingivitis and periodontitis. Even good oral hygiene habits of brushing and flossing twice a day might not be enough to ward them off.

Nearly a third of US adults have untreated tooth decay, and nearly half of those 30 and older have periodontal (gum) disease.\(^1\,\,2\)

Gum disease can be serious. As it progresses, it can lead to tooth loss, as well as inflammation that accelerates degenerative aging processes.\(^3\) Gum disease can lead to heart problems, cancer, Alzheimer’s, lung and kidney disorders, and more.\(^4\,\,14\)

Scientists looking for a solution to gum disease and tooth decay have discovered an innovative way to reduce the risk through targeted oral probiotic lozenges.
**The Oral Microbiome**

The natural community of microbes living in the mouth is called the **oral microbiome**. A healthy microbiome supports and protects the delicate mucous membranes as well as the surface of the teeth themselves.

When this community becomes disrupted and out of balance—whether by poor diet, lifestyle, drugs, or disease—it results in a state of microbial imbalance (called **dysbiosis**), which wreaks havoc on the normal immune system response.

**Dysbiosis** leads to numerous problems in the mouth, including **cavities** that arise from excessive acid-producing bacteria, and **gum disease** that contributes to tooth loss as well as inflammatory diseases throughout the body.

The need to restore a healthy oral microbiome led scientists to identify two strains of **good bacteria** that can combat gum disease on two fronts. The first one, **L. plantarum L-137**, boosts oral immune function and promotes healing. The second one, **S. salivarius M18**, kills harmful bacteria that live in the mouth, allowing itself to flourish.15-17

This **two-pronged** approach to gum disease prevention supports a healthy, balanced microbiome in the mouth, one that actively resists disease while promoting healing.

---

**Harnessing Natural Immune Responses**

One of the key problems with an imbalanced oral microbiome is that it reduces the mouth’s natural immune-fighting abilities. This leaves us vulnerable to infections by bacteria that cause gum disease, such as *Porphyromonas gingivalis*.

Making matters worse, *P. gingivalis* diminishes the mouth’s immune system even further by downregulating protective *IL-12* and upregulating pro-inflammatory *IL-6*, creating a vicious cycle that makes it nearly impossible for the body to heal itself.18-20

In order to counteract this disease-promoting cycle, scientists searched for a way to boost local immune function. They found their answer in the harmless bacterium **Lactobacillus plantarum**, strain L-137.17 When killed by heat treatment, this strain of *L. plantarum* has been found to increase production of the protective *IL-12*.

Treating periodontitis patients with this immune-boosting bacterium helps to overcome the impaired immune function in their mouths that occurs as a result of *P. gingivalis*. This assists in restoring the body’s natural oral immune response, which in turn promotes healing of the diseased, inflamed gums.

In other words, *L. plantarum* essentially plugs the immune system “hole” induced by evasive *P. gingivalis* and other bacteria, allowing our bodies to naturally resist gum disease.17

The impact of this was seen in a clinical trial of people with chronic periodontitis.

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**Clinical Trial**

Researchers conducted a randomized trial that included 39 people with chronic **periodontitis**.17 The subjects were randomly assigned to receive either a placebo or the **L. plantarum L-137** supplement for 12 weeks.

Over the course of 12 weeks, researchers measured the **probing pocket depth**, which is the distance from the gum line to the bottom of the tiny “pocket” between gum and tooth root.17 A normal, healthy gum pocket is **3 mm** deep or less, and a depth of **4 mm** or more defines **periodontitis**.21 Deeper pockets are a clinical measure of **periodontal** disease.

After 12 weeks, subjects supplementing with **L. plantarum L-137** had a **64% greater improvement** in pocket depth compared with placebo recipients.17

This remarkable study showed that it’s possible to improve periodontal disease through **modulation of the oral immune system**.
Improving pocket depth is one piece of the puzzle. It is equally important to restore balance to the mouth’s microbial community. By doing so, we can prevent immune dysfunction and the resulting inflammatory changes before they set in. That’s where an oral probiotic called S. salivarius M18 comes to the rescue.

A Well-Armed Probiotic Oral Defense System

A disease-resistant oral microbiome includes a wide variety of microbes that provide important biological functions. A dysbiotic microbiome is one in which one or several harmful strains dominate, suppressing other beneficial organisms and creating a disease-permissive environment.

What the research is proving is that in order to restore oral health and avoid problems such as gum disease, it is necessary to support the colonization and growth of beneficial organisms.22

The helpful organisms compete with the “bad guys,” cutting their populations down to size and allowing a wider range of beneficial microbes to succeed.

What You Need to Know

Probiotic Combats Gum Disease

- Tooth and gum disease are often-overlooked major contributors to failing health as we age.
- In addition to taking a toll on functions of the mouth, these conditions predispose us to heart, lung, brain, liver, and other age-related disorders.
- A balanced oral microbiome helps maintain a state of disease-resistance.
- An imbalanced, or dysbiotic, microbiome invites disaster by changing the elaborate natural immune and bacterial defenses against oral disease.
- Balancing a dysbiotic oral microbiome can restore natural disease resistance.
- HT-L. plantarum L-137 is a heat-treated strain of common Lactobacillus bacteria capable of inducing pro-healing cytokines in the mouth and boosting local immunity.
- S. salivarius M18 is a living probiotic strain that is armed with powerful lantibiotics that kill harmful bacteria.
- Adding these healthy bacteria to a regular routine of brushing and flossing can help make the mouth a safe place for protective microbes, which produces benefits throughout the body.
**S. salivarius M18** is one of the “good guys.” It competes with dangerous oral bacteria that cause or exacerbate periodontal disease, and has been shown to improve parameters of gingivitis and periodontitis.\(^{15,16}\)

A randomized, controlled trial was conducted to determine the impact of **S. salivarius M18** treatment on some of the most important clinical parameters of oral and gingival (gum) health.\(^{23}\) The study included men and women aged 20-60 years with moderate or severe **gingivitis** (gingival index score of 2 or 3), and moderate **periodontitis** (less than 6 mm probing pocket depth).

Half of the subjects received no treatment, and half received lozenges with 200 million **S. salivarius M18** daily after brushing. The subjects took the lozenges for 30 days, and the researchers observed them for an additional 30 days to determine if the benefits would continue even after the subjects stopped taking the probiotic.

The results of the **S. salivarius M18** group were favorable for all four measurements compared to the control group: \(^{23}\)

- The mean **plaque index** score was reduced by 44% on day 30 (the last day of treatment), and by 37% on day 60.
- The mean **gingival index** score was reduced by 42% on day 30, and by 35% on day 60.
- The **modified sulcus bleeding index** scores were reduced by 53% on day 30, and by 51% on day 60.
- Finally, **probing pocket depth** measurements were reduced by 20% on day 30, and by 22% on day 60.

Of note, the lowest scores for each index in the **S. salivarius M18** group indicated a return to near-normal values of less than 1 for plaque index, gingival index, and modified sulcus bleeding index, and a probing pocket depth of just over 3 mm. These values remained markedly abnormal in control subjects.\(^{23}\)

This study demonstrated the ability of the **probiootic lozenge** not only to significantly improve all four of the most important parameters of periodontal health, but also to continue working long after supplementation ended.\(^{23}\)

Previous clinical studies lend additional support to the use of **S. salivarius M18** for oral health. In one, 88% of **S. salivarius M18** recipients maintained plaque scores lower than their baseline, pretreatment values at the end of a 3-month treatment period, compared with just 44% of placebo recipients.\(^{15}\)

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**Whole-Body Effects of Periodontal Disease**

Periodontal (gum) disease can be painful, disfiguring, and even disabling when tooth loss and jawbone resorption occur.

But new science is showing that periodontal disease has far-reaching consequences that extend into most body systems, largely the result of inflammatory changes and other signaling pathway disruptions throughout the body.

Gum disease is now associated with disorders of the brain, heart, lungs, kidney, liver, and blood vessels—all of which promote aging and shorten lifespan.\(^ {7,14}\)

The good news is that reducing bacteria-laden plaque results in significant reductions in total-body inflammation.\(^ {29}\) This means that improving our tooth and gum health is vital not just for those oral structures, but also to preserve our health in practically all body systems.
In addition to its targeting of disease-causing organisms, *S. salivarius* M18 produces enzymes that help break down dental plaque, which is a main cause of tooth decay and gum disease. *S. salivarius* M18 also helps generate a neutral pH in the mouth that supports healthful bacteria, further balancing the oral microbiome and reducing disease risk.15

An additional research finding is that *S. salivarius* M18 reduces the presence of the pro-inflammatory cytokine IL-6 which is associated with periodontal disease.15 This complements a beneficial overlap with the immune-modulating features of *L. plantarum* L-137, providing added protection against chronic gum inflammation.

**Summary**

Gum diseases are rampant, especially as we age past 30 years.

Tooth brushing and flossing are important, but are insufficient to restore a damaged oral microbiome to its natural, disease-resistant state.

Recent advances in the understanding of beneficial bacteria (probiotics) reveal a two-pronged approach to restoring a balanced microbiome and rejuvenating healthy immune function in the mouth.

*L. plantarum* L-137 is a heat-treated preparation of beneficial *L. plantarum* bacteria that boosts oral immune function, reduces inflammation, and promotes healing.

*S. salivarius* M18 is a proven oral probiotic capable of colonizing the human mouth, where it kills harmful bacteria.

These two probiotics, when taken as a daily lozenges, can work together to enhance not only oral, but total-body health.

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

What Dentists Look for To Measure Gum Health

All that probing and poking around in your mouth at the dentist’s is no fun. But the dentist or hygienist is in fact looking carefully at multiple features of teeth and gums.

These have been standardized into several scores useful for measuring gum health, as well as for determining the best treatment option.

Those used in studies cited in this article are:

- **The Plaque Index** score: a zero to 3 rating, with zero being no plaque, and 3 being an abundance of plaque that extends below the gum line on the teeth.³⁴
- **The Gingival Index** score: a zero to 3 rating, with zero being normal gums, and 3 indicating severe inflammation with swelling, ulceration, and a tendency to spontaneous bleeding.³⁴
- **The Modified Sulcus Bleeding Index** score: a zero to 3 rating, with zero being no bleeding with gentle dental probing and 3 being ready bleeding, change of color, and gum swelling.³⁵
- **Probing Pocket Depth**: using a calibrated probe marked in millimeters, the dentist or hygienist measures the depth of the pocket between the tooth root and the gum. Generally, the deeper the pocket, the worse the gum disease, with pockets 3 mm or less in depth considered normal, while those deeper than 4 mm indicate periodontitis.²³,³⁶

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Statins are cholesterol-lowering drugs sold under trade names such as Lipitor® and Crestor®.

They have been shown to benefit people at risk for heart disease caused by elevated LDL-cholesterol and/or C-reactive protein.

For appropriate patients, statin drugs reduce cardiovascular death and disability rates.1-3

But despite these benefits, evidence suggests that statins, especially high doses of potent statins, may increase the risk, especially in older patients, of developing diabetes.3-6

Compelling data reveals that supplementing with CoQ10 can significantly reduce these glucose control issues.
Facts about Statins and Diabetes

Studies show that some statins, such as rosuvastatin (Crestor®), are associated with a 27% increased risk of developing new-onset type II diabetes. This is just one of many studies showing this harmful connection.4,6

One meta-analysis that utilized results from 13 statin studies involving more than 91,000 participants demonstrated an across-the-board increased diabetes risk of 9%,8 and found the highest risk in trials involving older subjects. Another meta-analysis showed that those taking higher doses of statins had a 12% higher risk of developing diabetes compared with subjects receiving “moderate” doses.9

These two alarming studies have made it apparent that older patients on more intensive statin regimens are at the greatest risk of developing diabetes from their treatment.1,10 Naturally, this poses a dilemma for anyone who is on, or considering starting, statin therapy. Is lowering the risk of cardiovascular disease worth the risk of developing diabetes which in turn could, paradoxically, increase the risk of developing cardiovascular disease?6

Experts generally say it’s a worthwhile gamble, because the benefits for cardiovascular disease outweigh the possibility of type II diabetes.8,11 Fortunately, by supplementing with CoQ10, you may be able to continue using statin drugs to lower cardiovascular risk, while minimizing the medication-induced risk of diabetes.

The CoQ10 Connection

One reason statins increase the risk of type II diabetes is because they deplete the body of CoQ10. When cells lack sufficient CoQ10, mitochondrial dysfunction sets in, leading to impaired insulin signaling, which may result in the chronically elevated glucose levels that define diabetes.3

By design, statins interfere with the production of new cholesterol molecules by blocking an enzyme called HMG-CoA reductase.4,12,13 But in the process, they also block a precursor of CoQ10,3,4 interfering with its natural production and resulting in lower CoQ10 blood levels.3

Making matters worse, lowering LDL cholesterol impairs CoQ10 transport into cells. The combination of these effects has been shown to directly reduce blood levels of CoQ10 by as much as 54%.3

Diabetic patients already have lower-than-normal CoQ10 levels. That’s because their body uses up much of its CoQ10 stores in an effort to combat diabetes-induced oxidative stress.2,12 When diabetics are prescribed statin drugs (which is a common occurrence), the further depletion of CoQ10 can be especially harmful.

Supplementing with CoQ10 allows people to derive lipid- and inflammation-lowering benefits from statins while protecting the body against CoQ10 depletion.

Benefits of CoQ10 Supplementation

Experts are increasingly recommending that anyone on statin therapy begin supplementation with CoQ10 in order to reduce the risk and consequences of diabetes. In addition to replacing depleted stores of CoQ10 in diabetic patients, supplementing with CoQ10 has been found to lower blood-sugar and hemoglobin A1C, a measure of long-term glucose exposure.14

Research also reveals that in fat cells exposed to statins, CoQ10 restores the normal glucose-uptake mechanism that is disrupted by statin therapy.15 CoQ10 has also been proven to reduce diabetes-induced cardiovascular risks. For example, studies...
have shown that depleted CoQ10 can lead to loss of heart muscle function known as diabetic cardiomyopathy.\textsuperscript{12,16} Diabetics also have poor endothelial (blood vessel lining) function, which can be worsened by statin therapy, again as a result of CoQ10 depletion.\textsuperscript{17}

Supplementing with 200 mg of CoQ10 per day has been shown to significantly improve diabetes-induced loss of endothelial function, illustrating the protective effect of simple CoQ10 supplementation.\textsuperscript{17}

In addition, previous studies have shown that lipophilic statins, such as simvastatin, reduce the GLUT4 protein levels in adipocytes, whereas hydrophilic statins (pravastatin) do not. GLUT4 plays an important role in controlling blood glucose. Reductions in the expression of GLUT4 can contribute to insulin resistance and consequently the onset of type II diabetes. In addition, previous studies have noted a reduction in CoQ10 levels when patients are using statins.

A 2013 study looked at the effects of simvastatin, pravastatin, and ezetimibe on GLUT4 in 3T3-L1 adipocytes. Compared to control, a significant decrease in relative intensity of GLUT4 protein by approximately 36\% was observed when adipocytes were treated with simvastatin. Pravastatin and ezetimibe did not statistically alter the relative intensity of GLUT4 protein, whereas ezetimibe + simvastatin significantly reduced the relative intensity of GLUT4 protein.\textsuperscript{15}

This study suggests that lipophilic statins (simvastatin) reduce the GLUT4 protein levels in adipocytes, whereas hydrophilic statins (pravastatin) do not. Co-treatment with CoQ10 appears to prevent the reduction in GLUT4 protein levels caused by simvastatin.

### Summary

While cholesterol-lowering statin drugs have been shown beneficial for reducing cardiovascular risk, use of high potency/high dosage statin drugs in older patients appears to increase the risk of developing type II diabetes.

One reason statins increase the risk of diabetes is because they deplete the body of CoQ10. Fortunately, studies suggest that supplementing with CoQ10 may help reduce the metabolic risks associated with statin therapy.

Diabetics who supplement with CoQ10 have also shown improvements in blood sugar and other measures, suggesting the multiple benefits of CoQ10 supplementation for statin users.

### References

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How GLYCATION Accelerates Aging

Diabetics suffer accelerated aging and early-onset of degenerative illnesses.

An underlying culprit behind diabetic complications is tissue glycation.¹

Glycation occurs when blood glucose links to proteins in the body. The pathologic impact is formation of advanced glycation end products that wreak systemic havoc.²⁻⁹

Those with poor sugar control suffer dangerously high glycation levels. These same toxic glucose reactions occur in nondiabetics, but at a slower pace.

For the past 14 years, Life Extension Magazine® has advised readers to avoid or reduce intake of food cooked at high temperatures. The reason is, when you eat these heat-damaged proteins, they inflict glycation damage to your body’s proteins. This is in addition to glycation that occurs as a result of life-long glucose exposure.

In this article, we provide a targeted strategy to defend against glycation-induced tissue damage.
Progressive glycation leads to reduced mitochondrial energy production and increased oxidative stress. Eventually, damaged mitochondria can stop functioning altogether, producing an age-related energy crisis that speeds up and worsens the aging process.6

This is one reason why, as we age, we not only move and think more slowly, but we also repair damage to cells and DNA more slowly, if at all. All of those actions require energy, which is in increasingly short supply.

Impact on the Body

Together, mitochondrial dysfunction and glycation have a disastrous effect on the body’s systems, and are responsible for many symptoms of aging. Here is a partial list of the types of damage they wreak on the body:

- The accumulation of advanced glycation end products (AGEs) can contribute to kidney disease and renal failure. When AGEs accumulate in the filtering portions of kidneys, it reduces the ability to excrete waste.7
- AGEs can lead to neurodegenerative diseases like Alzheimer’s and Parkinson’s because they contribute to the formation of cross-linked proteins. These damaged proteins accumulate in cells, disabling and eventually killing brain cells.8,9
- When glycation occurs in the skin, it sensitizes the skin to ultraviolet (UV) radiation, triggering oxidative stress that damages DNA and increases the risk of skin cancers.10
- AGEs damage joint cartilage, resulting in stiffening and loss of ability to handle stresses. AGEs are now recognized as major contributors to osteoarthritis.11
- When similar AGE-related damage occurs in spinal discs, it can make disc injury and herniation (“slipped disc”) more likely.12
- Glycation is especially damaging to our eyes. Not only does it lead to clouding of the lens (cataracts), it also causes retinal damage—both of which impair vision and ultimately produce blindness.13,14
- The protein-rich walls of arteries, and even tiny capillaries, are especially vulnerable to glycation-induced damage.15 The resulting stiffening and inflammatory changes produce atherosclerosis, the cause of heart attacks, strokes, and other vascular disorders of aging.4

What is Glycation?

Glycation is a process by which sugar molecules react chemically with proteins in the body, causing the proteins to cross-link and lose their functionality.2

Not only does this cross-linking prevent proteins from doing their intended jobs, it creates harmful molecules called advanced glycation end products (or AGEs).3

The acronym AGEs is appropriate considering these toxic protein reactions are a root cause of premature aging. Ultimately, glycation causes inflammation that damages mitochondria, while mitochondrial dysfunction exacerbates glycation. This result in an age-accelerating cycle as glycated proteins accumulate in tissues throughout the body.4,5

Mitochondria and Aging

The human body depends on sugar and oxygen to provide the energy that keeps its heart beating and brain thinking. Intracellular powerhouses called mitochondria work wonders by using glucose, fatty acids, and oxygen. The result is life-giving energy that powers every aspect of the body.

But, like other forms of energy generation, the process produces reactive molecules as byproducts that build up and damage the very cells, tissues, and organs the process is meant to support.

Glycation also damages molecules vital to life, like DNA, enzymes, and structural proteins.
In short, glycation, linked to poor mitochondrial function, accelerates every aspect of human aging. While we are exposed to glycation on a daily basis, we are not helpless in the face of its destructive effects. A huge volume of published data support the use of specific nutrients that work hand-in-hand to reduce glycation and its effects, while also supporting healthy, energy-producing mitochondria.

Antiglycation Nutrients

Four compounds have been identified to reduce the rate of glycation and control the consequences when it occurs.

The first is a fat-soluble form of vitamin B1 (thiamine) called benfotiamine. Lab studies have shown than benfotiamine can prevent glycation, and human studies have shown that it can help prevent the damage caused by glycation.

In a study of type II diabetics, benfotiamine helped prevent blood-vessel damage caused by glycation. For the study, subjects ate a meal high in AGEs (caused by high-heat cooking), then took benfotiamine for three days, and then ate the same high-AGE meal again.

Initially, the AGE-rich meal reduced blood flow throughout the subjects’ bodies as a result of the impact of AGEs on blood vessels. But after supplementing with benfotiamine for just three days, blood flow measurements completely normalized, demonstrating just how quickly benfotiamine exerts its powerful impact.

A later study of diabetic animals further demonstrated the ability of benfotiamine to improve heart and blood vessel function, while also reducing death and scarring of vital heart cells.

Lab studies have given us insight into how benfotiamine works to prevent glycation itself, as well as the damage it can cause. Through at least three biochemical pathways, benfotiamine has now been shown to improve function of tiny capillaries in the retina, increase mitochondrial energy production in muscle cells, protect against kidney and other tissue damage in dialysis, and prevent DNA damage.
Pyridoxal 5’-phosphate

Pyridoxal 5’-phosphate is an active form of vitamin B6 that is receiving growing attention as a natural complement to benfotiamine. Like benfotiamine, this active form of vitamin B6 has the dual benefit of helping prevent glycation as well as its harmful effects (such as the buildup of gunked-up proteins and AGEs). Pyridoxal 5’-phosphate is one of the most effective compounds known to inhibit glycation of fats (lipids) and proteins. This is an important protective function, since lipid glycation is a major threat to the function of cell membranes, which is an underlying factor in numerous age-related conditions.

This metabolically active form of vitamin B6 (pyridoxal 5’-phosphate) works by essentially trapping glucose breakdown products before they can participate in dangerous glycation reactions.

Avoid Foods Cooked at High Temperatures

The way you cook your food can affect your chances of becoming diabetic.

A randomized, controlled trial looked at two groups of obese subjects. The first group ingested a diet typically high in advanced glycation end-products (AGEs), which are proteins and lipids in foods that are often damaged by high temperature cooking.

The second group was required to eat food cooked at low temperatures (stewed, steamed or poached) and avoid food that was fried, baked or grilled.

In the group avoiding food cooked at a dry heat or high temperatures (low-AGE diet), insulin resistance significantly improved, and body weight was mildly reduced.

The high-AGE group’s markers of insulin resistance, on the other hand, were at higher levels compared to baseline.

Head researcher Helen Vlassara, MD, remarked: “While food AGEs are prevalent, particularly in Western diets, our study showed that avoiding foods high in AGEs could actually reverse the damage that had been done. This can provide us with new clinical approaches to prediabetes, potentially helping protect certain at-risk individuals from developing full diabetes and its devastating consequences.”

Life Extension first warned about the dangers of eating foods cooked at high temperature in the May 2003 issue of this magazine.

Luteolin

Luteolin is a flavonoid found abundantly in many plants. Since one of the main consequences of glycation is inflammation, luteolin’s anti-inflammatory properties make it an ideal natural complement to benfotiamine and pyridoxal 5’-phosphate. Inflammation is widely recognized for its association with cancer, atherosclerosis, and virtually all other chronic diseases.

Luteolin works by suppressing the activation of the master inflammatory complex called NF-κB, which triggers the production of a wide variety of pro-inflammatory signaling molecules (cytokines).

The anti-inflammatory actions of luteolin have been demonstrated in tissues throughout the body, including the brain, blood vessel lining, skin, intestines, lungs, gums, and bone. A study published in the American Journal of Respiratory and Critical Care Medicine gives us insight into how monumental luteolin’s anti-inflammatory impact truly is. When mice were exposed to a bacterial toxin, only 4.1% of them survived. But when mice that were given luteolin were exposed to the same toxin, it promoted survival in 48% of the mice.

Carnosine

Carnosine is a potent free-radical scavenger and anti-glycating agent that inhibits AGE formation and its cross-linked proteins, helping to keep them functioning properly.

Carnosine has powerful lipid glycation-preventing properties and profound impacts on fundamental AGE-signaling pathways, making it a highly promising anti-aging drug candidate.

Studies show that carnosine prevents protein cross-linking and the accumulation of the tangled protein clumps associated with Alzheimer’s disease.
Carnosine has also been shown to lower blood-lipid levels, reduce the metabolic stress induced by high-fat diets, and, very importantly, to help stabilize atherosclerotic plaques, reducing their risk of rupturing and triggering a heart attack or stroke.15,48

Finally, carnosine works in numerous ways to help protect mitochondria from the destructive effects of cellular oxidative stresses.43

Nutrients that Enhance Mitochondrial Function

As we discussed earlier, preventing glycation is one piece of the puzzle. It is equally important to preserve mitochondrial function in the face of glycation-induced damage. Three unique compounds have been identified in the scientific literature that can lend new life to aging mitochondria.

Pyrroloquinoline quinone (PQQ)

Pyrroloquinoline quinone (PQQ) is a vitamin-like molecule that promotes the production of new mitochondria in cells, helping to restore cellular energy.6,49 The result of insufficient cellular PQQ is reduced numbers of mitochondria.49

In a clever experiment, researchers treated animals with a toxic chemical that induces Parkinson’s disease-like symptoms. They then fed the rats a probiotic made of bacteria that had been engineered to produce PQQ.6 Initially, the chemically-treated rats lost mitochondria and showed obvious evidence of oxidant damage in their organs. But after receiving the PQQ-supplying probiotic, those changes were reversed, new mitochondria formed, and the animals recovered from severe metabolic damage.

R-Lipoic Acid

R-lipoic acid is essential to enzyme systems involved in extracting energy from food.50,51 This makes it vital for efficient mitochondrial function.

Studies show that giving older animals R-lipoic acid leads to improved metabolic function, healthier mitochondria, and reduced production of oxidative stress-inducing byproducts.

In addition, animals supplemented with R-lipoic acid age more slowly than they otherwise would. This is because R-lipoic acid also protects liver, heart, and brain cells from mitochondria-induced oxidative stress.52-58

Due to these abilities, R-lipoic acid is emerging as a popular anti-aging supplement.

Taurine

Taurine is an amino acid that has been found in extremely high concentrations inside mitochondria, where it regulates the enzymes responsible for harvesting energy from food molecules.59

Because of this important function, taurine is found most abundantly in heart and skeletal muscle, brain tissues, and the retina—all of which have extremely high metabolic rates that burn out mitochondria.60-63

Insufficient taurine in these tissues produces an energy crisis that results in accelerated aging.64,65 The good news is that adding taurine back to such cells in crisis can reduce oxidative stress and maintain—and often restore—mitochondrial function in aging cells.62,63,66

Indeed, taurine is one of the few nutrients capable of spurring brain cells to put out new shoots, called neurites, enhancing brain cell connections that preserve cognition and memory.67

Summary

Glycation of our body’s tissues is a normal consequence of aging. Those with poor blood sugar control suffer more glycation reactions and prematurely age. Ultimately, glycation and mitochondrial dysfunction together produce ever-faster aging.

Fortunately, scientists have uncovered several nutrients that function to support healthy mitochondrial function while reducing glycation and its damaging effects.

These nutrients work together to rejuvenate cell energy levels while reducing tissue damage. ●

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Resistance Exercise Reduces Cognitive Decline

When we think of the benefits of exercise, we tend to think of its ability to reduce cardiovascular disease, strengthen bones and muscles, and control weight.

Research is now proving that exercise is also crucial for preserving and enhancing brain function as we age.¹⁻⁸

Studies show that exercise inhibits neurodegenerative diseases and even promotes neurogenesis—the creation of new brain cells.¹⁻⁴

While most forms of exercise are associated with improved cognition, some forms may be superior to others in that respect. A newly released study demonstrates that resistance exercise or weight training, rather than aerobic exercise, has a greater impact on cognitive function.⁹

In this article, you will learn how exercise—especially strength-training exercise—can enhance cognition and memory and protect against age-related cognitive decline.
Enhanced Muscle Strength Provides Cognitive Protection

For aging individuals, exercise is associated with an array of benefits that support longer lifespan. One recent study supports its connection to protecting and enhancing brain function.

In October 2016, scientists released the findings of a large randomized, double-blind, controlled trial that investigated the effects of resistance training on cognitive function in older adults. Resistance training, also called strength training, is exercise that uses weights, machines, bands, or other devices that work key muscle groups.

Previous studies had already shown the cognitive benefits of exercise, but this time the researchers wanted to determine whether the cognitive improvements occurred as a result of increased aerobic capacity or increased muscle strength.

The study included 100 participants age 55 and over with mild cognitive impairment. Each was randomly assigned to either a sham version or a legitimate version of a progressive program of resistance training for two to three days per week. They also received computerized cognitive training.

Although the program improved both whole-body muscle strength and aerobic capacity, the study team found that only the enhanced strength scores—<i>but not the enhanced aerobic scores</i>—were significantly associated with improvements in cognition.

While the exact reason for these beneficial effects remains unknown, it is clear that it is the strength-related gains from resistance exercise that cause its cognitive benefits.

This is an important finding that should change how the medical community approaches exercise. Most medical professionals recommend aerobic exercise, yet fail to understand the value and benefits of resistance exercise, especially in aging populations. This trial showing the superior cognitive benefits of strength training adds to a wealth of past evidence supporting the value of exercise in inhibiting sarcopenia, cognitive decline, and the onset of neurodegenerative disease.

Data now conclusively show that exercise—specifically resistance training—is not just essential for the health of your body, but is an essential component to the health of your brain.

Exercise and the Brain

Exercise has been shown to be crucial for preserving, and even enhancing, brain function as we age. A Mayo Clinic study on more than 1,300 subjects concluded that any frequency of moderate-intensity exercise performed in midlife or late life was associated with reduced risk of having mild cognitive impairment.

Multiple mechanisms for this cognitive benefit have been identified:

- Exercise boosts blood flow in the brain, improving the delivery of oxygen and nutrients to critical brain cells.
- Exercise promotes angiogenesis (the formation of new blood vessels from pre-existing vessels) as well as neurogenesis (the formation of new neurons from stem cells) in the adult hippocampus. Angiogenesis is important for neurogenesis because the improved blood supply facilitates the growth of new neurons and their supporting structures.
- Exercise enhances the production of key neurotransmitters, such as serotonin, acetylcholine, and gamma-aminobutyric acid (GABA). Serotonin regulates mood and sleep; acetylcholine plays a role in cognition, memory, and learning; and GABA, the main inhibitory neurotransmitter in the brain.
- Exercise also increases the production of beneficial brain proteins called neurotrophins (a family of proteins that regulate neuron survival). Greater physical activity can increase the production of a specific neurotrophin that is associated with enhanced cognitive function and brain plasticity.
Resistance exercise, on the other hand, is essential for increasing—or even just preserving—lean body mass, which is especially critical for older adults. Strength training can also promote mobility, improve health-related fitness, and improve bone health.22

Nutrients That Boost Muscle Mass and Strength

Any good exercise regimen should be supported by key nutrients that help our bodies build and maintain muscle mass. The following nutrients have been shown to enhance the strength-boosting effects of resistance exercise—which, as we have learned, enhances cognition and memory, protects against age-related cognitive decline, and helps prevent sarcopenia.9

Inhibiting Sarcopenia

Another key benefit of exercise is its ability to inhibit sarcopenia, the age-related loss of muscle mass, strength, and functionality. Sarcopenia not only robs elderly people of the ability to perform even the most basic tasks of daily living, but also vastly heightens their risk of suffering devastating injuries and even death from sudden falls and other accidents.

This condition generally appears after age 40 and accelerates after age 75 and can be caused by suboptimal hormone levels, inadequate dietary protein, other nutritional imbalances, oxidative stress, and inflammation. Most often, it is seen in physically inactive people.19,20

While all types of exercise are beneficial, scientists have determined that resistance or strength training provides superior protection against the advance of sarcopenia.

Resistance exercise stimulates the release of hormones that promote healthy muscle mass, including growth hormone (which is responsible for cell growth and regeneration throughout the body), as well as local growth factors such as mechano growth factor (which is important in helping muscles repair and grow).20,21 As an added benefit, these types of exercises can enhance the effects of other interventions, such as hormone replacement therapy.

While aerobic exercise is excellent for maintaining cardiovascular health and keeping body fat levels low, it is only mildly effective in preserving lean body mass. This explains why sarcopenia is not uncommon in endurance athletes as they age.

Inhibit Cognitive Decline with Resistance Exercise

- Although best-known for its cardiovascular benefits, exercise is also critical for preserving brain function in later life and reducing the risk of neurodegenerative diseases.
- An exercise regimen even promotes the creation of new brain cells (neurogenesis).
- New evidence documents that it is the boost in muscle strength resulting from resistance training that is responsible for this potent cognitive protection in older adults.
- An array of natural supplements can enhance the powerful capacity of resistance training to preserve and enhance cognition.
Whey

Whey protein is especially effective at preserving lean body mass in older adults. Whey protein augments the effects of resistance exercise training, especially if consumed shortly before or after exercise. Men who supplemented with whey in combination with resistance training showed improvements in one or more measures of muscle strength as well as lean tissue mass, compared to placebo recipients.

Clinical studies indicate that older adults need greater amounts of high-quality protein than active, younger people, which means that the recommended daily protein intake may not be enough for older adults. So while the Institutes of Medicine recommends 0.8 grams per kilogram of body weight (or 58 grams for an aging adult weighing 160 pounds) for all adults, several studies suggest that healthy older adults need between 1.0-1.3 grams of protein per kilogram of body weight (or 73-94 grams for an aging adult weighing 160 pounds).

Creatine

Athletes use creatine monohydrate to increase muscular force and power, reduce fatigue, and help increase muscle mass. Numerous studies have demonstrated that creatine supplementation increases strength and lean body mass in older adults who are participating in resistance exercise training. This may be due to the fact that the muscle fibers most affected by creatine supplementation are the same “fast-twitch” (Type II) fibers that commonly atrophy in older adults.

Research suggests that when whey and creatine are taken together, they provide synergistic benefits that boost the effects of resistance training. In one study, men who supplemented with both whey and creatine showed greater gains in lean tissue mass and bench press strength than men who supplemented with whey alone or with placebo.

Branched Chain Amino Acids

Whey protein is packed with branched chain amino acids (BCAAs), but these potent compounds are also available separately for added muscle support.

Three specific BCAAs, leucine, isoleucine, and valine, are essential amino acids that play important metabolic roles during exercise and in the maintenance and growth of skeletal muscle. BCAAs account for 35% of the essential amino acids in muscle proteins and can serve as an energy source for muscle tissue during exercise. Leucine, the most metabolically active BCAA, has been well-documented to promote muscle tissue synthesis. Branched chain amino acids also reduce perceived exertion and mental fatigue during exercise.

Glutamine

Glutamine—the most abundant amino acid in the body—is highly concentrated in the skeletal muscles that make movement possible. When scientists gave 2,000 mg of glutamine to nine healthy adults, eight out of the nine subjects experienced a four-fold increase in growth hormone output. Evidence suggests that after intense exercise, glutamine helps replenish muscle stores of glycogen, which serves as a ready source of fuel to power muscle action.

Vitamin D

Vitamin D helps preserve the same (Type II) muscle fibers that are prone to atrophy in aging adults. This suggests that low vitamin D levels in older individuals may contribute to poor muscle function (and bone formation). Supplemental vitamin D may reduce the incidence of sarcopenia (and osteoporosis)—and therefore may contribute to the cognitive protection now associated with greater muscle strength through resistance exercise.
Carnitine

Carnitine is an amino acid derivative that transports fatty acids to the mitochondria to be used as fuel for energy production. It works by prompting mitochondria to produce cellular energy quickly and efficiently—helping to combat the age-related decrease in cellular energy and critically supporting exercise recovery.

Carnitine formulations may promote healthy muscle mass in older adults prone to sarcopenia, and it can protect against cognitive decline by boosting muscle strength. One novel form of carnitine known as propionyl-L-carnitine helps regulate levels of adenosine triphosphate (ATP)—the primary source of energy for all cellular processes—and can improve physical performance and reduce general fatigue.

Omega-3 Fatty Acids

The omega-3 fatty acid EPA (eicosapentaenoic acid) preserves muscle mass under various physiological conditions. Both EPA and the omega-3 fatty acid DHA (docosahexaenoic acid) have anti-inflammatory effects, which scientists believe may help manage sarcopenia. In 2016, a placebo-controlled, double-blind trial concluded that 6 grams daily of fish oil may alleviate muscle soreness experienced after resistance training.

D-Ribose

D-ribose is a naturally occurring carbohydrate molecule that facilitates the production of ATP, the body's energy currency. In studies of healthy athletes, supplying fatigued muscle cells with D-ribose quickly restored ATP levels to normal. By refilling depleted energy stores in muscle (and heart) tissue, D-ribose may help speed muscle recovery after high-intensity exercise.

Summary

As we age, regular exercise becomes crucial for maintaining brain function and helping to inhibit neurodegenerative diseases. Exercise even promotes neurogenesis—the creation of new brain cells.

A new study demonstrates that, in those regularly participating in resistance (vs. aerobic) exercise, it's the muscle-strength gains that mediate these cognitive benefits in aging individuals.

Various supplemental nutrients support the powerful benefits of resistance training to enhance cognition and memory and protect against age-related cognitive decline.

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

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

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The body’s production of digestive enzymes decreases with age, leading to poor digestion and bloating, as well as other discomforts—especially after eating a large meal.

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

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**References**

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Oats

Oats are a grain commonly eaten in the form of oatmeal, cereal or bread. As you’re about to see, oats have a number of remarkable health benefits, but you should be careful when buying this super food in some of its more popular forms, such as instant oatmeal, which often has large amounts of sugar mixed in. As a general rule, always check ingredients lists before buying even purportedly healthy foods.

Cholesterol

Due to containing more soluble fiber (in the form of beta glucan) than any other grain, oat intake can help cut levels of LDL cholesterol.1 This in turn can reduce the risk of cardiovascular disease.2

Weight Control

Research shows that eating oat-based foods regularly is correlated with lower body mass index.3 This may be due to the grain’s ability to reduce hunger and provide satiety.4

Blood Pressure

Evidence indicates that diets that emphasize whole grains such as oats can lower both systolic and diastolic blood pressure.5

Colorectal Cancer

Extensive research has found that a diet high in fiber derived from whole grains, including oats, is linked with lowered risk of colorectal cancer. And the level of risk is reduced in direct relation to dosage intake, with every additional 10 grams of total dietary fiber per day leading to an additional 10% reduction in colorectal cancer risk.6

References
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Vitamin K1, vitamin K2 (MK-4), and vitamin K2 (MK-7) can also be found in Life Extension® Once-Daily Health Booster (formerly Super Booster). If you take Once-Daily 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 Super Booster. There is evidence, however, that users of drugs like warfarin could benefit from a consistent low dose of supplemental K. Ask your doctor if you can take a low dose (45 mcg a day) of vitamin K2 in the long-acting MK-7 form for the purpose of stabilizing your INR levels and also protecting your body against long-term vitamin K deficit. Do not initiate any form of vitamin K supplementation without full cooperation of your treating doctor, as your doctor may need to increase your dose of warfarin to compensate for your vitamin K supplement. Life Extension® provides several forms of low-dose vitamin K for physician consideration.

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

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LE: *Life Extension®* has always been at the forefront of presenting innovative lab tests that aren’t always available from mainstream doctors. Are there any new tests on the horizon?

**Dr. Fogle:** Yes. We are pleased to introduce neurotransmitter testing, an innovative test that looks at the balance of chemical messengers in your brain. The results from this urinary test can offer important insight into numerous health issues that may be difficult to assess by standard blood testing.

LE: What are neurotransmitters, and why are they important?

**Dr. Fogle:** Neurotransmitters are powerful chemical messengers, just like hormones. When neurotransmitters are out of balance, it affects mood, cognition, attitude, coping skills, energy, sleep, overall health, and more. At *Life Extension*, we have always encouraged people to balance their sex hormones, such as testosterone, estrogen, progesterone, DHEA, and pregnenolone. We receive positive feedback from customers around the world that balancing sex hormones has helped change their lives. These customers report improvements in mood and well-being as well as healthy changes on blood testing markers. Now people can do the same thing with neurotransmitters! This scientific approach to wellness is something that very few doctors offer to their patients. Yet clinical experience has shown that balancing both sex hormones and neurotransmitters is a strategy for feeling great, functioning optimally, managing stress better, promoting longevity, and just feeling more vibrant and healthy.
**LE:** Who should have this type of neurotransmitter test done?

**Dr. Fogle:** It is especially important to get your neurotransmitters tested if you are experiencing issues such as mood disorders, depression, anxiety, adrenal issues, fatigue, insomnia, loss of mental focus, ADD, ADHD, brain fog, addiction, poor impulse control, hormonal imbalances, cravings, irritable bowel syndrome (IBS), headaches, cognitive dysfunction, chronic pain, and insulin resistance, to name a few.

But in general, this test is also beneficial for anyone who is not feeling optimal. If you wake up feeling fantastic and go to sleep easily, then your neurotransmitters are probably well-balanced and you don’t need to bother testing them. If you do not feel that way, then it is a good idea to test and see how balancing your neurotransmitters can help bring those positive attributes back into your life.

**LE:** Why don’t more doctors check neurotransmitters?

**Dr. Fogle:** From my experience, doctors are overwhelmed with information these days and too often reach for the prescription pad rather than think outside the box. If I could change the healthcare industry, I would make it so everyone gets both sex hormones and neurotransmitters tested every year. By balancing both of these important and vital chemical communicators in the body, many diseases could be prevented, saving pain, heartache, and billions of healthcare dollars, and ultimately enhancing lifespan.

**LE:** What neurotransmitters are included in the test?

**Dr. Fogle:** This test measures serotonin, dopamine, epinephrine plus glutamate, norepinephrine, and GABA. These are the most important neurotransmitters, and they represent both the excitatory and inhibitory aspects of neurotransmitters. Think of neurotransmitters like the gas pedal and brake pedal on your car. Your nervous system needs a balance of both excitatory (the gas pedal) and inhibitory (the brake pedal) neurotransmitters to function optimally. One of the biggest problems in today’s society is that too many people are pressing down too heavily on the gas pedal, yet barely touching the brakes. This leads to elevated epinephrine, norepinephrine, and glutamate (the excitatory neurotransmitters) and low GABA (the primary inhibitory one) and low serotonin. This imbalance makes you feel depressed, irritated, negative, and tired, but at the same time, you cannot sleep or rest well because the excitatory neurotransmitters are too high. That person will continue to struggle with these symptoms until neurotransmitters are brought back into balance. Making matters worse, out-of-balance neurotransmitters can often push hormones out of balance as well.

**LE:** Have you seen neurotransmitter testing work in clinical practice?

**Dr. Fogle:** Since I saw such good results with hormone testing, I was one of the first doctors to start doing specialty neurotransmitter testing many years ago. I tried it out on my staff first. A young female staff member was gaining weight, feeling irritable and anxious, had low libido, no energy, no desire to exercise, and craved carbs nearly every evening. Her results showed major imbalances in her neurotransmitters, especially with low serotonin. We targeted those imbalances with the appropriate nutrients to support serotonin...
and GABA, and within a week her mood picked up dramatically, she felt more positive, slept better, experienced increased libido, was less irritable, and had more willpower to resist the carbs in the evening. In another week, she was feeling so much better that she was motivated to start working out and losing weight. I have since used this test with many patients and have been impressed with the results. I’m amazed these tests are not utilized more widely to help restore people back to good health.

**LE:** Should people do neurotransmitter testing in place of sex hormones?

**Dr. Fogle:** Ideally, people should test both since they are different types of chemical messengers that communicate with the body. If someone already has done hormone testing and treatment but still thinks they could feel even better, then neurotransmitter testing is the next step to discovering more about how to balance their individual biochemistry for optimal health. Testing both neurotransmitters and sex hormones provides a much more comprehensive view of the body’s functional neuroendocrine status, and it brings to light additional factors that may be contributing to symptoms. For example, low estrogen can lead to low dopamine in a woman and can cause serotonin receptors to be less responsive. Low progesterone can contribute to low GABA receptor activity. Serotonin is involved in the release of ACTH and proper cortisol response. The connections between hormones and neurotransmitters could fill a book. Only by testing both can you get a more complete picture of your individual biochemistry.

**LE:** How are sex hormones different from neurotransmitters?

**Dr. Fogle:** Both are powerful chemical messengers. They differ in their molecular structure in that sex hormones have a steroid base and neurotransmitters are more amino acid based. Hormones act more globally on tissues, and especially on DNA in the nucleus of our cells. This makes sex hormones very powerful and important because they interact with our DNA to turn on and off important genes. On the other hand, neurotransmitters act in the synapses of the nerves, such as in the central nervous system (CNS). Since the CNS/brain drive communication to the rest of the body through hormones, it makes physiological sense to balance both. Neurotransmitter and hormones work together, and if they aren’t working together you will feel the negative effects.

**LE:** So, like sex hormones, the neurotransmitter testing helps provide a targeted approach customized to your unique biochemistry?

**Dr. Fogle:** Exactly. Some people need more support for the excitatory neurotransmitters while others need more inhibitory support. People need different natural ingredients to support balance in their individual neurotransmitter pattern. The same natural support that can make one person feel fantastic can make another person feel worse. Hence, the importance of testing them just like testing hormones.

**LE:** Some drugs work via neurotransmitters right?

**Dr. Fogle:** Correct. Antidepressant drugs like Prozac inhibit the reuptake of serotonin in the synapses to help prolong its effect. Barbiturates and benzodiazepines both bind to GABA receptors to augment GABA-mediated responses. Wellbutrin acts as a relatively weak inhibitor of the neuronal uptake of norepinephrine, serotonin, and dopamine, thus keeping more of those specific neurotransmitters in the neural synapse longer. I have seen all these drugs work effectively for some people, but I have also seen them cause unpleasant side effects in other people. Also, due to genetics, people metabolize these drugs differently, which helps explain why some medications might be life-changing for one person, but can cause a negative reaction in another person.

**LE:** That leads me to my next question. Are there natural ingredients that can help support neurotransmitters?

**Dr. Fogle:** Amino acids, plant extracts, vitamins, hormones, and other natural ingredients can support healthy neurotransmitter levels. For example, tryptophan or 5-HTP helps with serotonin formation. Tyrosine supports the formation of the catecholamines such as dopamine and epinephrine. Plant extracts such as saffron, the Chinese orchid *Gastrodia elata*, curcumin, adaptogenic herbs like rhodiola, and more can benefit neurotransmitter balance. In addition, cofactors such as vitamins are important for the transformation of precursors into neurotransmitters. For example, if someone has low dopamine, insufficient activated vitamin B6 (P5P) could be to blame since it is a necessary cofactor needed for dopamine formation. Testing allows you to see which neurotransmitters need support, and then identify specific amino acids, cofactors, and other natural ingredients to help restore balance. A targeted approach based on testing dramatically increases success.
LE: Do you recommend combining conventional treatment with natural alternatives?

Dr. Fogle: If you’re already being treated for a condition, it’s important to work with your doctor, especially if you are on a prescription medication. However, more doctors are becoming open to working with educated patients, especially if they have lab results showing their neurotransmitter levels are out of balance.

One of the first patients I tested was a woman on an antidepressant medication. She complained of weight gain and low libido, both known side effects of her medication. When I tested her neurotransmitters, she had extremely low serotonin levels. We did a therapeutic trial of natural serotonin support, and I monitored her carefully. She responded great, and she worked with the doctor who prescribed the antidepressant to slowly wean her off it as she improved. Her mood and libido improved, and she felt more motivated to work out, which is another powerful way to improve mood and health. I love to see vicious negative cycles broken and replaced by positive changes that
lead to more and more improvements in someone’s health, and I have seen hormone and neurotransmitter testing do just that.

**LE:** We have talked about how neurotransmitters and hormones influence each other. What other factors could cause an imbalance in neurotransmitters?

**Dr. Fogle:** Many seemingly unrelated conditions can have a profound impact on neurotransmitter balance. For example, chronic inflammation can cause depression through the neuromodulating effects of inflammatory molecules called cytokines. These same cytokines are the ones that make you feel lethargic and antisocial when you have the flu. In chronic inflammation, the brain has to contend with a continuous onslaught of mood-altering cytokines leading to melancholy and anxiety. For example, the inflammatory cytokines interferon regulatory factor (IRF), interferon-alpha (INF-a), and NF-kB can activate an enzyme that breaks down tryptophan, the precursor to serotonin, thus leading to depleted brain levels of this important mood-supporting neurotransmitter: This effect of lowering serotonin explains why being sick makes us feel terrible, depressed, and moody.

Gut inflammation resulting from imbalances between beneficial bacteria and harmful microbes, poor food choices, or food allergies can also impact neurotransmitters. To underline the importance of beneficial bacteria on mood, human studies on the combined administration of two unique probiotics, *Lactobacillus helveticus* R0052 and *Bifidobacterium longum* R0175, have demonstrated a 50% decrease in depression scores and a 55% improvement in anxiety scores.1,2

Traumatic brain injury (TBI), such as incurred in many contact sports, can also have long-lasting and detrimental impacts on brain health and neurotransmitter function. Victims of TBI may later suffer from memory and cognitive defects, depression, and anxiety. The chronic aftermath of TBI correlates with reduced acetylcholine, norepinephrine, and dopamine activity. Similarly, emotional trauma can lead to undesirable emotional states. Although grief, sadness, and fear can be normal, individuals often find themselves stuck in these types of responses. In cases of physical and emotional trauma, neurotransmitter testing can be an invaluable tool to feeling better again.

**LE:** How can people get this test?

**Dr. Fogle:** Some forward-thinking doctors already do these tests; unfortunately, most mainstream doctors are not even aware that they exist. In most cases, doctors order these tests through specialty labs. For our neurotransmitter testing, we collaborate with a lab in Portland, Oregon, that was founded by two doctors, one an MD and the other an ND, which is a great combination of knowledge and clinical experience. Their lab uses liquid chromatography combined with tandem mass spectrometry (LC-MS/MS), which is considered a gold standard in laboratory testing for its accuracy, and *Life Extension* is now pleased to offer this neurotransmitter test to customers.

**LE:** After someone gets tested, what do they do with that information?

**Dr. Fogle:** They can work directly with their doctor or call in to speak with one of our trained wellness specialists who can give them helpful information and customized suggestions. Our team of wellness specialists enjoys seeing people benefit from their suggestions. The information they provide helps people have more detailed conversations with their own doctor as well.

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**References**


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Michael Ray Garvin earned his nickname—the “World’s Most Jacked Athlete”—in 4.2 blazing seconds during the 2009 NFL draft, when he ran the fastest 40-yard dash in the country and a photo of him running the race went viral.

The picture showed a world-class athlete in peak condition as he covered almost 10 yards a second. This was no fluke: a driven athlete, Garvin was already a two-sport all-American athlete in football and track, and during his high school years at Don Bosco was ranked the fourth best football player in the state.

Later that year, Garvin would be signed by the NFL’s Arizona Cardinals, where he averaged 30 yards on four kickoff returns in his first preseason game. Unfortunately, Garvin tore his meniscus that season and required surgery. He was released by the Cardinals and signed that same year by the Detroit Lions, where he played with the practice squad, then played with the Canadian Football League.
Throughout his professional career, Garvin wasn’t only known for his explosive speed. That famous picture—the one of him leaning forward, heavy veins in his chest and forehead snaking under his skin like cables, his eight-pack abs etched in sharp relief—continued to spread across the Internet. Fitness companies and trainers used it to promote themselves, and everywhere people wanted to know: “How can I get results like those? Do I have to take steroids?”

No, says Garvin emphatically. In fact, Garvin has never taken any type of illegal performance-enhancing drugs.

Today, Garvin has reinvented himself as a trainer, author, speaker, and unwavering advocate for natural health. A dedicated supplement user since he was 14 years old, Garvin has written two books: World’s Most Jacked Athlete, and 2016’s follow-up, Jacked Athlete Supplement Manual. In his books, Garvin details his own sports history and shares the training and supplements secrets that made it possible for him to build and maintain an incredible physique.

### Smashing the Stereotypes

A dedicated student of health and supplementation, Garvin is eager to share his knowledge with the rest of the world. According to Garvin, the key to success as an athlete and supplement user is to remain disciplined, but stay flexible.

“All supplements have some type of benefit, but it depends on how different people metabolize them,” he said. “One of the first laws of training is the law of individual differences. Some people may not receive a benefit from a supplement and have to take more, while others may need to take less. Start small and work your way up.”

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One thing that isn’t required, however, is illegal performance-enhancing drugs.

“I never felt any pressure at all to use them, even in professional football,” Garvin said. “I always did my studying and knew I could be great naturally. There was no need to take illegal, performance-enhancing drugs.”

At the same time, Garvin questioned where some of the substances came from—especially not-natural-to-the-body testosterone used in steroids. As he learned more, and found out how the synthetic hormone and steroid industry actually operates, he became even more convinced to stick with natural supplementation.

Learning, he says, is crucial. Garvin relies on Life Extension® to help provide legitimate, deeply researched information as he creates the supplement stacks and programs he recommends.

### Protect Your Brain!

Garvin stresses that his supplement manual isn’t only for professional or even hardcore athletes. In fact, weekend warriors and occasional gym rats can also benefit from intelligent supplementation with products that are designed to enhance muscle mass, improve heart function and blood sugar sensitivity, and increase cellular energy.

He also has worked hard to develop a protocol to reduce the damage caused by concussions. In recent years, the NFL has come under significant pressure to reduce the number of concussions players suffer. According to an investigation by the PBS documentary series *Frontline*, over the last two seasons alone, more than 300 players have suffered some...
type of traumatic brain injury on the field. Emerging data is showing that these players are at significantly increased risk for memory and cognition problems later in life, as well as increased rates of depression and suicide.

The problem isn’t limited to the NFL. A 2016 study published by FAIR Health found that the rate of concussion diagnosis for people under the age of 22 increased by a staggering 500% between 2010 and 2014, with the highest numbers coming during high school football season.

According to Garvin, the key to mitigating concussion damage is to provide the brain with rapid support to help increase cellular energy in the damaged brain tissue and speed healing.

“Concussion trauma triggers progressive degeneration of the brain tissue, including the buildup of an abnormal protein called tau,” he said. “Very high levels of abnormal tau protein in the brain can cause slower recovery after a concussion. In order to decrease brain degeneration and tissue damage, we need to trigger neurogenesis, or the growth of new brain cells.”

This can be accomplished by taking supplements immediately after a head injury that increase levels of nerve growth factor and neurotrophic growth factor, with a particular focus on velvet deer antler, alpha GPC, lion’s mane mushrooms, and L-tyrosine and glutamine.

“I suffered the worst concussion of my career while playing in the Canadian Football League,” he said. “I had a serious headache and stumbled toward the sidelines. After about three minutes, I became more coherent and aware of my surroundings, partly because I took a supplement that contained an amino acid complex right after my concussion. I supplemented with deer antler after the game. I recovered quickly from my brain injury and have not had any symptoms.”

Garvin recommends that any athletes who engage in sports that increase the risk of concussion should keep these supplements readily available during game time.

The Essential Supplements

While the concussion supplements are for special use, the heart of Garvin’s program is the group of supplements he calls the “essentials.” This custom program is designed to support athletes before, during and after training or games. He recommends rotating supplements and finding what works best for you. These essential supplements include:

- **Whey protein isolate.** Whey protein really forms the foundation of a solid training program, Garvin says. It provides a lean form of protein, plus nonessential amino acids and branched chain amino acids. These are important not only in creating and maintaining muscle mass but also in helping synthesize neurotransmitters, joint support, and post-workout recovery. The best whey proteins, according to Garvin, come from cows that were raised on grass-fed diets without hormones or antibiotics. The product should be free of sweeteners and artificial ingredients. Garvin recommends between 30 and 50 grams of whey protein a day for active athletes, taken within 30 minutes of exercises, but “never before.”

- **Creatine.** Garvin says he’s been taking creatine since he was 15 years old, starting with a creatine monohydrate and later switching to effervescent creatine because “it’s more bioavailable and less harsh.” Creatine, he says, is a great way to build explosive power
Finally, Garvin says it’s crucial to read as much as you can about supplements and find credible information. “I’ve learned a lot from Life Extension,” he said. “It’s unbiased information and tells people what they need to know about how to use supplements.”

For more information or to follow Michael Ray Garvin on Twitter, go to: https://twitter.com/MichaelRGarvin

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

To purchase a copy of World’s Most Jacked Athlete, visit www.amazon.com

Garvin also recommends that male athletes do everything they can to naturally boost testosterone. He says this is possible by taking supplements that have been proven to boost testosterone levels, as well as monitoring your DHEA levels and supplementing with additional DHEA if necessary. “I have at one point taken three different natural testosterone boosters at the same time, because each one contained certain ingredients,” he said. “If you try to take each one by itself, I believe it would be a waste of time.”

during exercise or activity because it increases cellular energy. He recommends that athletes take 5 grams of creatine a day on an empty stomach.

- **Green Superfood Complex.** The supplement called “the most important supplement for athletes” is a powerful blend of antioxidants and detoxifying ingredients that would benefit anybody. Garvin recommends superfood complexes with wheat-grass juice powder, alfalfa juice, spirulina and chlorella algae, spinach, probiotics, milk thistle, turmeric, and other ingredients. Together, these help maintain a healthy pH level, remove toxins and lactic acid build-up, and promote immunity and better health.

- **Glutamine.** Garvin recommends the amino acid glutamine to help prevent muscle breakdown, to boost the immune system, and for its powerful free radical scavenging properties. “Glutamine is essential for muscle recovery and wound healing,” he said. “Glutamine has helped me in so many different ways. There have been days where I was nauseated and took glutamine to ease my stomach. It has helped me before, during, and after my intense workouts.”
Research suggests specific probiotics positively influence biochemical signaling between the gastrointestinal tract and the nervous system—resulting in positive effects on mood.¹

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In 1991, Glenn Sabin was a happy and apparently healthy 28-year-old newlywed. He was energetic, big into exercise, and felt fine—so he was totally floored when the results of routine bloodwork showed he had chronic lymphocytic leukemia (CLL).

Doctors told him treatment could alleviate the symptoms and perhaps extend his life to a degree, but there was no dependable cure—he was suffering from a fatal disease.

Despite this grim prognosis, Sabin refused to accept that he had no chance to recover. Since mainstream medicine couldn’t help him reach that goal, he resolved to find another way. He didn’t turn his back on his doctors, but rather, working in collaboration with them, he did extensive research and essentially became, in the parlance of medical studies, n of 1, meaning a group of subjects consisting of only one person—himself.

It was a long, hard struggle, but in 2012 there was a near-miraculous result. A biopsy at Harvard showed Sabin had no trace of leukemic cells in his bone marrow. Against all odds, his “incurable” cancer had been cured.

Sabin cautions other cancer patients, however, that what worked for him will not work for everyone. For that reason, he doesn’t encourage anyone to abandon conventional treatment or to copy his diet or supplement protocols. Rather, he encourages others to get the help they need to develop protocols tailored to their particular needs.

In this interview with Life Extension®, Glenn Sabin discusses the incredible medical journey he describes in his book titled N of 1, and its implications for cancer treatment.
**LE:** You were first diagnosed with chronic lymphocytic leukemia in 1991. Tell us about the circumstances surrounding that diagnosis.

**GS:** (At that time) it wasn’t unusual for me to put in long days at a media company that my father had founded. Shortly after I got married, my father’s health had begun to fail, and I found myself running more and more of the operation.

Despite my long workdays, I did not neglect my body. Exercise was planned into my schedule. I worked out almost every day, usually lifting weights. I snuck in occasional unplanned cardio... I honestly can’t recall being fatigued at that time. I felt like a tank. Indestructible.

So when I showed up at the doctor’s office for my “routine maintenance,” I expected that last errand of the day to end with a nice slap on the back, and a “See you next year.” Instead, the doctor came into the exam room wearing an uncharacteristically solemn expression. My blood tests showed a problem, he told me. Something serious.

**LE:** You ultimately decided against that, even though doctors thought it was the only thing that offered even the slim chance of a cure.

**GS:** I immediately backed away when Dr. Lee Nadler (a renowned expert in chronic lymphocytic leukemia) told me that 20% of patients who underwent the procedure died. Not of leukemia, but of complications from the bone marrow transplant. I’m no math whiz, but I recognized those odds. They were about the same as Russian roulette.

**Editor’s note:** Other studies show much higher long term mortality from an allogenic bone marrow transplant where bone marrow is donated by another person.

**LE:** Were you presented with another option?

**GS:** To my great disappointment, it was “watchful waiting.” Dr. Nadler must have seen my face fall, because he was quick to point out that on the plus side, delaying treatment meant I could take advantage of whatever scientific discoveries lay in the future.

**LE:** You weren’t happy with that option either, so you decided to exercise and eat healthily while foregoing a transplant. What happened then?

**GS:** Despite the vast improvements in my diet, my blood counts remained abnormal. Not by much, but it was clear I still had chronic lymphocytic leukemia. I had cleaned up my diet, eating vegetables and fruits almost exclusively, avoiding pesticide-sprayed foods, and taking supplements and exercising daily. I explained this new regime to Dr. Kressel, and he heartily encouraged my healthy new...
lifestyle. However, when I pressed him about the effect of my new way of living on leukemia, Dr. Kressel admitted that he didn't think it was likely to help. There was simply no scientific evidence that lifestyle had any effect on leukemia.

**LE:** In 1998, you went on to investigate an alternative pharmacy in Bethesda, Maryland, called The Apothecary. What did you gain from it?

**GS:** At the epicenter of The Apothecary was Dr. Irv Rosenberg. Both pharmacist and nutritionist, Rosenberg was working with scores of patients, many with cancer, and using natural agents to complement their conventional care.

**LE:** Did he add to the supplements you were already taking?

**GS:** Before I list those details, do be warned that this list is not meant to be construed as a treatment for cancer. Using this list... in lieu of seeking personal guidance from your own medical professional could cost you your life. So now that you understand that this program was built for me specifically, that it is therefore unsuitable for anyone else, and that you should work with your own health professional to develop a program that fits your needs, I'll proceed to share with you what Dr. Rosenberg recommended to me, and me alone.

One of Dr. Rosenberg's top recommendations for me was d-alpha tocopherol, part of the vitamin E family. Irv also suggested I use a fermented mushroom extract containing “active hexose correlated compound” (AHCC).

Irv also recommended a soy extract called genistein, a vegetable extract called inositol hexaphosphate, and colostrum, an antibody-rich secretion of the bovine mammary gland produced at the time of birth.

**LE:** So had you turned away from mainstream medicine at this point?

**GS:** I never have, and never will. During the years I was experimenting with supplementation...I saw my local specialist, Dr. Kressel, regularly, for blood tests and examinations. Every few years I returned to Harvard's Dana-Farber Cancer Institute for an exam by Dr. Nadler. Every year or two, I submitted to painful bone marrow biopsy.

**LE:** You felt fine for a while until 2003, when you had flu-like symptoms and underwent tests that showed your leukemia was getting worse, and Dr. Kressel recommended chemotherapy. I understand you asked for a second opinion.

**GS:** Dr. Kressel quickly arranged one for me at the renowned Johns Hopkins Hospital in Baltimore. I drove to Baltimore to meet with Dr. Richard Ambinder.

**LE:** After testing, what was the upshot?

**GS:** He began with the fact that my red blood cell count was dangerously low, and there was no question about the cause: chronic lymphocytic leukemia. My immune system had been hijacked by the chronic lymphocytic leukemia. The hijacker had turned my own immune system against my red blood cells.

Dr. Ambinder explained his proposed plan. First, he said, the hemolytic anemia should be treated with an immune-suppressing drug called prednisone. Then, once the hemolysis was under control, several chemotherapy drugs would be given. Every detail of Dr. Ambinder's plan concurred with Dr. Kressel's advice. I realized that the moment I dreaded was finally here. The doctors were unanimous—I needed chemotherapy. Not “curative” chemotherapy, but a palliative Band-Aid to get me out of the danger zone and buy some time.

I reviewed my predicament. Chronic lymphocytic leukemia was considered terminal. Though some people lived for a number of years with this disease, there was no cure. And then it occurred to me—there was another choice, a very obvious one. This other choice would require the services of another type of healer... I had already met him. It was me. I would have to learn how to treat myself.

**LE:** From there, you proposed a sort of research partnership?

**GS:** I proposed that together, Dr. Kressel and I monitor the anemia. I would revisit and reinforce my home-cobbled program, and would show up twice a week at his office for blood work...We'd know for certain whether I was getting better or worse. Dr. Kressel was game.

Over the next few weeks, as often as I could, I swam. I stretched too, one muscle group at a time, and I could feel the strength and spring return to my step. To me, exercise was a healing form of meditation. Although the walks and swims were short, at least for the first month or so, they still happened every day.
I stayed the course. I proceeded with my self-directed program of activity, declining conventional treatment. I went to Dr. Kressel regularly for blood tests, as he and I agreed. And then, during the third week, Dr. Kressel and I got a surprise.

There was a measurable improvement in my counts. That initial result was good, Dr. Kressel explained, but caution was needed. To prove this result was a trend, we’d need three consecutive tests showing improvement. I was to return a week later, for the second of the three tests.

The following week, another test...

When I heard the result, I joyfully blurted out, “Another improvement!”

The fourth and fifth week’s blood tests confirmed we had a trend. The anemia was definitely improving. Although my red cell levels were not back to normal, they were definitely on their way. And the improvement was happening without prednisone or chemotherapy.

And then, after a few more weeks, the fevers went away and my night sweats vanished. My blood counts completely normalized. I had faced down the leukemia. It had backed off. I was out of immediate danger!

Dr. Kressel was pleased by the complete turnaround in my condition, although he could not explain what had happened. He recommended we take a closer look at my blood using a technique called flow cytometry. This investigation would tell us if leukemic cells were still lurking among the normal blood cells. Within a few days I got the results. They nearly floored me. There were no leukemic cells in my blood. None.

It seemed to me that there was a powerful, synergistic effect between the nutraceutical compounds, my diet, physical activity and my improving health. Perhaps consistent daily exercise contributed to an increased metabolic rate, and maybe my stress hormones were kept in check through all of these things. Ultimately, my body’s innate healing capacity was activated. I can’t know exactly how this came about. I can only speculate that my lifestyle played a big part. Whatever the molecular details, I knew I had accomplished something important.

LE: At that point you went back to see Dr. Nadler. What was his reaction?

GS: Dr. Nadler pulled up the report from my previous visit in summer of 2003, when I’d been so ill. He told me that in his 30 years as a doctor, he had never encountered a patient with chronic lymphocytic leukemia who had done so well. There was no evidence of leukemia on any of the tests, he told me.

It seemed to me that Dr. Nadler thought my remission must have been attributable to one thing in my protocol. One supplement or one botanical had to be responsible for the stunning turnaround in my health. Dr. Nadler wanted to know exactly which one it was.

I was more than happy to spend the next 45 minutes explaining to Dr. Nadler all the things I had done: my incredibly healthy diet, the meditative walks, the long swims, the weight workouts, and the nutraceuticals program. The nutraceuticals caught Dr. Nadler’s attention. He made me go over them several times, while he took notes and asked questions about formulations, dosages and schedules. I told Dr. Nadler, point blank, that I thought looking for one active agent responsible for my recovery was the wrong approach. In my opinion, the secret formula was the combination of diet, exercise, mind-body work, and nutraceuticals.

Deep down in my heart, clear marrow was what I wanted. I wanted to be free of leukemia once and for all. If I wanted to know I was indeed cured, I would have to take the only test that would tell me what was happening deep in my bones—another bone marrow biopsy.

LE: So what were the results?

GS: Leukemic cells were still there, lurking deep in my marrow. The news was a brutal kick to the stomach.

LE: From there, you read about epigallocatechin-3-gallate, or EGCG, which is an alkaloid in green tea that had been shown to kill cancer cells in a test tube. You made it part of your regimen, but not long afterward, you found out your leukemia was no longer in remission. Under the care of integrative medicine advocate Dr. Keith Block, part of your response was to increase your EGCG intake. What was the result?

GS: By March 2011, my white blood cell count began to drop. At 30 thousand, it was still high, but for the first time in a year, there was some improvement... I continued full steam ahead on every aspect of my lifestyle regimen. By the end of May 2011, my white blood cells had decreased to 19,000... By mid-July, my white blood cell count had fallen to 9,400, which was within normal range. By November 2011, about a year after increasing the dose of...
**Author Interview**

**LE:** So how are you today?

**GS:** My most recent blood tests, including flow cytometry, could find no evidence that I’ve ever had chronic lymphocytic leukemia. Only time will tell if I am truly cured.

**LE:** Anything you’d like to say in closing?

**GS:** I call on conventional physicians and investigators to put serious resources to work looking at cases like mine, where an unexpected recovery occurs. Please, conduct the rigorous research needed to learn how best to use diet, exercise, stress reduction techniques, herbs, and supplements to help people with serious illness. The time is now for this approach to become a major thrust of research.

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**EGCG**, my white blood cell count was 5,600, at the low end of normal! In addition to the dramatic decrease in my white blood cells, every single number in my terrain report had returned to within the normal range. A complete blood count and flow cytometry of the blood found no chronic lymphocytic leukemia cells. My blood was normal.

I was in clinical remission. Again.

**LE:** At this point, you wanted a bone marrow biopsy done to see if, amazingly enough, you could possibly have been cured. But doctors considered that extremely unlikely, and were reluctant to perform the test. Still, you went back to Dr. Nadler and insisted, correct?

**GS:** Unlike me, Dr. Nadler was always a gentleman, and was helpful whenever possible. Or perhaps on that occasion he just wanted to shut me up. By the end of the phone call, he had agreed to do the bone marrow biopsy for me.

**LE:** What happened when you got the results?

**GS:** As I scanned the report, a chill shot up my spine. Was I reading it accurately? Was it saying what I thought it was saying? It took me a moment to translate (the report) from medical-ese to English. The two most important words were “not seen.” What exactly was not seen? Leukemia. There was no sign that I had ever had it. My marrow was stone cold normal.

I could not wrap my mind around this astonishing fact. … These wonderful results occurred without conventional treatment... Was synergy between several factors at work? Dr. Nadler suggested looking into EGCG...To my mind, that was one possible answer. Rather than one component of my program, such as EGCG, being entirely responsible for my recovery, was it possible that the various elements of my program had worked together to improve my health?
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**SUBTOTAL OF COLUMN 1**

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

MAY 2017

RECEIVE 25% OFF THE RETAIL PRICE OF ALL PRODUCTS
<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>
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**COMBINED PRODUCTS:**

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<td>LIFE EXTENSION MIX™ • 490 caps w/o copper</td>
<td></td>
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<tr>
<td>02166</td>
<td>LIFE EXTENSION MIX™ POWDER • 14.81 oz w/o copper</td>
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<tr>
<td>01608</td>
<td>LIVER EFFICIENCY FORMULA • 30 caps</td>
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<tr>
<td>01639</td>
<td>5-LOX INHIBITOR W/APRÈSFLX® • 100 mg, 60 veg. caps</td>
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<tr>
<td>01678</td>
<td>L-LYSINE • 620 mg, 100 veg. caps</td>
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<tr>
<td>00455</td>
<td>LYCOPENE (Mega) • 15 mg, 90 softgels</td>
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</tr>
</tbody>
</table>

M

<table>
<thead>
<tr>
<th>ITEM No.</th>
<th>PRODUCT</th>
</tr>
</thead>
<tbody>
<tr>
<td>01559</td>
<td>MACUGACD® OCULAR SUPPORT w/ SAFFRON • 60 softgels</td>
</tr>
<tr>
<td>01593</td>
<td>MACUGCD® OCULAR SUPPORT w/ SAFFRON &amp; ASTAXANTHIN • 60 softgels</td>
</tr>
<tr>
<td>01459</td>
<td>MAGNESIUM CAPS • 500 mg, 100 veg. caps</td>
</tr>
<tr>
<td>01682</td>
<td>MAGNESIUM (CITRATE) • 160 mg, 100 veg. caps</td>
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<tr>
<td>02107</td>
<td>(EXTEND-RELEASE) MAGNESIUM • 60 veg. caps</td>
</tr>
<tr>
<td>01908</td>
<td>MEDITERRANEAN TRIM WITH SINETROL™-XPUR 60 veg. caps</td>
</tr>
<tr>
<td>02109</td>
<td>MEDITERRANEAN WHOLE FOOD BLEND • 90 veg. caps</td>
</tr>
<tr>
<td>01668</td>
<td>METALONIN • 300 mcg, 100 veg. caps</td>
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<tr>
<td>01083</td>
<td>METALONIN • 500 mcg, 200 veg. caps</td>
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<tr>
<td>00329</td>
<td>METALONIN • 1 mg, 60 caps</td>
</tr>
<tr>
<td>00330</td>
<td>METALONIN • 3 mg, 60 veg. caps</td>
</tr>
<tr>
<td>00331</td>
<td>METALONIN • 10 mg, 60 veg. caps</td>
</tr>
<tr>
<td>00332</td>
<td>METALONIN • 3 mg, 60 veg. lozenges</td>
</tr>
<tr>
<td>01734</td>
<td>METALONIN (Fast-Acting Liquid) • 2 fl. oz (Citrus-Vanilla)</td>
</tr>
<tr>
<td>01767</td>
<td>METALONIN TIMED RELEASE • 300 mcg, 100 veg. tabs</td>
</tr>
<tr>
<td>01788</td>
<td>METALONIN TIMED RELEASE • 750 mcg, 60 veg. tablets</td>
</tr>
<tr>
<td>01766</td>
<td>METALONIN TIMED RELEASE • 3 mg, 60 veg. tabs</td>
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<tr>
<td>02101</td>
<td>MEMORY PROTECT • 36 day supply</td>
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<tr>
<td>01536</td>
<td>METHYLCOBALAMIN • 1 mg, 60 veg. lozenges (vanilla)</td>
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<tr>
<td>01537</td>
<td>METHYLCOBALAMIN • 5 mg, 60 veg. lozenges (vanilla)</td>
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<tr>
<td>00709</td>
<td>MIGRA-EEZE™ (Butterbun) • 60 softgels</td>
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<tr>
<td>01522</td>
<td>MILK THISTLE (European) • 60 veg. caps</td>
</tr>
<tr>
<td>01922</td>
<td>MILK THISTLE (European) • 60 softgels</td>
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<tr>
<td>01925</td>
<td>MILK THISTLE (European) • 120 softgels</td>
</tr>
<tr>
<td>01940</td>
<td>MIRAFORTE w/ STANDARDIZED LIGNANS (Super) • 120 veg caps</td>
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<tr>
<td>01669</td>
<td>MITOCHONDRIAL BASICS W/BIOPOQ® • 30 caps</td>
</tr>
<tr>
<td>01668</td>
<td>MITOCHONDRIAL ENERGY OPTIMIZER w/BIOPOQ® • 120 caps</td>
</tr>
<tr>
<td>00065</td>
<td>MK-7 • 90 mcg, 60 softgels</td>
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<tr>
<td>00451</td>
<td>MSM (Methylsulfonylmethane) • 1,000 mg, 100 caps</td>
</tr>
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N

<table>
<thead>
<tr>
<th>ITEM No.</th>
<th>PRODUCT</th>
</tr>
</thead>
<tbody>
<tr>
<td>01534</td>
<td>N-ACETYL-L-CYSTEINE • 600 mg, 60 veg. caps</td>
</tr>
<tr>
<td>01904</td>
<td>NAD+ CELL REGENERATOR™ • 100 mg, 30 veg. caps</td>
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<tr>
<td>01807</td>
<td>NATURAL APPETITE SUPPRESS (Advanced) • 60 veg. caps</td>
</tr>
<tr>
<td>00984</td>
<td>NATURAL BP MANAGEMENT • 60 tablets</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>ITEM No.</th>
<th>PRODUCT</th>
</tr>
</thead>
<tbody>
<tr>
<td>02012</td>
<td>NATURAL CORTISOL BALANCE • 30 veg. caps</td>
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<tr>
<td>01892</td>
<td>NATURAL ESTROGEN • 60 veg. tabs</td>
</tr>
<tr>
<td>01626</td>
<td>NATURAL SEX FOR WOMEN® 50+ (Advanced) • 90 veg. caps</td>
</tr>
<tr>
<td>01444</td>
<td>NATURAL SLEEP® • 60 veg. caps</td>
</tr>
<tr>
<td>01551</td>
<td>NATURAL SLEEP® w/ MELATONIN (Enhanced) • 30 caps</td>
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<tr>
<td>01511</td>
<td>NATURAL SLEEP® w/ O MELATONIN (Enhanced) • 30 caps</td>
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<tr>
<td>01445</td>
<td>NATURAL SLEEP® MELATONIN • 5 mg, 60 veg. caps</td>
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<tr>
<td>00987</td>
<td>NATURAL STRESS RELIEF • 30 veg. caps</td>
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<tr>
<td>01603</td>
<td>NEURO-MAG® MAGNESIUM L-THERIONATE • 90 veg. caps</td>
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<tr>
<td>01602</td>
<td>NEURO-MAG® MAGNESIUM L-THERIONATE w/ CALCIUM &amp; VITAMIN D3 • 25 grams</td>
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<tr>
<td>01990</td>
<td>NITROVASC® w/CORDIART® • 30 veg. caps</td>
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<tr>
<td>01903</td>
<td>NK CELL ACTIVATOR® • 30 veg. tablets</td>
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<tr>
<td>00373</td>
<td>NO FLUSH NIAIN • 800 mg, 100 caps</td>
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O

<table>
<thead>
<tr>
<th>ITEM No.</th>
<th>PRODUCT</th>
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</thead>
<tbody>
<tr>
<td>01824</td>
<td>OLIVE LEAF VASCULAR SUPPORT w/ CERELY SEED EXTRACT (Advanced) • 60 veg. caps</td>
</tr>
<tr>
<td>01888</td>
<td>OMEGA-3 PLUS EPA/DHA w/ SESAME LIGNANS, OIL EXTRACT, KRILL &amp; ASTAXANTHIN (SUPER) • 120 softgels</td>
</tr>
<tr>
<td>01893</td>
<td>OMEGA-3 EPA/DHA w/ SESAME LIGNANS &amp; OIL EXTRACT (Super) • 60 softgels</td>
</tr>
<tr>
<td>01982</td>
<td>OMEGA-3 EPA/DHA w/ SESAME LIGNANS &amp; OIL EXTRACT (Super) • 120 softgels</td>
</tr>
<tr>
<td>01984</td>
<td>OMEGA-3 EPA/DHA w/ SESAME LIGNANS &amp; OIL EXTRACT (Super) • 60 enteric coated softgels</td>
</tr>
<tr>
<td>01985</td>
<td>OMEGA-3 EPA/DHA w/ SESAME LIGNANS &amp; OIL EXTRACT (Super) • 120 enteric coated softgels</td>
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<tr>
<td>01986</td>
<td>OMEGA-3 EPA/DHA w/ SESAME LIGNANS &amp; OIL EXTRACT (Super) • 240 small softgels</td>
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<tr>
<td>01991</td>
<td>ONCE-DAILY HEALTH BOOSTER • 60 softgels</td>
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<tr>
<td>02113</td>
<td>ONE-PER-DAY • 60 tablets</td>
</tr>
<tr>
<td>01328</td>
<td>ONLY TRADE MINERALS • 90 veg. caps</td>
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P

<table>
<thead>
<tr>
<th>ITEM No.</th>
<th>PRODUCT</th>
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<tbody>
<tr>
<td>01779</td>
<td>PALMETTOGUARD® SAW PALMETTO W/ BETA-SITOSTEROL 30 softgels</td>
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<tr>
<td>01790</td>
<td>PALMETTOGUARD® SAW PALMETTO/NETTLE ROOT W/ BETA-SITOSTEROL • 60 softgels</td>
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<tr>
<td>01323</td>
<td>PEAK ATP® WITH GLYCOCARN® • 60 veg. caps</td>
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<tr>
<td>00342</td>
<td>PECTA SOL-C® MODIFIED CITRUS PECTIN • 6454 grams powder</td>
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<tr>
<td>01080</td>
<td>PECTA SOL-C® MODIFIED CITRUS PECTIN • 270 veg. caps</td>
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<td>01811</td>
<td>PENNY IMMUNE • 60 veg. caps</td>
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<table>
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<tr>
<th>ITEM No.</th>
<th>PRODUCT</th>
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<tbody>
<tr>
<td>00673</td>
<td>PDX® PLUS MULBERRY (WellBetX®) • 150 veg. caps</td>
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<tr>
<td>01953</td>
<td>POMERGRANATE COMPLETE • 30 softgels</td>
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<tr>
<td>00956</td>
<td>POMERGRANATE FRUIT EXTRACT • 30 veg. caps</td>
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<tr>
<td>01837</td>
<td>POMI-T™ • 60 veg. caps</td>
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<tr>
<td>00577</td>
<td>POTASSIUM IODIDE • 130 mg, 14 tabs</td>
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<tr>
<td>01500</td>
<td>PQG CAPS W/BIOPOQ® • 10 mg, 30 veg. caps</td>
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<tr>
<td>01647</td>
<td>PQG CAPS W/BIOPOQ® • 20 mg, 30 veg. caps</td>
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<tr>
<td>00302</td>
<td>PREGENELONE • 50 mg, 100 caps</td>
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<tr>
<td>00700</td>
<td>PREGENELONE • 100 mg, 100 caps</td>
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<tr>
<td>00373</td>
<td>PRELOX® NATURAL SEX FOR MEN® • 60 tablets</td>
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<tr>
<td>ITEM No.</td>
<td>PRODUCT</td>
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<tr>
<td>---------</td>
<td>---------</td>
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<tr>
<td>00525</td>
<td>PROBOST™ THYMIC PROTEIN A • 30 packets</td>
</tr>
<tr>
<td>01441</td>
<td>PROGESTA-CARE® • 4 oz cream</td>
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<tr>
<td>01928</td>
<td>PROSTATE FORMULA (Ultra NAT) • 60 softgels</td>
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<tr>
<td>01909</td>
<td>PROSTATOL® (Triple strength) • 30 softgels</td>
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<tr>
<td>01742</td>
<td>PROTEIN-ISOLATE (Whey) Vanilla • 403 grams</td>
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<tr>
<td>01743</td>
<td>PROTEIN-ISOLATE (Whey) Chocolate • 437 grams</td>
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<tr>
<td>01770</td>
<td>PROTEIN CONCENTRATE (New Zealand Whey) Vanilla 500 grams</td>
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<tr>
<td>01771</td>
<td>PROTEIN CONCENTRATE (New Zealand Whey) Chocolate 640 grams</td>
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<td>01812</td>
<td>PROVITAL® PURIFIED OMEGA-7 • 30 softgels</td>
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<tr>
<td>01676</td>
<td>PS CAPS (Phosphatidylserine) • 100 mg, 100 veg. caps</td>
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<td>01508</td>
<td>PTEROFUNE® Pterostilbene • 50 mg, 60 veg. caps</td>
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<td>01209</td>
<td>PUMPKIN SEED EXTRACT (Water-soluble) • 60 veg. caps</td>
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<td>01637</td>
<td>PYCNOGENOL® FRENCH MARITIME PINE BARK EXTRACT 100 mg, 60 veg. caps</td>
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<tr>
<td>01217</td>
<td>PYRIDOXAL 5'-PHOSPHATE • 50 mg, 60 veg. caps</td>
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<tr>
<td>01309</td>
<td>QUERCETIN (Optimized) • 250 mg, 60 veg. caps</td>
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<tr>
<td>01030</td>
<td>RED YEAST RICE (Bluebonnet) • 600 mg, 60 veg. caps</td>
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<tr>
<td>00605</td>
<td>REGIMINT • 60 enteric-coated caps</td>
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<tr>
<td>01708</td>
<td>REISHI EXTRACT MUSHROOM COMPLEX • 60 veg. caps</td>
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<tr>
<td>01448</td>
<td>REJUVENEX® BODY LOTION • 6 oz</td>
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<tr>
<td>01621</td>
<td>REJUVENEX® FACTOR FIRMING SERUM • 1.7 oz</td>
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<tr>
<td>01220</td>
<td>REJUVENEX® (Ultra) • 2 oz</td>
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<tr>
<td>00676</td>
<td>REJUVENIGHT® (Ultra) • 2 oz</td>
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<tr>
<td>01410</td>
<td>RESVERATROL W/PTEROSTILBENE • 100 mg, 60 veg. caps</td>
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<td>02031</td>
<td>RESVERATROL W/NICOTINAMIDE RIBOSIDE • 30 caps</td>
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<tr>
<td>02030</td>
<td>RESVERATROL (Optimized) • 60 veg. caps</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 200 mg, 30 veg. caps</td>
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<tr>
<td>00972</td>
<td>(D) RIBOSE POWDER • 150 grams</td>
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<tr>
<td>01473</td>
<td>(D) RIBOSE TABLETS • 100 veg. tabs</td>
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<tr>
<td>01609</td>
<td>RICH REWARDS® BREAKFAST GROUND COFFEE • 12 oz. bag</td>
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<tr>
<td>01730</td>
<td>RICH REWARDS® BREAKFAST BLEND GROUND COFFEE Natural Mocha • 12 oz. bag</td>
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<tr>
<td>01729</td>
<td>RICH REWARDS® BREAKFAST BLEND GROUND COFFEE Natural Vanilla • 12 oz. bag</td>
</tr>
<tr>
<td>01612</td>
<td>RICH REWARDS® BREAKFAST BLEND WHOLE BEAN COFFEE 12 oz. bag</td>
</tr>
<tr>
<td>01610</td>
<td>RICH REWARDS® DECAFENATED ROAST GROUND COFFEE 12 oz. bag</td>
</tr>
<tr>
<td>01208</td>
<td>R-LIPOIC ACID (Super) • 240 mg, 60 veg. caps</td>
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<tr>
<td>00070</td>
<td>RNA CAPSULES • 500 mg, 100 caps</td>
</tr>
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<table>
<thead>
<tr>
<th>ITEM No.</th>
<th>PRODUCT</th>
<th>YOUR PRICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>01432</td>
<td>SAFFRON W/SATIEREAL® (Optimized) • 60 veg. caps</td>
<td>36.00 27.00 24.00</td>
</tr>
<tr>
<td>01935</td>
<td>SAMe (S-ADENOSYL-METHIONINE) 200 mg, 30 enteric coated tablets</td>
<td>25.00 18.75 16.50</td>
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**SUBTOTAL OF COLUMN 9**

**SUBTOTAL OF COLUMN 10**

RECEIVE 25% OFF THE RETAIL PRICE OF ALL PRODUCTS
<table>
<thead>
<tr>
<th>Item No.</th>
<th>PRODUCT</th>
<th>YOUR PRICE</th>
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<tbody>
<tr>
<td>0101</td>
<td><strong>$01051</strong> RECEPTIVE 25% OFF THE RETAIL PRICE OF ALL PRODUCTS</td>
<td><strong>$03388</strong> OUTSTANDING HEALTH: THE 6 ESSENTIAL KEYS TO MAXIMIZE YOUR ENERGY AND WELL-BEING by Michael Gaitzer, MD &amp; Larry Trivin Jr. • 2015</td>
</tr>
<tr>
<td>0021</td>
<td>VANADYL SULFATE • 7.5 mg, 100 veg. tablets</td>
<td>15.00</td>
</tr>
<tr>
<td>0210</td>
<td><strong>VENOFLOW®</strong> • 30 veg. caps</td>
<td>52.00</td>
</tr>
<tr>
<td>0040</td>
<td>VENOTONE • 60 caps</td>
<td>18.95</td>
</tr>
<tr>
<td>0120</td>
<td><strong>VINOCETINE</strong> • 10 mg, 100 veg. tablets</td>
<td>18.00</td>
</tr>
<tr>
<td>00372</td>
<td><strong>VITAMIN B3 NIACIN</strong> • 500 mg, 100 caps</td>
<td>7.65</td>
</tr>
<tr>
<td>0202</td>
<td><strong>VITAMIN B5</strong> • 500 mg, 100 veg. caps (Pantothenic Acid)</td>
<td>11.00</td>
</tr>
<tr>
<td>0153</td>
<td><strong>VITAMIN B6</strong> • 250 mg, 100 veg. caps</td>
<td>12.50</td>
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<tr>
<td>00361</td>
<td><strong>VITAMIN B12</strong> • 500 mcg, 100 lozenges</td>
<td>8.75</td>
</tr>
<tr>
<td>01634</td>
<td><strong>VITAMIN C</strong> w/HYDROPERCETIN • 1,000 mg, 60 veg. tablets</td>
<td>10.00</td>
</tr>
<tr>
<td>00927</td>
<td><strong>VITAMIN C</strong> w/HYDROPERCETIN • 1,000 mg, 250 veg. tablets</td>
<td>27.00</td>
</tr>
<tr>
<td>00064</td>
<td><strong>VITAMIN C POWDER</strong> (BUFFERED) • 454 grams</td>
<td>23.95</td>
</tr>
<tr>
<td>01736</td>
<td><strong>VITAMIN C-MAGNESIUM CRYSTALS (EFFERVESCENT)</strong> 180 grams</td>
<td>20.00</td>
</tr>
<tr>
<td>01732</td>
<td><strong>VITAMIN D3</strong> • 2,000 IU, 1 fl. oz, Mint flavor</td>
<td>28.00</td>
</tr>
<tr>
<td>01753</td>
<td><strong>VITAMIN D3</strong> • 1,000 IU, 80 softgels</td>
<td>7.00</td>
</tr>
<tr>
<td>01751</td>
<td><strong>VITAMIN D3</strong> • 1,000 IU, 250 softgels</td>
<td>12.50</td>
</tr>
<tr>
<td>01713</td>
<td><strong>VITAMIN D3</strong> • 5,000 IU, 60 softgels</td>
<td>10.00</td>
</tr>
<tr>
<td>01718</td>
<td><strong>VITAMIN D3</strong> • 7,000 IU, 60 softgels</td>
<td>14.00</td>
</tr>
<tr>
<td>01758</td>
<td><strong>VITAMIN D3 W/SEA-IODINE™</strong> • 5,000 IU, 60 caps</td>
<td>14.00</td>
</tr>
<tr>
<td>00864</td>
<td><strong>VITAMIN D3 LIQUID</strong> • 2,000 IU, 1 fl. oz</td>
<td>28.00</td>
</tr>
<tr>
<td>01640</td>
<td><strong>VITAMIN D AND K W/SEA-IODINE™</strong> • 60 caps</td>
<td>24.00</td>
</tr>
<tr>
<td>01863</td>
<td><strong>VITAMIN E (Natural)</strong> • 400 IU, 90 softgels</td>
<td>28.00</td>
</tr>
<tr>
<td>01936</td>
<td><strong>VITAMIN K2 (Low dose)</strong> • 45 mcg, 90 softgels</td>
<td>18.00</td>
</tr>
<tr>
<td>01902</td>
<td><strong>WAIST-LINE CONTROL™</strong> • 120 veg. caps</td>
<td>42.00</td>
</tr>
<tr>
<td>01919</td>
<td><strong>X-R SHIELD</strong> • 90 veg. caps</td>
<td>15.00</td>
</tr>
<tr>
<td>00409</td>
<td><strong>XYLIWHITE™ MOUTHWASH</strong> • 16 oz</td>
<td>10.00</td>
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<tr>
<td>01813</td>
<td><strong>ZINC HIGH POTENCY</strong> • 50 mg, 90 veg. caps</td>
<td>7.95</td>
</tr>
<tr>
<td>01561</td>
<td><strong>ZINC LOZENGES</strong> • 60 veg. lozenges</td>
<td>9.00</td>
</tr>
<tr>
<td>01061</td>
<td><strong>ZINC LOZENGES</strong> (Enhanced) • 30 veg. lozenges</td>
<td>12.00</td>
</tr>
<tr>
<td>01051</td>
<td><strong>ZYLAMEND® WHOLE BODY</strong> • 120 liquid veg. caps</td>
<td>72.95</td>
</tr>
</tbody>
</table>

**SUBTOTAL OF COLUMN 12**

* These products are not 25% off retail price.
** Due to license restrictions, this product is not for sale to customers outside of the USA.
*** Due to license restrictions, this product is not for sale to Canada.
† Due to license restrictions, this product is not for sale to customers outside of the USA.
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Not sure exactly which supplements you need? Talk to a Wellness Specialist toll-free at 1-800-226-2370
## ORDER SUBTOTALS

<table>
<thead>
<tr>
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## ORDER TOTALS

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<td>C.O.D.s (ADD $7 FOR C.O.D. ORDERS)</td>
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<tr>
<td>Shipping</td>
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<td>Grand Total (MUST BE IN U.S. DOLLARS)</td>
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**PLEASE MAIL TO:** Life Extension  
P.O. Box 407198 • Ft. Lauderdale, Florida 33340-7198  
Or Call Toll Free 1-800-544-4440 • Fax: 866-728-1050

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**BILL TO ADDRESS**

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<th>Phone</th>
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**SHIP TO ADDRESS**

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AMPK Activator

Item #01907 - 90 vegetarian capsules
1 bottle $48
Retail Price $36

$33 each

AMPK Activator

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Gynostemma Pentaphyllum

Trans-tiliroside promotes healthy blood glucose levels and body weight already within normal range. In one study, researchers documented a 1-inch reduction in abdominal circumference in overweight individuals who took 450 mg daily of G. pentaphyllum extract for 12 weeks. 

Trans-tiliroside promotes healthy blood glucose and body weight already within normal range.

ActivAMP® is a registered trademark of Gencor. This supplement should be taken in conjunction with a healthy diet and regular exercise program. Individual results are not guaranteed and results may vary.

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

Importance of AMPK

Studies show increased AMPK activity supports:

- Reduced fat storage
- New mitochondria production
- The promotion of healthy blood glucose and lipids already within normal range

AMPK Activator provides nutrients shown to significantly boost AMPK activity.

Non-GMO

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.

References


AMPK Activator

- Reduced fat storage
- New mitochondria production
- The promotion of healthy blood glucose and lipids already within normal range

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WHAT’S INSIDE

Visit us at www.LifeExtension.com

7 SHOULD YOU EAT BEFORE A BLOOD TEST?
Up until now, people have been told to fast 8 to 12 hours prior to having a blood test. New data indicates a more accurate reading may be obtained when blood is drawn 2 to 6 hours after a normal meal.

38 PROBIOTIC LOZENGE PROMOTES ORAL HYGIENE
Targeted oral probiotics can reduce gum deterioration and tooth decay by eliminating harmful bacteria for a healthier mouth.

54 COMBAT SUGAR TOXICITY
When sugar (glucose) reacts with the body’s proteins, toxic glycation reactions accelerate aging. Fortunately, there are ways to impede glycation by cooking at lower temperature and neutralizing formation of advanced glycation end products.

28 ARTERIAL PLAQUE RUPTURE
A human study published in December 2016 corroborates previous clinical research showing dramatic reductions in markers of atherosclerosis, along with stabilization of rupture-prone arterial plaque.

49 COQ10 FIGHTS STATIN-INDUCED DIABETES
New findings reveal how coenzyme Q10 can help protect against statin-induced insulin resistance.

66 THE RIGHT EXERCISE INHIBITS COGNITIVE DECLINE
Strength-training exercise can boost cognition and fight memory decline.