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Homocysteine was discovered in 1932, but its role in promoting atherosclerosis went largely unrecognized until 1969.¹

For many decades, conventional medicine was so focused on cholesterol that homocysteine went unnoticed.

We helped ignite the debate with our 1981 publication showing high homocysteine blood levels increase heart attack and stroke risk. Since then, we’ve published dozens of articles about the life-shortening impact of excess homocysteine, and how easy it is to lower it.

New studies link high homocysteine to degenerative brain disorders. These reports yield critical pieces of data that explain why some homocysteine-lowering studies do not yield expected benefits.²⁻⁴

For example, a group of researchers found that people using B vitamins to lower homocysteine must also have sufficient omega-3s to protect brain function.⁵

Brain cells require DHA (an omega-3 fat) for structure and function. It is not surprising that some clinical trials using B vitamins to improve neurological status show benefits only in people with higher omega-3 levels.⁶

Additional findings reveal how much more effective “activated” B vitamins such as 5-MTHF (folate) are at pushing down elevated homocysteine, especially in elderly individuals.⁷,⁸

This issue of Life Extension Magazine® reviews startling new findings about the pathological role of homocysteine in degenerative brain aging.
patients with cognitive dysfunction were more likely to have five-point higher homocysteine levels.16

Just imagine how easy it might be to restore cognition in these individuals by giving them high-potency activated B vitamins like 5-MTHF (folic acid) and methylcobalamin (vitamin B12).

Low-Potency Folate Supplements Often Ineffective

Most conventional physicians are not trained on the optimal use of folate supplements. As a result, they inadvertently design clinical trials using low potencies of the least effective forms of folic acid.

The chart on this page shows the many enzymatic steps required to convert the folic acid found in commercial supplements into activated 5-MTHF.

Some people only need commercial folic acid to lower their homocysteine since they have high enzymatic activity to convert it to 5-MTHF. Many others lack the ability to convert folic acid to its active form (5-MTHF), especially as they age.17,18 These individuals often suffer disorders related to excess homocysteine.19-22

Why Conventional Folate Supplements Do Not Optimally Lower Homocysteine

Homocysteine is decreased in the body by 5-methyltetrahydrofolate (5-MTHF).7

When folic acid is taken, it must go through several enzymatic changes to convert to 5-MTHF.

A surprising number of people, especially as they age, lack the enzymes needed to convert folic acid into metabolically active 5-MTHF.17 These individuals need to take a 5-MTHF supplement to directly supply their body with the form of folate that reduces homocysteine.

This chart shows the many steps required by the body to convert folic acid to 5-MTHF.

If one is supplementing with folic acid yet still suffers higher-than-optimal homocysteine, they should add 1 mg (1,000 micrograms) to 10 mg (10,000 micrograms) of 5-MTHF to their daily supplement regimen. This higher potency 5-MTHF supplement is now available without a prescription.
There are studies where folic acid potencies of 400-800 mcg are used with little benefit derived. We know from decades of experience in working with our supporters that higher doses of folate and other B vitamins are often needed to drop homocysteine into safer ranges.

For instance, when a blood test reveals elevated homocysteine, we suggest that 1,000 mcg of 5-MTHF be taken once or twice daily in addition to the 400 mcg of 5-MTHF included in our multi-vitamin formulas.

If this dose fails to sufficiently reduce homocysteine, we then suggest 5,000 mcg of 5-MTHF once or twice daily, along with higher potencies of the methylcobalamin form of vitamin B12 and higher doses of pyridoxal-5-phosphate, which is an “activated” form of vitamin B6.

Compared to poorly designed trials where 400-800 mcg potencies of folic acid are used along with less active forms of B12 and B6, we are suggesting higher doses of more effective forms of B vitamins.

Based on very recent studies, anyone with elevated homocysteine should also consider taking an omega-3 supplement in order to derive brain-health benefits.5,6,23

Omega-3s and B Vitamins Prevent Brain Atrophy

As we age, our brain literally shrivels in size. As this happens, we experience a wide range of neurological disorders.

A study was done on elderly people with mild cognitive impairment who were randomly assigned to receive folic acid (800 mcg), vitamin B6 (20 mg), and B12 (500 mcg) or placebo.5 The study authors described these potencies as “high-dose,” whereas for many people with elevated homocysteine, these are insufficient potencies of less active forms of B vitamins. This study nonetheless revealed some intriguing new findings.

Both groups (B-vitamin supplemented and placebo) underwent MRI brain imaging at baseline and two years later. In the B-vitamin group that had high baseline omega-3 blood levels, the mean brain atrophy rate was slowed by a remarkable 40% compared to placebo.5 There was no significant benefit amongst the B-vitamin group with low baseline omega-3 blood levels.

In the placebo arm of the study, there was no slowdown of brain shrinkage (atrophy) even in the presence of higher omega-3s. This study provides intriguing new data on the importance of consuming B vitamins and omega-3s to protect against brain atrophy.

Another recent study showed B vitamins plus omega-3s enhanced the mental performance benefits in elderly people with mild cognitive impairment. Among those with good omega-3 status, B-vitamin treatment resulted in 63% more elderly subjects deriving cognitive benefits.6 As with the brain atrophy study, this trial showed there was no effect of B vitamins when omega-3 levels are low, but significant benefit when B vitamins were given to elderly subjects whose omega-3 status was in the upper-normal range.

Take-home lesson:

B vitamins + omega-3s = Delayed Brain Aging.
Postmenopausal Mental Decline

Postmenopausal women are prone to accelerated loss of a wide range of cognitive functions. Until recently, this was blamed on lack of estrogen, progesterone and testosterone brought about by menopause.

A study was done using a battery of tests of neurological functions in postmenopausal women and found that those with elevated homocysteine suffered the greatest percentage of cognitive decline. Here is the study author's conclusion:

“In summary, hyperhomocysteinemia was related with increased risk of decline in executive functioning, complex attention, cognitive flexibility, and memory in postmenopausal women.”

Reference Ranges Need to be Revised

A deficiency of vitamin B12 alone can cause mild cognitive impairment (and dementia).

A study looked at blood (serum) concentrations of vitamin B12 in a group of people suffering typical age-related neurological dysfunctions.

The findings showed that people with vitamin B12 in the “low” normal reference ranges showed significantly poorer learning ability and performance than did patients with “high” normal vitamin B12 status.

Both of these blood markers are modifiable, meaning they can be brought down to safer ranges.

Protection against Non-Alzheimer’s Dementia

A number of studies have sought to assess the effectiveness of nutrients like vitamin E (alpha tocopherol) and risk of dementia. Some studies indicate benefits to antioxidant nutrients while others fail to show a protective effect.

A study evaluated blood levels of vitamin A, vitamin E, and homocysteine in elderly persons with and without dementia. The findings showed decreased risk of non-Alzheimer’s dementia in those with higher blood levels of vitamins A and E and lower levels of homocysteine.

Record Number of Centenarians

According to the Centers for Disease Control and Prevention, the number of people in the United States age 100 and older has increased by 43.6% since year 2000.

Whether people are demented by the time they reach 100 years has a lot to do with their behavior in earlier years, and genetic factors.

A recent study on centenarians evaluated a number of parameters and found dementia to be associated with higher blood levels of homocysteine and proinflammatory factors like C-reactive protein.

Both of these blood markers are modifiable, meaning they can be brought down to safer ranges.

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**As We See It**

**Even Fetuses Need Protection**

A number of previous studies associate prenatal maternal folate deficiency with reduced prenatal brain growth in offspring. Little is known about the longer-term impact.

A study of Dutch children aged 6-8 years was done utilizing MRI brain scans and other measures of intelligence. Children of mothers with insufficient folate showed poorer performance on language and visuospatial scores. The authors concluded:

“Our findings suggest that folate insufficiency in early pregnancy has a long-lasting, global effect on brain development and is, together with homocysteine levels, associated with poorer cognitive performance.”

**Young Adults may Benefit From B Vitamins**

A study of people aged 18-40 years was done to compare the effects of a multivitamin supplement on mood.

In response to the multivitamin, homocysteine levels dropped significantly with a corresponding improvement in mood as measured by a recognized score of mental depression. Younger people respond well to standard B vitamins because their enzymatic conversion systems function at a high level, meaning they readily convert folate into 5-MTHF.

As people age, their ability to absorb and enzymatically metabolize folic acid is compromised, which is why homocysteine levels surge higher with age. The solution is to use the 5-MTHF form of folate that requires no enzymatic conversion to reduce homocysteine.

**What are “High” Homocysteine Levels?**

When Life Extension® evaluated homocysteine toxicity in the mid-1990s, we found persuasive evidence that optimal levels were below 8 μmol/L of blood.

The medical establishment has never been able to agree on what a “safe” homocysteine level really is, and there are many contradictory findings in the published literature.

Research has demonstrated that homocysteine levels above 10 μmol/L are associated with increased heart-attack risk. Another study showed an increased cardiac risk with homocysteine levels above 9 μmol/L and that the risk increased sharply as levels rise to 15 μmol/L or greater.

A recent study found that homocysteine levels higher than 15 μmol/L were associated with almost double the prevalence of dementia, along with cognitive and functional impairment.

These variations are commonly found across the different published studies and explain why conventional medicine has not been able to reach a consensus as to what optimal homocysteine levels should be.

From a practical standpoint, many aging individuals will be challenged to bring their homocysteine levels to below 8 μmol/L because of impaired B vitamin-dependent detoxification systems. That does not mean, however, that there is not a significant benefit to lowering homocysteine to, let’s say, below 12 μmol/L, as opposed to letting it stay at 15 μmol/L or higher.

**Impact of Homocysteine on Cardiac-Stenting Patients**

In response to narrowing or blockage of a coronary artery, most patients today have a metal stent inserted into the occluded artery to restore blood flow to the affected heart muscle. This eliminates the need for open-chest coronary bypass surgery and its many complications.
Homocysteine Blood Testing

One reason we initiated direct-to-consumer testing 20 years ago was that many doctors refused to prescribe homocysteine blood tests when our members requested them.

We thought this to be highly inappropriate, considering there was no risk to someone merely checking their homocysteine blood levels. We are confident that our offering homocysteine blood tests saved lives based on surprisingly high levels that some people have and are able to lower by taking more B vitamins.

If you have not had your homocysteine checked recently, you can order it today and have your blood drawn at your convenience at a blood-draw station near you.

Our regular discount price to test homocysteine levels is $54, but if you order before August 31, 2017, we will include our CBC/Chemistry blood panel at no charge ($35 value). Page 15 itemizes the many important tests included in our CBC/Chemistry panel.

To order a homocysteine blood test for $54 and receive a complimentary CBC/Chemistry panel, call 1-800-208-3444 or log on to LifeExtension.com/homocysteine.

The concern is how long the stenting of one or multiple arteries will last and whether there will be long term cardiovascular problems.

A study was done on patients who underwent coronary-artery stenting to investigate whether elevated homocysteine at admission predicted long-term outcomes.

The subjects were divided into a group whose homocysteine blood levels were under 12 μmol/L compared to those 12 μmol/L and over.

After a mean follow-up of almost five years, rates of major adverse cardiac events were 30% higher in the group whose homocysteine was 12 μmol/L and above compared to those whose homocysteine was under 12 μmol/L.

The most striking variable was cardiac death. Stent patients with homocysteine of 12 μmol/L and above were more than twice as likely to die from cardiac death over the study period compared to those whose admission homocysteine readings were below 12 μmol/L.

Erectile Dysfunction

An early sign of vascular disease in men can be erectile dysfunction, which is the topic of endless television advertisements promoting expensive drugs like Cialis® and Viagra®.

A study comparing men with erectile dysfunction with controls found significantly reduced penile blood flow velocity in men with homocysteine levels above 12.65 μmol/L. This led the researchers to suggest that “elevation of homocysteine levels was associated with an increased risk of ED.”

Stroke Induced by Homocysteine

A number of studies have looked at homocysteine blood levels and stroke, with inconsistent findings reported.

One reason is that the many independent risk factors for stroke (such as hypertension, glucose, inflammation, and lipids) make it difficult to pinpoint homocysteine as a specific independent causation factor.

A study published at the end of 2016 looked at stroke patients treated with the clot-busting drug tPA and found poorer outcomes in acute stroke patients with high homocysteine.

A striking finding from this study was that mean homocysteine levels in these ischemic stroke cases was 22.62 μmol/L, which is high by everyone’s standards.

Yet most doctors today are not checking their elderly patients’ homocysteine blood levels, leaving a correctable risk factor unmeasured that is of importance to older people.

Individual Variation of Blood-Homocysteine Levels

Life Extension informs readers of novel methods to counteract age-related diseases that are overlooked by the medical mainstream.
We gauge **efficacy** based on peer-reviewed published findings, along with real-world interactions with physicians and our loyal supporters.

Over the past 37 years, we’ve reviewed thousands of homocysteine blood-test results and observed a wide variation.

Some people with healthy detoxification systems present with low homocysteine (under 8 μmol/L), while other similarly situated individuals have strikingly higher levels.

**Folic acid** and **vitamin B12** detoxify homocysteine via the “methylation” pathway, whereas **vitamin B6** detoxifies homocysteine via the “transsulfuration” pathway. Activated forms of these vitamins (such as 5-MTHF, methylcobalamin, and pyridoxal-5-phosphate) provide direct maintenance of these two homocysteine-detoxification pathways.

As humans age, homocysteine levels tend to rise, necessitating more aggressive use of proven homocysteine-lowering nutrients.

Many of you have recently had your homocysteine levels tested and can easily see where your level is.

If you have used our convenient blood-testing service, we keep your records on file back to year 2012. To receive a free copy of your blood results, call 1-800-208-3444 or send us an email to [customerservice@lifeextension.com](mailto:customerservice@lifeextension.com)

---

**No More Need for Prescription B Vitamins**

Nearly two decades ago, pharmaceutical companies obtained patents for B-vitamin formulas that contained the metabolically active 5-MTHF form of folate.

These prescription drug B-vitamin formulas are still sold at prices that exceed $200 a month. Now that patents have expired, consumers have access to superior formulas that provide high-potency 5-MTHF along with bioactive forms of vitamins B6 and B12 for a fraction of the prescription-drug price.

A large number of adults suffer the toxic effects of high homocysteine, which steadily increases as a consequence of normal aging.

If your **homocysteine** levels are **higher** than optimal, which we opine is any blood reading significantly greater than 8 μmol/L, please consider using the appropriate **B vitamins** to reduce it to safer ranges.

As we’ve advocated for the past four decades, reducing excess **homocysteine** will likely result in substantive public-health benefits in elderly population groups.

For longer life,

William Faloon, Co-Founder, Life Extension®
References


**Blood Test**

Regular discount price is **$54**. Order by **August 31, 2017**, and get our comprehensive **CBC/Chemistry** panel at **NO charge**.

High homocysteine is associated with elevated risk of heart attack, stroke, and dementia. It’s important to know if you have blood homocysteine at an unsafe level, so you can take steps to lower it.

Order a **homocysteine** test by **August 31**, and you’ll also receive, at **NO** extra charge, the **CBC/Chemistry** panel offered by **Life Extension®**. As you can see below, our **CBC/Chemistry** panel provides far more tests than most conventional labs.

Normally **$35**, but **FREE** with a purchase of the **homocysteine** test, **Life Extension's CBC/Chemistry Panel** provides:

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<td>Platelet count</td>
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To order a homocysteine blood test at our regular discount price of **$54** (Item Code LC100061) and receive a comprehensive **CBC/Chemistry** blood panel for **FREE**, call **Life Extension** today at **1-800-208-3444** or order online at **LifeExtension.com/homocysteine**. You’ll be sent a list of drawing stations in your area along with a pre-paid requisition. You can walk into the drawing station nearest you at your convenience. You also have free access to our Wellness Specialists to help review your results.

Blood test 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.
Cognitex® with Pregnenolone & Brain Shield®

Cognitex® is designed to improve cerebral performance and protect against neurological problems over the long term.

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

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

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

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

Non-GMO

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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For full product description and to order Cognitex® with Pregnenolone & Brain Shield®, call 1-800-544-4440 or visit www.LifeExtension.com

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Maintain Youthful HOMOCYSTEINE for Heart & Brain Health

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

Just one daily capsule of Homocysteine Resist provides:

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

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

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

WITH ADVANCED PROBIOTICS

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

Non-GMO

Item #02123 • 30 liquid veg. capsules

Retail Price Your Price
1 bottle $33 $24.75
4 bottles $22.50 each

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CoQ10 Improves Lipids and Glucose Metabolism

In a double-blind trial employing women with polycystic ovary syndrome (PCOS), supplementation with CoQ10 resulted in lower glucose, insulin, insulin resistance, and total and LDL cholesterol compared with a placebo group that did not receive CoQ10.*

Dr. Zatollah Asemi and colleagues randomized 60 women with PCOS to receive 100 mg of CoQ10 or a placebo daily for 12 weeks. Blood samples collected before and after the treatment period were evaluated for serum lipid levels and markers of insulin metabolism.

Among CoQ10-supplemented participants, acne and hair loss, which are prominent features of PCOS, were reduced by the end of the trial compared with the placebo group. Women in the CoQ10 group had lower fasting plasma glucose, serum insulin and insulin resistance. Total cholesterol and LDL cholesterol were also reduced.

Editor’s Note: Abnormal lipids affect an estimated 70% of women with PCOS and insulin resistance is estimated to affect between 50% and 75%. In previous research, Dr. Asemi and colleagues found that 100 mg of CoQ10 per day in subjects with metabolic syndrome improved markers of insulin metabolism.

Fasting Fights Leukemia

A recent study detailed findings that point to a potential benefit for every-other-day fasting in the treatment of the most common form of childhood leukemia.*

Cheng Cheng Zhang and his associates at the University of Texas Southwestern Medical Center found that alternate-day fasting inhibited the initiation of B cell as well as T cell acute lymphoblastic leukemia and reversed their progression in rodent models with the malignancy. Fasting was not, however, effective in acute myeloid leukemia, which occurs more frequently in adults.

“Strikingly, we found that in models of T cell acute lymphoblastic leukemia, a regimen consisting of six cycles of one day of fasting followed by one day of feeding completely inhibited cancer development,” Dr. Zhang reported. “Mice in the [acute lymphoblastic leukemia] model group that ate normally died within 59 days, while 75% of the fasted mice survived more than 120 days without signs of leukemia.”

Editor’s Note: “It will be important to determine whether [acute lymphoblastic leukemia] cells can become resistant to the effects of fasting,” Dr. Zhang remarked. “It also will be interesting to investigate whether we can find alternative ways that mimic fasting to block [acute lymphoblastic leukemia] development.”

Vitamin D Deficiency can Lead to Metabolic Syndrome

Vitamin D deficiency has been found to play a central role in the development of metabolic syndrome—a group of risk factors that increases your risk for heart disease, stroke, and diabetes.*

For 18 weeks, Dr. Yuan-Ping Han and colleagues gave mice a control diet supplemented with a sufficient amount of vitamin D3, a vitamin D-deficient control diet, a high-fat diet supplemented with vitamin D3, or a high-fat diet that was deficient in vitamin D. The team found that a high-fat diet by itself is not sufficient to induce insulin resistance and fatty liver disease, but that “a second hit,” in the form of vitamin D deficiency, is required.

It was demonstrated that a high-fat diet alters gut bacteria, which contributes to elevated glucose and fatty liver. This imbalance is aggravated by a lack of vitamin D, which results in decreased production of antimicrobial molecules called defensins that are needed to maintain healthy flora.

“Based on this study, we believe that keeping vitamin D levels high...is beneficial for prevention and treatment of metabolic syndrome,” said coauthor Stephen Pandol of Cedars-Sinai Medical Center. “A sufficient dietary vitamin D supplement can partially but significantly antagonize metabolic syndrome caused by high-fat diet in mice.”

Editor’s Note: In animals that received high fat, vitamin D deficient diets, oral administration of synthetic defensin improved intestinal bacteria balance.

Iron Deficiency Associated With Hearing Loss

An article in JAMA Otolaryngology-Head & Neck Surgery reports an association between iron deficiency anemia and hearing loss.*

Kathleen Schieffer, BS, and colleagues evaluated data from 305,339 men and women between the ages of 21 and 90 who visited Penn State Milton S. Hershey Medical Center during 2011-2015 and had information available concerning serum ferritin and hemoglobin levels. Iron deficiency anemia was determined by low serum ferritin levels and low hemoglobin levels that were determined according to age and sex-defined values.

Hearing loss identified during past visits was categorized as conductive (associated with the bones of the middle ear), sensorineural, or combined loss (conductive and/or sensorineural loss, deafness or loss due to unspecified causes). Subjects who had iron deficiency anemia had 82% higher odds of being diagnosed with sensorineural hearing loss and a greater than two-fold increased risk of combined hearing loss.

Editor’s Note: The authors note that only one artery supplies blood to the cochlea of the ear, and that low hemoglobin levels that impair the blood’s oxygen-carrying capacity can lead to ischemia in this area.

Nicotinamide Could Help With Early Onset Parkinson’s Disease

Nicotinamide may have promising beneficial use in the treatment of early-stage Parkinson’s disease.*

In a recent study, L. Miguel Martins and colleagues focused on fruit flies with a mutation, *PINK1*, that results in a condition similar to human Parkinson’s disease. The flies were fed a diet supplemented with nicotinamide, which is a precursor to **nicotinamide adenine dinucleotide** (NAD+), a coenzyme needed for the generation of energy in cells’ mitochondria. NAD+ also helps protect neurons from degeneration.

Flies with the *PINK1* mutation that received nicotinamide had fewer faulty mitochondria and less neuron loss compared to those that did not receive the vitamin. Preventing depletion of NAD+ in the brain resulted in healthier mitochondria, greater neuron survival, and longer life.

“The results suggest that in familial Parkinson’s, available NAD+ is critical for keeping mitochondria in shape and the disease at bay,” Dr. Martins concluded.

**Editor’s Note:** “Parkinson’s disease occurs when dopaminergic neurons in a part of the brain called the **substantia nigra** are lost,” Dr. Martins explained. “This can happen for a variety of reasons, but in some hereditary cases, the main problem is unhealthy mitochondria—the organelles that power the cell.”

“Mutations in genes such as *PINK1* prevent cells from clearing out the defective powerhouse,” he continued. “When they accumulate, neurons can’t get enough energy and die. The faulty mitochondria also release toxic molecules that damage their genes encoded by DNA.”

Pump Up Your Heart Health

UBIQUINOL CoQ10

BETTER ABSORPTION
WITH ADDED MITOCHONDRIAL SUPPORT

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60 softgels • Retail Price is $62 • Your price is $46.50 • 4 bottles are only $39 each

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New Zealand Whey Protein Concentrate

derived from grass-fed, free-range cows living in New Zealand not treated with growth hormone.

Naturally high content of branched-chain amino acids, lactoferrin, and immunoglobulins for those who wish to:

• Help maintain lean muscle mass,
• Support healthy immune function,
• Promote anabolic metabolism.

Natural chocolate and natural vanilla flavors.

References

Contains milk. Non-GMO

NEW ZEALAND Whey Protein CONCENTRATE

Maintain Healthy Lean Muscle Mass

New Zealand Whey Protein Concentrate (Vanilla)
Item #01770 • 500 grams

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New Zealand Whey Protein Concentrate (Chocolate)
Item #01771 • 640 grams

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For full product description and to order New Zealand Whey Protein Concentrate, call 1-800-544-4440 or visit www.LifeExtension.com

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Boost Your Longevity Genes

Higher Potency NICOTINAMIDE RIBOSIDE
Lower Cost-Per-Milligram

When you ingest nicotinamide riboside, it converts to NAD+ in your body.

NAD+ is essential for cell energy production and DNA function. As we age, NAD+ levels markedly decline.

Save more than 30% with new higher-potency NAD+ Cell Regenerator™.

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Item #02144 - 30 vegetarian capsules

NIAGEN® is a registered trademark of ChromaDex, Inc. Patents see: www.ChromaDexPatents.com.

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Back in the 1980s, a prescription cream used to treat acne was accidentally found to have age-reversal effects on the skin.

The brand name of this cream was Retin-A®. Its active ingredient (retinoic acid) was found to increase collagen production when applied topically.

Rather than depend on a prescription cream that carries warnings to avoid exposure to UV-light, researchers began experimenting with different potencies of a topical nutrient called retinyl palmitate.

They discovered that a 1.0% concentration of retinyl palmitate enables noticeable skin-cell renewal. Clinical studies validate reduced fine lines and wrinkles when this highly-concentrated retinyl palmitate is applied daily.

Similar to prescription topical creams, retinyl palmitate (1.0%) converts to collagen-promoting retinoic acid, but without the exfoliating effects of Retin-A that force people to avoid sunlight.

A second complementary ingredient is a 0.5% concentration of oryza rice-bran ceramides.

When applied topically, this special ceramide creates a protective barrier that retains skin hydration to further reduce wrinkling.

In human clinical trials, scientists confirm impressive skin rejuvenation benefits when these two ingredients are used at these potencies.

The measurable effects include reduced fine lines and wrinkles as well as restoration of moisture. These studies were performed on sun damaged, time ravaged, aging skin.

Since skin is a living organ, it needs continuous nourishment to function at youthful capacity. Armed with data from successful trials, researchers identified additional nutrients that can stave off skin aging factors.

They discovered nutrients that “feed” the skin and complement the potent activity of retinyl palmitate and oryza rice-bran ceramides.

The upshot is a new skin “cocktail” that provides a broad spectrum of science-based restorative agents not found in any other skin-care program.
REVITALIZE AGING SKIN USING ADVANCED THERAPEUTICS

Our faces often reveal our age and the state of our health. Many people who have not cared for their skin can look much older than they are. Skin rejuvenation utilizing clinically tested ingredients is transforming into evidence-based reality.

One group of scientists wrote: “Active ingredients go well beyond simple moisturizers and exert a more complex activity in protecting skin.”

Reporting on visible skin restoration results, scientists writing in a dermatological journal concluded that certain nutrients used in advanced skin care are “…closer to drugs in preventing and treating wrinkles.”

Innovative bioactive compounds have been identified that reduce underlying causes of skin degeneration. These compounds complement other established ingredients to:

- Increase cell renewal
- Enhance hydration
- Decrease oxidation/inflammation

Triggering Skin-Cell Renewal

1.0% Retinyl Palmitate

Often prescribed by dermatologists to revitalize tired, aging skin, retinyl palmitate, a vitamin A derivative, binds with specific skin-cell receptors to trigger skin renewal.

The potency of 1.0% retinyl palmitate is almost impossible to find in commercial skin-care products, yet has been shown in human studies to visibly reduce the signs of skin aging.

To test the age-reducing effects of topical application of 1.0% retinyl palmitate, scientists conducted a clinical study on 67 female volunteers with photodamaged skin. Participants were randomly assigned to receive a topical formula containing retinyl palmitate (with vitamin E and moisturizers) or no treatment. Every evening the treatment group applied the product to their faces, necks, décolletages, outer arms, and lower legs.

After 12 weeks—compared to both the no-treatment group and to baseline—the face and neck areas of the treated women demonstrated significant improvements in fine lines, coarse wrinkles, mottled pigmentation, uneven skin tone, roughness, firmness, and clarity of the skin. The décolletage, arms, and lower-legs areas exhibited reduced levels of crepe-like skin texture, dryness, scaling, and roughness.

These impressive results would probably not have been possible with a lesser dose of retinyl palmitate. The 1.0% amount is a recognized clinical dose.

Increase Skin Collagen

As we age, the skin’s protein content decreases. Topical retinyl palmitate was shown in animal studies to reverse this trend. Scientists documented a 32% increase in skin protein content and an impressive 128% increase in collagen—the skin’s main structural protein. Another result was a beneficial thickening of the protective epidermis.

Unlike many other skin-care ingredients, retinyl palmitate easily penetrates the skin’s epidermis, where it also boosts vitamin A content. The skin needs vitamin A for renewal and achieving a healthy and firm skin matrix. Generating increased vitamin A levels in the skin help it maintain youthful regeneration.

To verify that retinyl palmitate increases vitamin A levels in the skin, researchers conducted a mouse study and found that a topically applied, 1.0% concentration of retinyl palmitate increased the skin’s content of vitamin A by more than four-fold.
The effectiveness of oryza rice-bran ceramides was made clear in a three-week human study that applied either a rice-derived ceramide preparation or placebo to the skin of volunteers. What the scientists found was important improvement to the moisture content of the skin. Those patients who applied the oryza rice-bran ceramide cream had better hydrated skin. In the study, those using the oryza rice-bran ceramides showed that water content in the outermost skin layer was boosted by 141% compared to 111% in placebo recipients. The water-loss rate was reduced to just 23% of baseline among treated volunteers, compared to a loss rate of 39% of baseline among placebo subjects.13

Another study looked at ceramides topically applied to the skin of children with atopic dermatitis. This is a condition in which skin dryness and inflammation mimic some elements of skin aging. The ceramides improved clinical symptoms by improving skin barrier function and ameliorating abnormalities.14

These topical rice-bran ceramides complement the internal moisturizing effects of oral wheat-derived ceramides.

As a word of caution, be aware that many cosmetics use a similar ingredient called retinol, which can cause irritation and redness to the skin. However, retinyl palmitate is extremely well tolerated. For maximum effectiveness, it is best to use the clinically validated dosage of 1.0% retinyl palmitate.

The Cosmetic Ingredient Review Expert Panel verified that a 1.0% concentration of retinyl palmitate is a safe cosmetic agent.10

For restorative skin care, 1.0% retinyl palmitate does the important work of generating skin renewal. When combined with 0.5% oryza rice-bran ceramides, the skin is protected and freshened with vital moisture.

Enhance Hydration

0.5% Oryza Rice-Bran Ceramides

As skin ages, it becomes depleted of protective, waxy lipid molecules known as ceramides. The result is a decrease in skin hydration and protective-barrier function.11 Wrinkles are more apparent when skin is dehydrated. Optimal hydration is a sign of youthful, vibrant skin.

In order to replace vital ceramides to the skin’s surface, scientists have discovered a way to extract ceramides from oryza rice bran, making it ideal for improving skin health when applied topically.12

Rice-bran ceramides prevent water loss and contribute to the skin’s protection against microbes and its protective barrier function.2

What You Need to Know

Skin Rejuvenation

• Dermatologists frequently prescribe 1.0% retinyl palmitate to restore aging skin. It has been shown to generate cell renewal and reduce fine lines and wrinkles.

• Researchers have identified the benefits of .5% oryza rice-bran ceramides as a compound for restoring healthy hydration to the skin’s surface and enabling the protective barrier.

• Seeking to employ the most innovative bioactive compounds for restoring youthful skin, researchers have employed ingredients such as beta-glucans, hyaluronic acid, green tea and raspberry extract to support healthy skin renewal and restore aging skin. This long list of ingredients complements the active work performed by 1% retinyl palmitate and oryza rice-bran ceramides in revitalizing facial skin.

The effectiveness of oryza rice-bran ceramides was made clear in a three-week human study that applied either a rice-derived ceramide preparation or placebo to the skin of volunteers.

What the scientists found was important improvement to the moisture content of the skin. Those patients who applied the oryza rice-bran ceramide cream had better hydrated skin. In the study, those using the oryza rice-bran ceramides showed that water content in the outermost skin layer was boosted by 141% compared to 111% in placebo recipients. The water-loss rate was reduced to just 23% of baseline among treated volunteers, compared to a loss rate of 39% of baseline among placebo subjects.13

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These topical rice-bran ceramides complement the internal moisturizing effects of oral wheat-derived ceramides.
Our skin’s natural content of hyaluronic acid is destroyed by enzymes such as hyaluronidase and matrix metalloproteinases (such as MMP-1). This loss of moisture contributes to biological skin aging.\(^{16,20,21}\)

Hyaluronic acid binds water molecules and provides a gelatinous matrix in which collagen fibers are embedded. This provides youthful skin suppleness.\(^{19,22}\) Production of collagen and elastin—proteins that provide skin elasticity—are also dependent on hyaluronic acid.\(^{23}\)

To fully document the impact of hyaluronic acid on skin moisture and flexibility, researchers enlisted 76 women, aged 30 to 60, to apply a 0.1% hyaluronic-acid cream twice daily around one eye and a placebo cream around the other eye. After 60 days, the hyaluronic cream visibly demonstrated improvements in hydration and elasticity, with remarkable reductions in wrinkle depth and maximum roughness.\(^{24}\)

Beta-Glucans

Topically applied beta-glucans have been shown to help speed the healing of burn-induced tissue damage, in part by restoring depleted levels of oxidant-reducing compounds.\(^{25}\)

And, in clinical research, the use of beta-glucans has been shown to protect and even reverse skin wrinkling due to environmental exposure.\(^{26}\)

When applied topically, beta-glucans, derived from natural sources, also lock in valuable skin moisture. Beta-glucans are thought to penetrate deeper layers and circulate in the spaces between live skin cells (keratinocytes) and connective tissue cells (fibroblasts).
Scientists believe that beta-glucans stimulate fibroblasts to produce **procollagen** and **collagen** by stimulating the release of certain growth factors.\(^{27}\) This action reverses some of the undesirable changes in skin associated with aging and cumulative sun damage—changes that are directly related to loss of collagen and procollagen.\(^{28}\)

**Importance of Reducing Oxidation/Inflammation**

The skin’s ability to reduce harmful oxidation fades with age, causing accumulation of damaged cells that cannot be repaired and make skin appear tired and lifeless.

As the body’s natural protection against oxidation diminishes, continuous contact with air, chemical, and radiation stresses result in a telltale photoaged appearance.\(^{29-31}\)

A string of scientific studies has identified nutrients that target the skin’s reduced ability to fight off oxidation, which includes topical **vitamin C**, **vitamin E**, and **green tea extract**.

**Vitamin C Targets UV Damage**

Vitamin C is a well-recognized oxidation-decreasing nutrient. Numerous clinical trials have demonstrated its capacity to target both clinical and subjective signs of UV-damage to facial skin when applied topically.\(^{32-36}\)

**Vitamin E Inhibits Skin Damage**

Vitamin E has a strong track record of inhibiting skin damage, including photoaging.\(^{37}\)

Despite its vital skin functions, vitamin E is found in decreased amounts in aging skin.\(^{38}\)

Topical vitamin E helps prevent photoaging, reduces inflammation-triggering fat oxidation, and mitigates the cancer-inducing impact of UV radiation.\(^{37}\)

**Green Tea Reduces Age Acceleration**

Polyphenol-rich **green tea** leaves naturally protect against UV radiation, as well as oxidative and other chemical stresses.

Cultured human skin cells treated with the predominant **green tea polyphenol** (EGCG) produced substantially less of a “matrix-destroying” enzyme called MMP-1.

This demonstrated green tea’s potential to prevent collagen degradation, which is a hallmark of premature skin aging.\(^{39}\)

In human volunteers, **topical green tea** protected skin from the damage and the impaired immune function that normally results from UV radiation—**independently** of any sunscreen-like effects.\(^{40}\)

**Additional Compounds That Nourish Radiant Skin**

Researchers scoured the literature and found that the following ingredients also provided benefits for obtaining youthful, vibrant skin.

- **DMAE** (dimethylaminoethanol) to smooth and firm skin,\(^{46}\)
- **Taurine** to inhibit premature aging,\(^{47}\)
- **Alpha Lipoic Acid** to inhibit the appearance of wrinkles,\(^{48}\)
- **Melatonin** to protect against UV-induced skin reddening and DNA damage,\(^{49}\)
- **Pomegranate** to protect against free radical- and radiation-induced skin damage,\(^{50,51}\)
- **Green Tea Leaf Extract** to protect against UV radiation,\(^{40}\) and
- **Ginseng Root Extract** to inhibit wrinkle formation and increase skin moisture content.\(^{52}\)
Summary

In their search for an effective, science-based topical application to reduce skin aging, scientists identified both 1.0% retinyl palmitate and 0.5% oryza rice-bran ceramides as a powerful approach to skin rejuvenation. Clinical studies verified the impact of these two ingredients on restoring aging skin.

In an effort to create the most complete skin-care product, researchers investigated and included a long list of complementary ingredients ranging from beta-glucans and hyaluronic acid to green tea, vitamin C, and raspberry extract.

The result is a major advance that works through multiple channels to preserve and restore the vitality of youthful skin.

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


Shea Butter for Essential Moisture

Shea butter is a vitamin E-rich fat extract of an African plant. It is a potent moisturizing agent. Research indicates that Shea butter ingredients provide significant UV protection.

Sunflower Seed Oil Enhances Hydration

Sunflower seed oil supports the integrity of the skin’s stratum corneum—the outermost layer of the epidermis—and enhances hydration, as demonstrated in randomized clinical research.

Raspberry Extract Stimulates Ceramide Production

Raspberry plant extracts are rich in phenolic and oil-soluble compounds. These oil-soluble compounds are also critical components of the skin barrier. When tested on skin cells, raspberry extract induced genes responsible for skin hydration and production of hyaluronic acid, while stimulating expression of ceramide production.

How Much Repair Does Your Skin Require?

The rate your skin ages is highly individualistic. Choosing ingredients that best suit one’s needs should be determined by the damage one seeks to reverse.

To promote collagen renewal that can help erase superficial lines and wrinkles, start off each day with a cream that provides clinical doses of retinyl palmitate (1.0%) and rice ceramides (0.5%), along with vitamins and plant extracts to facilitate cell renewal.

This can be especially effective against photodamage, which is a primary cause of premature facial aging.

Our body naturally undergoes systemic repair during sound sleep. To facilitate facial skin revitalization, researchers designed a melatonin-rich night cream that also provides 1.0% retinyl palmitate and 0.5% rice ceramides.

The effects of nutrient-dense day or night creams may be augmented by first applying an ultra-thin serum containing 2.8% hexapeptide-11 to promote skin elasticity and reduce various senescent factors.

To protect the entire body from environmental onslaughts, apply a lotion containing bioactive botanicals and vitamins to restore, hydrate and regenerate.


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Enhance Erectile Function by Improving Vascular Health

Mention erectile dysfunction and most people think of Viagra® and similar drugs.

These drugs temporarily solve “sexual” problems for about half of men.¹

Aging men that visit their doctors to get erectile dysfunction drugs often have no idea what causes this condition.

Erectile dysfunction is an early symptom of artery disease. It can show up as a warning sign up to three years before a heart attack or stroke.²

Compelling research demonstrates that certain nutrients boost levels of nitric oxide, which relaxes blood vessels and enables efficient blood flow—the key to both overall vascular health and male sexual function.³⁻⁵

A study published in the March 2017 issue of Andrology found that a significant proportion of erectile dysfunction patients have low levels of L-arginine (a nitric oxide precursor).⁶ Another recent study shows that supplementing with L-arginine and pine-bark extract significantly boosts erectile function.⁷

Fortunately, large doses of arginine are no longer needed. That’s because a nitric oxide-boosting equivalent can be obtained with a lower dose of the amino acid chelate, L-arginine aspartate.

These compounds have been shown in previous clinical trials to improve not only erectile dysfunction⁵⁻⁷,⁸ but also the underlying cardiovascular cofactors.⁵,⁹
Vascular Disease Results
In Erectile Dysfunction

Male sexual dysfunction frequently results from underlying health issues, including prostatic disease, neurological damage, diabetes, metabolic syndrome, obesity, multiple sclerosis, medication side effects—and especially, vascular occlusion.2,16,17

In a study released online in April 2017 by the American Journal of Hypertension, 1,136 men (ages 45 to 84) were scored according to cardiovascular risk factors. A decade later, 58% of the men with the highest cardiovascular disease risk had erectile dysfunction, compared with just 33% of men with the lowest cardiovascular risk.14

Blood flow through the arteries and endothelial function (function of the inner arterial lining) are essential to sexual arousal.2

That’s why erectile dysfunction should trigger an investigation for early indications of cardiovascular disease, such as comprehensive blood tests. But this is almost never the case.

First, many people don’t bother to see a doctor about sexual dysfunction.15

Second, those who do are generally prescribed drugs without regard for underlying cofactors.

Pharmaceutical firms have persuaded the public and medical establishment that sexual symptoms are drug-treatable “diseases” instead of early-warning signs, so mainstream doctors seldom think to investigate further.

The fact is that erectile dysfunction, reduced libido, and loss of fertility are potential predictors of cardiovascular disease, which strikes epidemic numbers of aging individuals.2,16,17

Unaware of these links, many men experiencing sexual difficulties seek prescriptions such as Viagra®, Cialis®, or Levitra®, that work by relaxing the smooth muscles lining the arteries, in turn increasing blood flow into the arteries that supply the penis.

These drugs provide only temporary effects, work for only about half of erectile dysfunction patients, cost as much as $50 a pill without insurance,18 and are associated with side effects ranging from indigestion, flushing, visual disturbances, hearing loss, and headache. Rare but more serious problems include neurologic disorders and heart attack.19-27

More critically, these drugs do not adequately treat an underlying cause of erectile dysfunction—chronic endothelial dysfunction.

Healthy endothelial cells release nitric oxide synthase, an enzyme that catalyzes production of nitric oxide from the amino acid L-arginine.

Nitric oxide triggers relaxation of the smooth muscle in the arteries of the penis, providing the adequate blood flow necessary for an erection. However, dysfunctional endothelial cells, disabled by plaque buildup, can no longer produce sufficient levels of nitric oxide synthase.28

Thankfully, innovative scientists have identified three natural ingredients that boost endothelial function—simultaneously enhancing sexual capability and protecting against heart attack and stroke.
Restore Endothelial Health—and Sexual Potency

Scientists have studied three compounds that modulate the mechanisms underlying erectile dysfunction. **French maritime pine-bark extract** and **L-arginine aspartate**—an amino acid chelate—work together to stimulate nitric oxide synthase, thus producing sufficient bioactive nitric oxide to induce and maintain an erection.5

Icariin—a flavonoid compound used in Chinese herbal medicine—further supports the ability to maintain an erection by blocking phosphodiesterase-5, the enzyme responsible for causing erections to subside.29 This enzyme-blocking effect mimics the primary mechanism of Viagra®, which delivers no other benefit.

Compelling human trials demonstrate that this nutrient blend improves male sexual function and underlying vascular health through an array of health effects, delivering:

- Normal erectile function5,8,9
- Enhanced sperm quality and quantity30,31
- Elevated sexual interest32 and greater intercourse frequency5
- Enhanced sexual performance32
- Lowered blood cholesterol levels,5 and
- Reduced blood pressure.5,9

This combination may provide additional health benefits via stimulation of nitric oxide production.

Nitric oxide modulates the release of neurotransmitters33 and acts as a neurotransmitter involved in long-term memory.34-37 It promotes a healthy immune function38 and favorably modulates vascular tone, coagulation, and fibrinolysis.39

Clinical Studies of French Maritime Pine-Bark Extract and Arginine

Scientists treated erectile dysfunction patients aged 25 to 45 with **L-arginine aspartate**.

After a month, only 5% of patients had normal erections. In month two, however, 80 mg of **French maritime pine-bark extract** was added to the regimen, and by month’s end, a remarkable 80% of men experienced normal erectile function.

In the third month, the pine-bark extract dosage was increased to 120 mg, and at the end of that month, 92.5% of participants achieved normal erectile function.8

What You Need to Know

Reversing Erectile Dysfunction via Vascular Support

- Painted by pharmaceutical firms as merely a “sexual problem,” erectile dysfunction is generally treated with costly drugs, such as Viagra®, that for some may temporarily alleviate these common symptoms of underlying vascular problems.
- Unfortunately, many aging men—and some doctors—are unaware that this condition is an early-warning symptom, appearing up to three years before a heart attack or stroke.
- An array of persuasive studies show that L-arginine—found in reduced levels in many erectile dysfunction patients—as well as French maritime pine-bark extract and the flavonoid icariin safely boost levels of nitric oxide, the blood flow-promoting key to both healthy male sexual function and overall vascular health.
- Research has shown that these three natural compounds improve both erectile dysfunction and underlying cardiovascular cofactors.
In a second clinical trial—a double-blind, placebo-controlled, crossover design—researchers examined 50 middle-aged men with mild to moderate erectile dysfunction. They treated them with placebo or with French maritime pine-bark extract and L-arginine aspartate. Participants recorded their degree of sexual function or dysfunction, and investigators monitored testosterone levels and endothelial nitric oxide synthase levels along with clinical chemistry.

These nutrients restored erectile function to normal and doubled intercourse frequency within one month. Nitric oxide synthase in spermatozoa and blood testosterone levels also increased significantly. When looking at the vascular effects of this nutrient combination, blood cholesterol and blood pressure decreased.5

In another double-blind study, patients with mild-to-moderate erectile dysfunction were treated with a supplement that delivered either a placebo or a daily dose of 60 mg of French maritime pine-bark extract, 690 mg of L-arginine, and 552 mg of aspartic acid. The results were assessed using the International Index of Erectile Function test. Blood biochemistry, urinalysis, and salivary testosterone were also measured.

After eight weeks, there was marked improvement in the total erectile dysfunction score, including erection hardness, and satisfaction with sexual intercourse. Notably, there was a significant decrease in blood pressure and a slight boost in salivary testosterone—with no adverse reactions.9

A fourth clinical trial was conducted in 2015 on 47 patients with mild erectile dysfunction and abnormally low sperm numbers combined with low sperm motility and a low level of healthy-shaped sperm. The men received daily doses of 60 mg of French maritime pine-bark extract, 690 mg of L-arginine, and 552 mg of aspartic acid. Four months later, erectile dysfunction was “significantly ameliorated,” and average sperm concentration was notably increased. No unwanted effects were noticed or reported.30

Underscoring these effects, a 2017 study found that a significant proportion of erectile dysfunction patients have low levels of L-arginine. These levels were 17% lower in men with complete erectile dysfunction. The authors concluded that low L-arginine levels may “increase the erectile dysfunction risk by reducing the concentration of nitric oxide,” which is essential to vascular health.6

These and other clinical studies further confirm the ability of French maritime pine-bark extract and L-arginine aspartate to restore erectile function,5 reverse low male fertility values by improving sperm quality30,31 and semen volume,30 and double intercourse frequency.5
Compelling research demonstrates that certain nutrients boost levels of nitric oxide, which relaxes blood vessels and enables efficient blood flow—critical for both healthy male sexual function and overall vascular health.

In 2017, scientists demonstrated that a significant proportion of erectile dysfunction patients have low levels of L-arginine, which is needed to produce nitric oxide to promote blood flow.

Consistent research findings show that supplementing with arginine compounds, pine-bark extract, and the flavonoid icariin provides safe and rapid improvement not only in erectile dysfunction, but also in underlying cardiovascular cofactors.

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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As we age, levels of a harmful amino acid known as homocysteine increase.

Research indicates that homocysteine can be a major factor in the creation of strokes and heart attacks as well as crippling dementia.1,2

Lowering homocysteine can reduce one’s risk for catastrophic events.1-4

In the past few years, hundreds of papers on homocysteine and cardiovascular disease have been published. A February 2017 study stated that homocysteine levels are a powerful predictor of cardiovascular disorders.5

Homocysteine levels can be determined by a simple blood test and lowered with the proper forms of B6 (pyridoxal-5-phosphate), B12 (as methylcobalamin), folate (as 5-methyltetrahydrofolate), and vitamin B2 (riboflavin-5-phosphate).6-17 It is important to ask yourself: When was the last time my doctor measured my homocysteine blood levels?

Optimizing homocysteine blood levels can be an important factor in reducing your risk of vascular disease and dementia.
An Overlooked Cardiovascular Risk Factor

Homocysteine levels rise as we age, a consequence of declining kidney function, B-vitamin deficiencies, and other factors such as impaired detoxification.\(^{18}\)

Studies show that as many as 30% of patients 71 or older are deficient in vitamin B12, a critical cofactor in the body’s ability to naturally lower homocysteine.\(^{18,19}\) Deficiencies of B vitamins contribute to elevated homocysteine levels in up to 40% of patients aged 80 or over.\(^{18}\)

Elevated homocysteine levels set off a series of harmful processes that include oxidative stress, inflammation, increased risk of clotting (thrombosis), and damage to endothelial function in arteries.\(^{20-25}\)

Together, these properties contribute to decreased blood flow to vital organs, particularly the heart and brain. This increases the risk of a sudden obstructive blood clot, which triggers heart attacks and strokes, while chronically reduced blood flow in the brain contributes to dementia and cognitive decline.

Data supporting the role of high homocysteine and cardiovascular risks are compelling.

Homocysteine Increases Heart Risks

Elevated homocysteine levels increase the risk of developing heart disease.

People with high homocysteine levels who also take the anticoagulant drug warfarin have a 23% increase in their risk for cardiovascular events of all kinds, a 38% increase in their risks of myocardial infarction (heart attack), and a 41% increase in the risk of death from all causes.\(^{26}\)

Those same elevated risks apply to ischemic stroke—which is increased by 20%-32% in people with elevated homocysteine.\(^{24}\) These data make a strong argument for those taking anticoagulant drugs to optimize their homocysteine blood level.

Elevated homocysteine is associated with a 42% increase in the risk of narrowing of the carotid arteries, the main blood suppliers to the brain.\(^{27}\) That risk skyrockets to 189% in patients with diabetes, a known aggravator of atherosclerosis and cardiovascular disease.\(^{27}\) Carotid artery narrowing represents a major ischemic stroke risk.

People with excess homocysteine have a much higher risk for having microscopic bleeding that further contributes to the damage to brain tissue after a stroke. They also have an increased risk of poor outcomes even after being treated with “clot-busting” medications.\(^{28}\)

High homocysteine interferes with recovery from heart attacks as well, as shown by a study of survivors who had coronary artery stenting (insertion of a tiny tube inside a blocked artery, see above). The people in this study with high homocysteine had a significant 30% higher rate of major adverse cardiac events (death, another heart attack, stroke, or the need for additional surgery), compared to those with normal levels.\(^{29}\)

Additional Heart Risks

Studies show that people with high homocysteine are much more likely to have heart rhythm disturbances, especially atrial fibrillation, an irregular, often rapid heartbeat that causes poor blood flow.\(^{30,33}\) That’s critical, because homocysteine promotes excessive blood clotting, while atrial fibrillation predisposes us to blood-clot formation, specifically in the heart’s upper chambers (atria).\(^{18,32,33}\)

If an atrial clot breaks free and becomes lodged in another part of the body, such as the lungs, where it causes a pulmonary embolism, or the brain, where it causes a stroke, the results are devastating.

In fact, increased homocysteine levels quadruple one’s risk for a stroke in the case of atrial fibrillation.\(^{18}\)

Together, these data demonstrate the dangerous cardiovascular impact of the pro-clotting, pro-inflammatory, chemical stress-inducing homocysteine.

Let’s now turn to the effects of this metabolic toxin on the brain, cognition, and memory.

Homocysteine and Dementia

Innovative physicians are beginning to recognize that elevated homocysteine is also a major factor in the development of a wide range of dementias.
Effective Homocysteine-Reducing Therapy

Studies show that people with B vitamin dietary deficiencies are more likely to suffer from both cardiovascular and brain disorders, with the common connection being a resulting rise in homocysteine.39,46-49 Numerous studies have demonstrated the benefit of supplementation with vitamins B2, B6, B12, and folate on homocysteine levels.10,50-56

Vitamin B2, also called riboflavin, helps facilitate the benefits of folate, which in turn is required to detoxify homocysteine.54 Vitamin B6 and its active form, called pyridoxal 5’-phosphate is required for the conversion of homocysteine into less toxic molecules.53 Vitamin B12, in the form of methylcobalamin has been shown to lower homocysteine levels.6,8 And folate in its active form, 5-methyltetrahydrofolate or 5-MTHF, is superior at raising serum folate levels,57 which in turn translates into lower homocysteine levels.17

But while individual B vitamins can be effective for some, using a combination of these four key B vitamins provides an effective arsenal against elevated homocysteine levels.

What You Need to Know

B Vitamins Lower Homocysteine

- High levels of homocysteine are associated with risks for numerous age-related disorders, such as heart attacks, strokes, arrhythmias, and neurodegenerative disorders.
- High homocysteine is caused in part by a deficiency in B vitamins.
- B-vitamin supplementation has been shown to lower homocysteine levels and reverse some of the conditions associated with their elevations.
- It is now possible to say with some confidence that many of these age-related conditions may in fact be preventable through simple nutritional supplementation.
Large meta-analysis studies suggest that lowering blood homocysteine levels by 25% would reduce the risk of coronary heart disease by up to 16% and the risk of stroke by up to 24%. These studies also indicate that we must find the optimum combination of B vitamins to achieve those results, because each vitamin has a specific role to play regarding homocysteine balance.10

For example, it has now been shown that both riboflavin and folate must be present in ample quantities for optimal homocysteine-lowering.10,54,55 Yet some studies have shown that even people whose folate and riboflavin status has been restored by supplementation may not significantly lower high homocysteine levels until vitamin B6 is added to the equation.53

Research shows that healthy adults that use mixed B-vitamin supplementation consistently show improvement in homocysteine status and reduction of associated oxidative stress.52,56

Similar actions in the brain provide further evidence favoring mixed B-vitamin supplementation.

In patients who had recently suffered a stroke or near-strokes (transient ischemic attacks), supplementation significantly reduced the volume of brain white-matter hyperintensities (tiny markers of damage also called leukoaraiosis) in patients with the most severe lesions at baseline.50

Even more compelling data comes from a study of gray matter atrophy, which is shrinkage of the main “thinking” portions of the brain as seen in Alzheimer’s disease. In this study, elderly subjects with mild cognitive impairment (at increased risk for Alzheimer’s) who received B vitamins for 2 years experienced a slowing of brain shrinkage compared with placebo.51

Importantly, in those subjects, supplementation reduced shrinkage of brain areas especially vulnerable to Alzheimer’s damage by up to 7-fold.51

**Summary**

A growing body of scientific evidence points clearly to the fact that some of our most feared age-related disorders can be prevented simply by lowering homocysteine levels.

High circulating homocysteine imposes enormous chemical stresses on tissues throughout the body, and raises our risks for heart attacks, arrhythmias, strokes, and neurodegenerative conditions.

A host of new studies is finding that B vitamin supplementation at ample doses can lower homocysteine levels and reverse some of the conditions associated with their elevations.

It’s also clear that assuring adequate omega-3 status in the blood potentiates the beneficial effects of B-vitamin supplementation.

With proper nutrition, some of the leading causes of death and disability can be prevented or at least decelerated—good news for all of us.

Homocysteine levels should be part of a yearly battery of blood tests to ensure a healthy, long life. *Life Extension®* advises that one should target their homocysteine levels below 10 μmol/L with optimal numbers being <7-8 μmol/L.

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

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

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


Do Omega-3 Fatty Acids Enhance B-Vitamin Benefits?

B vitamins help lower homocysteine levels, thereby reducing the risks of homocysteine-related diseases, including cardiovascular and neurological diseases.

Further analysis of an earlier trial reveals two new studies that have found that blood levels of omega-3 fats, eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), are important contributing factors to successful B-vitamin therapy.358

Both studies evaluated patients with mild cognitive impairment (MCI) at the start of the study, and followed them for two years to determine the combined impact of B-vitamin supplementation and omega-3 blood levels.

Both studies found better results in supplemented subjects overall, but not in every individual.

In one study, the outcome of interest was brain shrinkage, or atrophy.3 It found that, among the B-vitamin-supplemented patients with higher levels of combined EPA and DHA, the rate of brain shrinkage was significantly (40%) slower, compared with placebo recipients.3

The other study’s outcome measure was cognitive decline, and B-vitamin-supplemented subjects were again evaluated according to their omega-3 levels.38

Here, scores on memory, cognition, and dementia rating improved in the B-vitamin-supplemented subjects according to their baseline omega-3 levels, with a particularly strong effect for levels of DHA.38

The bottom line?

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

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Folate helps maintain homocysteine levels within the normal range, thereby promoting cardiovascular health. Folate also supports neurotransmitter synthesis—which in turn helps maintain cognitive abilities.

However, not everyone has sufficient activity of the enzyme required to convert folate to its biologically active form, 5-methyltetrahydrofolate, or 5-MTHF. 5-MTHF requires no enzymatic conversion to become metabolically active—providing maximum support for both cardiovascular and cognitive health.

Optimized Folate provides metabolically active 5-MTHF folate in 1,000 mcg or 5,000 mcg strengths.

References

For full product description and to order either of these Optimized Folate formulas, call 1-800-544-4440 or visit www.LifeExtension.com

Caution: Do not use this product if treated with methotrexate, fluorouracil, phenytoin, phenobarbital, primidone, or levodopa prior to consultation with your personal physician.

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Take Charge Over Your Homocysteine Blood Levels

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

Just one daily capsule of Homocysteine Resist provides:

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

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

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A staggering number of Americans suffer from a disorder called "metabolic syndrome" that is characterized by a combination of:

• High blood sugar
• Increased blood pressure
• Abdominal obesity
• Abnormal cholesterol and triglyceride levels

Those with metabolic syndrome are at increased risk for heart attack, stroke, type II diabetes and early death.

A root cause of metabolic syndrome is insulin resistance.

This article describes natural substances that work together to promote healthy fasting blood sugar and insulin sensitivity.
In the United States there are 86 million adults with prediabetes. A substantial number of those with poor glucose control convert to full-blown type II diabetes. Before diabetes is diagnosed, chronically elevated glucose damages tissues throughout the body.

The Power of Prevention

Insulin resistance means the body’s cells cannot respond normally to insulin. That causes blood sugar levels to creep up gradually – entirely without symptoms in most people.

In those with prediabetes or insulin resistance, risk of progression to type II diabetes can be reduced by about 58% with lifestyle interventions, including diet, that lower blood-sugar levels. In addition, studies have identified multitargeted nutrients capable of reducing blood glucose via a variety of mechanisms.

Cinnamon Acts on Multiple Glucose Targets

Cinnamon is an effective tool for lowering blood sugar and reducing the risk of type II diabetes.

A water-soluble, oil-free cinnamon extract has been identified that has demonstrated beneficial effects on blood sugar, glycation, and metabolic syndrome. The US Department of Agriculture filed a patent application on this extract based on its glucose-lowering properties.

Lower Blood Sugar With Chromium

Another nutrient that improves blood-sugar levels and insulin sensitivity is chromium.

Studies show there is a powerful connection between chromium and diabetes. For example, people with diabetes and heart disease are relatively deficient in chromium levels, compared with healthy people. And people with known chromium deficiencies develop symptoms associated with type II diabetes.

Human studies show chromium’s impact on both short- and long-term blood-sugar control. When diabetic patients receive chromium supplements, their fasting blood glucose and insulin levels drop promptly, while their long-term sugar levels improve, as indicated by reductions in hemoglobin A1C.

Unlike glucose-lowering drugs and insulin, chromium poses no danger of producing dangerously low blood sugar (hypoglycemia), which is a major advance in safety.
Chromium works in multiple ways to boost glucose uptake from the blood. It boosts *production* of GLUT4 transporter molecules, and triggers the GLUT4 movement from the cell’s interior to its membrane—both of which help move glucose out of the blood and into cells. This has the dual benefit of lowering blood-sugar levels while providing much-needed chemical energy inside cells.

These glucose uptake-promoting properties mean that chromium fights insulin resistance by enhancing the impact of insulin on a cell’s sugar-absorbing capabilities—and that’s a very good thing for anyone with borderline or high blood sugar.

### Ancient Remedies Prevent Tissue Damage

While chromium produces *outstanding* sugar-lowering effects, it is also a highly reactive metal ion that is capable of inducing oxidative stress that could damage tissue. That’s why scientists now recommend that chromium supplements be *stabilized* with organic compounds that can reduce the oxidative stress and allow chromium’s major benefits to emerge. Two such compounds are *amla* and *shilajit*.
In addition to enhancing chromium’s benefits, these two ancient natural remedies have some impressive protective properties of their own that make them a perfect complement to chromium. Modern science has revealed that amla extracts powerfully oppose oxidative stress of all kinds. Amla protects against glycation of proteins, which helps prevent the damage that otherwise occurs in tissues throughout the body (eye lens and retina, heart muscle, kidney, nerves, and blood vessels). Amla also directly prevents blood-sugar levels from rising after a starch-containing meal by blocking the enzymes that convert starch into sugar in the intestine. This can help to prevent the effects of the occasional carbohydrate overindulgence and may also help address unhealthy fasting blood-sugar levels.

Shilajit is an adaptogen that helps cells and tissues survive oxidative and other stresses. Research shows that shilajit promotes efficient glucose “burning” in mitochondria.

Efficient-running mitochondria produce fewer chemically stressful byproducts, reducing cell damage. Their energy output is also maximal, helping cells to meet their needs. And clean-burning mitochondria are less vulnerable to outside oxidative stress.

Studies show that amla and shilajit provide the tissue protection that is not found in many pharmaceutical drugs.

Providing supplemental chromium stabilized with amla and shilajit is an effective, safe way of lowering blood sugar, minimizing glucose-induced tissue damage, and promoting efficient energy production—all of which are known to mitigate prediabetes and diabetes.

An Underlying Cause of Insulin Resistance

Insulin resistance, a crucial factor in the development of prediabetes, occurs when the body’s cells cannot respond normally to insulin. That causes blood sugar levels to creep up gradually—and, in most people, entirely without symptoms.

One of the key dysfunctions in developing insulin resistance is a reduction in movement of glucose-transporting molecules from deep within a cell out to its membrane. These transporters, known as GLUT4, are responsible for transferring sugar from blood plasma into the cell. Once there, its chemical energy is released to keep the cell working.

Without adequate transportation out of the blood and into the cells, sugar is left in the blood, causing blood-sugar levels to steadily rise. Over time, this damages tissues through the chemical reaction known as glycation, which occurs when sugar reacts chemically with vital molecules, including proteins, causing them to become stuck together and preventing them from functioning properly.

Glycation also creates harmful advanced glycation end products (AGEs), which are known to be a root cause of aging.

The good news is that if it is caught early enough, insulin resistance can be alleviated. Studies have shown you can reduce the risk of progression from prediabetes to diabetes by about 58% within three years simply through lifestyle interventions. And of course, people who already have diabetes need to control their blood-sugar levels just as urgently as those with prediabetes.

That’s why virtually everyone—diabetic or not—can benefit from recent discoveries about multitargeted nutrients capable of improving insulin sensitivity and reducing fasting blood glucose through a variety of mechanisms of action.
Seaweed Regulates Blood Sugar

Seaweed is a sea vegetable that works in many ways to lower blood sugar and help protect against metabolic syndrome.52-55

Like cinnamon and chromium, seaweed increases levels of the glucose-transporting GLUT4, and increases activity of the energy-sensing PPAR system—both of which promote insulin sensitivity and glucose uptake.56,57

In addition, sea vegetables are rich in iodine, which plays a role in maintaining insulin sensitivity.58 Animal studies have shown that oral supplementation with iodine reduces glucose levels.59,60 And one recent human study showed that in obese, iodine-deficient women, iodine supplements reduced high cholesterol.61

Many of seaweed’s sugar-lowering effects occur directly in the digestive tract. There, seaweed components block the enzymes needed to release sugar molecules from starch.62-66 As a result, glucose is not released, never contributing to rising blood sugar levels.52

Another important way seaweed extracts help combat insulin resistance and metabolic syndrome is by reducing body weight and fat mass. When obese animals were given seaweed supplementation, it was found to lower blood sugar, diminish food intake, reduce body weight, and slow weight gain.67 One reason for these benefits could be because seaweed contains compounds that have been shown to activate systems that cause fat to be burned off rather than stored in the body.68,69

Seaweed supplementation also reduces the development and maturation of new fat cells, which helps prevent weight gain caused by a high fat diet.70,71 As a result, supplemented animals were exposed to far lower levels of the inflammation-promoting molecules (cytokines) that fat tissue pours out into the circulation.72

Summary

More than one-third of Americans have metabolic syndrome, an insulin-resistant state in which borderline high blood sugar and other metabolic abnormalities signal ever-growing risks for heart disease, stroke, cancer, and a host of other age-accelerating conditions.73

Sugar-lowering drugs are not generally prescribed until after a person develops diabetes, which leaves millions of us in a dangerous, prediabetic state without treatment. Natural supplements have long been shown to reduce the risks of metabolic syndrome by lowering blood-sugar levels before they reach dangerous concentrations.

Cinnamon, chromium, amla, shilajit, and seaweed provide sugar-lowering, energy-burning, and fat-reducing properties, and should be considered as a regular part of a healthy supplement regimen.

While diabetics are well aware of the risks of elevated blood sugar, ultimately anyone—even those with normal blood sugar levels—should be keenly interested in maintaining healthy blood-sugar levels.

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

TARGETED BLOOD-SUGAR CONTROL


AMPK PROMOTES LONGEVITY FACTORS

Importance of AMPK
Studies show increased AMPK activity supports:

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- 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.

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

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

References

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Optimize Healthy Blood-Sugar Levels

This formula combines proprietary cinnamon and seaweed extracts with a unique chromium complex to promote healthy blood-sugar levels already in normal range.

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

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**Loss of mitochondrial function** contributes to aging throughout the body. **Mitochondrial** decline opens the door to age-related diseases such as neurodegeneration, diabetes, and obesity.\(^1\)\(^2\)

In a discovery published in 2017, scientists found that the natural hormone **melatonin** works in a **unique** way to combat **mitochondrial dysfunction**.\(^3\)

A contributor to mitochondrial dysfunction is the opening of a **hole** in the mitochondrial inner membrane that decreases their ability to produce energy. Preventing or closing this **hole** is a key to preserving youthful mitochondrial function. Up until recently, there were no drugs able to do so permanently.

This landmark 2017 study reveals that **melatonin** helps maintain normal levels of an **enzyme** whose job is to **plug** that hole.\(^3\)

By preserving mitochondrial function, **melatonin** exerts a **highly targeted** and specific action on a fundamental cause of aging.
Mitochondria and Aging

Melatonin has long been hailed for its benefits on cellular function and disease prevention, as well as its impressive impact on longevity in animal models of aging.14-21

In a study published in 2017, scientists uncovered a new way that melatonin promotes longevity. This new mechanism involves melatonin’s ability to preserve mitochondrial function.

To fully grasp the impact of the study’s findings, we first need to review some background information.

Mitochondrial dysfunction plays a large role in aging and disease because mitochondria are the powerhouses of our cells. By “burning” fuel supplied by the food we eat, mitochondria release massive amounts of energy needed to power the human body.

This energy release occurs in the form of molecules of ATP (adenosine triphosphate). ATP drives every cellular function that requires energy. Low levels of ATP result in diminished energy, decreased cellular function, and, eventually, poor tissue, organ, and system function throughout the body.

The number of mitochondria in our cells, and their efficient function, degrades over time. This accounts for a large part of the aging we experience in the form of increased disease vulnerability and shortened lifespans.1-3

Mitochondrial Death Channel

A contributor to mitochondrial dysfunction is the activation of a protein in the mitochondrial inner membrane called MPTP, or mitochondrial permeability transition pore.22-24 The MPTP forms a channel, or pore, through the mitochondrial membrane.25,26

MPTP opening is not good because it causes swelling, as water and small chemical molecules flow nonstop into the mitochondria.13 This is followed by a sudden sharp loss of the mitochondria’s ability to retain their essential electric charge. The result is a collapse of energy production, a decrease in ATP supplies, and increased oxidative stress on cells.24

Numerous studies show that opening of the MPTP is associated with common diseases of aging, and with markers of aging itself in human tissues.25-31 Closing the MPTP is essential for long-lived, efficient mitochondria.13,24,28

The new study shows us for the first time that melatonin supplementation can dramatically reduce the MPTP opening, thereby reducing the impact of dead and dying mitochondria on aging without resorting to toxic and expensive drugs.

New Findings

In the study published in early 2017, researchers in South Carolina and Russia teamed up to investigate details of how melatonin interacts with the MPTP to boost and preserve mitochondrial function.13 In an entirely new development, the researchers found that melatonin improved mitochondrial function by boosting levels of an enzyme involved in controlling MPTP holes.13

The enzyme, called CNPase, protects mitochondria. It does this by breaking down a molecule that promotes the opening of the MPTP. Continued CNPase activity is necessary for maintaining normal mitochondrial function and energy availability in the cell.13

But animal research has shown that CNPase levels fall by as much as 34% with aging, accompanied with loss of mitochondrial electrical function by up to 69%.24 This has dangerous effects on overall tissue and organ function.

The new study found that melatonin helps maintain normal levels
of CNPase within mitochondria, where it suppresses MPTP. This maintains normal electrical function in mitochondria and contributes to normal tissue and organ function, resistance to disease, and slower aging.13

These findings indicate that, at the most basic possible level, melatonin contributes to disease resistance and age deceleration through its direct impact on mitochondrial function.

Melatonin as Mitochondrial Medicine

The findings of this new study lend additional weight to the evidence that melatonin prevents age-associated disease through its impact on mitochondrial health.19

This should not be surprising, considering the highest concentrations of melatonin inside of cells is found in the mitochondria, which suggests an important natural role for its effects on energy production and cellular integrity.32

Indeed, melatonin is known for its ability to extend the lifespan of multiple species, from insects to mammals. This effect is accomplished through melatonin’s ability to protect mitochondria, promote longevity-associated proteins such as SIRT1, and reduce oxidative stress that can induce mitochondrial destruction.14-21

Specifically, melatonin can:

- Prevent age-related mitochondrial dysfunction in brain cells, with the potential to slow or prevent neurodegenerative diseases,4,8-10
- Prevent death of skeletal muscle cells through supporting mitochondrial energy production,5
- Protect heart muscle cells following loss of blood flow (ischemia) during and after a heart attack,6
- Improve mitochondrial function, and hence, energy utilization, in fat tissues of animal models of diabetes and obesity,11
- Alleviate fatty liver disease by protecting liver mitochondria in similar animal models,12
- Improve function of smooth muscle cells in intestines, which often slows down during aging as their energy supplies are threatened.2

With its newly-discovered ability to support the CNPase enzyme, and the resulting prevention of MPTP formation, melatonin helps preserve youthful function in every tissue in the body.

And since most human cells and tissues contain mitochondria, that translates to a vital protective effect of melatonin in all body organs and systems.

Summary

Loss of mitochondrial function is a fundamental contributor to aging in every cell, tissue, organ, and body system in humans.

A landmark study published in early 2017 has shown that melatonin supplementation supports youthful mitochondrial function by preventing the expression of an opening, or pore, or “hole” in mitochondrial membranes that would otherwise degrade their ability to generate energy.

Melatonin and Aging

Loss of mitochondrial function is a known fundamental contributor to aging throughout the body, predisposing us to age-related diseases such as coronary artery disease, neurodegeneration, and metabolic disturbances like diabetes and obesity.

A major contributor to mitochondrial dysfunction is the opening of a hole in mitochondrial membranes that results in swelling and eventual death of individual mitochondria.

Studies reveal that melatonin preserves healthy mitochondrial function by safely and effectively preventing the opening of the pore.

Life Extension® recommends regular melatonin supplementation to prevent mitochondrial degradation, and to preserve youthful energy supplies.

Melatonin is a low-cost supplement that has been available to Americans since 1992.
This results in enhanced mitochondrial function, and a reduction in age-related diseases—and it goes a long way to explaining melatonin’s known longevity-promoting properties.

By supplementing with melatonin, we can preserve youthful energy supplies by providing protection for the body’s main energy source.

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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Arterial Protect supports the body’s ability to control arterial plaque formation.1

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Healthy sleep is one of the best ways to feel revitalized and maintain optimal health. Increasingly, research has shown the health benefits of a good night’s sleep. Melatonin is one of the most popular supplements for supporting sleep.

For optimal results, melatonin should be taken within 30-60 minutes before going to sleep.

Melatonin 3 mg
Item #00330 • 60 vegetarian capsules

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Contrary to previous scientific belief, human adult brain cells can regenerate. This discovery prompted Brant Cortright, PhD, professor of psychology at San Francisco’s California Institute of Integral Studies, to look at the research and write a book about this exciting new field of neurogenesis.

The Neurogenesis Diet & Lifestyle combines a holistic approach to increase the creation of new brain cells with the latest neuroscience research on enhancing brain health and cognitive function.

In his book, Cortright points to research showing that neurogenesis is “the most important biomarker for brain health most people never heard of.” While a low rate of neurogenesis is linked with mental disorders such as anxiety, depression, stress, and cognitive deficits, a high rate of neurogenesis has only positive effects—lowered stress, anxiety and depression, plus enhanced cognitive abilities including faster learning and better problem-solving skills.

Dr. Cortright sat down with us to discuss neurogenesis as well as some of the methods that can be used to enhance this extremely beneficial process.
**LE:** Medical science once believed that people stop growing new brain cells early in life, but recent research has shown that to be false. What are the implications of this?

**BC:** The discovery that your brain produces new brain cells as long as you are alive upends the belief that the brain stops growing in young adulthood. It also changes our entire picture of aging, for if new brain cells are being formed, then the brain can renew itself. What is key is the rate at which new brain cells form.

There are vast differences in how quickly people produce new brain cells, and your rate of neurogenesis may be the single most important factor for a high quality of life. When neurogenesis is high, you are alive, engaged, expansive, fulfilling your potential. Your mind’s abilities are enhanced and your emotional vitality is strong. You are protected from stress and depression. You feel good and life is fulfilling. Immunity is robust. Your spirits are high and your outlook is positive.

---

**LE:** What happens with a low rate of neurogenesis?

**BC:** Your brain shrinks, your life contracts, and you move toward memory loss, cognitive deficits, dementia, stress and anxiety, depression, reduced executive function and immunity, and myriad health problems. When neurogenesis is low, your whole quality of life suffers. Having a high level of neurogenesis may be the most important thing you can do to cultivate a high quality of life.

**LE:** In your book, you advocate a holistic approach to neurogenesis involving diet and stimulation of what you call the four levels of the brain: body, heart, mind, and spirit. What’s the rationale behind this approach?

**BC:** Different kinds of brain stimulation support each other. For instance, running boosts neurogenesis, but with running alone there is a 40% to 60% loss of these newly created brain cells. However, other parts of an enriched environment prevent neuronal cell loss but don’t increase the number of new neurons formed. Put together, there is a large boost in new brain cells as well as an almost 100% survival rate. But only a holistic, multipronged approach produces the powerful boost in both new neurons and survival rates that results in a major increase in neurogenesis.

**LE:** You recommend a number of foods and nutrients that are available as extracts.

**BC:** Yes. This makes including these in your diet more economical and practical. For example, a daily diet that includes fresh blueberries can be pricey, but two capsules of blueberry extract is much more affordable and easier to keep in the house.

**LE:** Which nutrients have been shown to increase neurogenesis?

**BC:** The four most outstanding foods for stimulating neurogenesis are blueberries, omega-3 fatty acids, green tea, and curcumin. It’s worth considering making these a part of your regular diet.

**LE:** Let’s take a closer look at some of these nutrients. What can you tell us about blueberries, for instance?

**BC:** It’s hard to sing blueberries’ praises highly enough. They act in so many ways to promote neurogenesis and protect the brain from cognitive decline that if blueberries were a drug, pharmaceutical companies would be bombarding us with ads to entice us to upgrade our brains with this “miracle drug.”

Numerous studies show adding blueberries to the daily diet of mice increases neurogenesis significantly. Further, blueberries seem to protect against cognitive decline, inflammation, oxidation (free radical damage), radiation,
and glycation. Generally, it takes different substances to protect against any one of these things. That blueberries have so many effects is little short of astounding. Blueberries are packed with polyphenols, especially flavonoids called anthocyanins that stimulate neurogenesis. More specifically, the anthocyanin dye, which causes the dark blue color, crosses the blood-brain-barrier to stimulate neurogenesis.

Blueberries have been shown to reverse cognitive decline in both humans and animals. Mice bred to develop Alzheimer’s showed improvements in memory when fed blueberries, and two neuroprotective chemicals were higher in these mice. Humans with cognitive decline showed improvements after consuming blueberries daily. Aside from increasing neurogenesis, blueberries allow better communication among neurons, something called signal transduction, and they also protect against brain injury, stroke, certain neurotoxins, excitotoxicity, and so may help with Parkinson’s, MS, and other neurodegenerative diseases as well.

LE: How about omega-3s?

BC: Neuroscience researcher Sandrine Thuret, PhD, of London’s Kings College, reported a 40% increase in neurogenesis by adding omega-3s in Science Daily in 2007. Other studies have shown equally impressive gains in neurogenesis.

Our brains are made up of about 60% fat. DHA, one of the most important of the omega-3s, constitutes about 30% of the brain’s cerebral cortex. In the ongoing tearing down, replacing, and rebuilding of our brains’ cellular structures, we want to consume high-quality fats in order to continuously rebuild our brains with the best fats possible. Omega-3s are the highest quality fats for brain development. A diet high in unhealthy or “bad” fats slows down neurogenesis, but a diet high in healthy or “good” omega-3s increases neurogenesis to a higher level.

LE: Green tea contains polyphenols, including epigallocatechin gallate (EGCG). Does this have an effect on neurogenesis?

BC: Yes. Green tea’s polyphenols have been shown to increase BDNF (brain-derived neurotrophic factor, which appears to be the main signal that turns on neurogenesis), and to have strong health benefits ranging from cancer prevention, cardiovascular benefits, immunity improvement, and glucose reduction. EGCG and green tea’s other polyphenols not only increase neurogenesis but, like blueberries and omega-3s, exert powerful antioxidant and anti-inflammatory effects as well. Green tea has clear cognitive benefits and even improves working memory, which is one of the most difficult functions to increase.

LE: How about the benefits of curcumin?

BC: Curcumin has strong neurogenic effects. In addition, it is a powerful anti-inflammatory and antioxidant compound. Aging populations who consume curcumin show better cognitive performance. It reduces beta-amyloid and plaque formation in aging humans and has high potential as part of an anti-Alzheimer’s strategy. It has long shown antidepressant effects, which naturally follow from decreasing inflammation and increasing neurogenesis. 

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LE: As just one other example, you also write about melatonin’s healthful properties.

BC: Melatonin is a hormone secreted by the pineal gland. The body secretes melatonin at night, when it’s dark and we’re asleep. Levels drop as we age, as does neurogenesis, and, accordingly, sleep disturbances increase. Melatonin increases neurogenesis and helps regulate it. It also increases the immune system's capacity and has anticancer effects. Melatonin can be used as a sleep aid at night. There is wide dosage individual variation—some people take 1 mg per night while others take 20 to 30 mg per night. This is a vivid example of how you need to individualize your own approach to brain health.

LE: Finally, could you briefly outline how exercise of the mind relates to neurogenesis?

BC: Exercising the mind by engaging in various forms of mental stimulation increases neurogenesis and keeps mental faculties sharp. There is no quick fix for keeping our mental abilities strong, no one exercise or video game that will prevent the mind from deteriorating. Most forms of mental stimulation are discrete and do not generalize to other parts of cognitive function. Hence, we need to use our minds in as many ways as we can—reading, problem solving, remembering, discussing, writing, musical training, and attention training.

Building cognitive reserve by using our minds throughout our lives is an insurance policy against Alzheimer’s and dementia. At whatever age we begin, mental exercise increases neurogenesis and expands our world.

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 order a copy of The Neurogenesis Diet & Lifestyle, call 1-800-544-4440 or visit www.LifeExtension.com

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

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

Some of the healthiest “vegetables” you can eat aren’t really vegetables. Take the savory mushroom. It’s actually a fungus, which doesn’t sound appetizing, but nevertheless, mushrooms are one of the most popular “veggies” around.

Luckily, they’re also quite nutritious—low in fat and sodium, cholesterol free, but high in dietary fibers, minerals and B vitamins, among many other important nutrients.1

Just one word of warning: Unless you really know what you’re doing, it’s best to avoid picking your own wild mushrooms. Some types are toxic and can make you seriously ill, or worse.

Here’s a list of some of the specific health benefits of mushrooms…

**Boost Your Immune System**

Unlike the majority of fruits and vegetables, mushrooms contain selenium,1 which improves the activity of T cells, which in turn contribute to the body’s immune defenses.2 They also harbor beta-glucans in their cell walls, which help prevent tumors from developing by boosting the immune system.3

**Lower Blood Pressure**

Mushrooms contain a good amount of potassium.1 Potassium helps control blood pressure by maintaining normal fluid and mineral balance.4

**Improved Nutrient Absorption**

Mushrooms are a good source of vitamin D,1 which doesn’t turn up much in other foods. Vitamin D helps the body absorb and metabolize minerals such as phosphorous and calcium,5 which mushrooms also contain.

**Lowered Risk of Diabetes**

Mushrooms contain dietary fibers,1 and high-fiber diets help fight diabetes.6 According to research, type II diabetics have shown better sugar, lipid, and insulin levels.7

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. If you take Once-Daily Health Booster, you do not need additional Super K with Advanced K2 formula.

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

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Each bottle lasts for three months.
Sara Gottfried, MD, is a board-certified gynecologist and a graduate of Harvard Medical School and MIT.

Based in Berkeley, Calif., Dr. Gottfried uses evidence-based medical data, functional medicine and natural hormone balancing strategies in her practice to help women lose weight, detoxify, and slow down aging.

The author of the New York Times bestsellers The Hormone Cure and The Hormone Reset Diet, Dr. Gottfried published her latest book, Younger: A Breakthrough Program to Reset Your Genes, Reverse Aging & Turn Back the Clock 10 Years in March 2017.

The following is a recent interview with Dr. Gottfried at her medical office.

LE: The relatively affordable price of genetic testing is opening up new opportunities for the way women think about their health and how they care for their bodies. Many are getting their genes mapped. How do women find doctors who can understand this information and work with them to devise strategies that will help them feel optimally healthy and younger?

SG: I agree that finding a collaborative functional medicine doctor—who can perform root-cause analysis and look at the whole picture, from DNA to the entire body—is important, but I also believe we need to start with the basics of what are the most important seven genes to know and what can be changed with health strategies that address them (i.e., epigenetics). My new book, Younger, cites these genes and provides a foundation for women to learn evidence-based and specific directions to counter the aging process that begins in the muscles and skin, as well as to reduce stress at a molecular level, sleep better, and feel younger.
Functional medicine is an increasingly popular and holistic system of medicine that engages the whole person, not just an isolated set of symptoms, and works from the inside out to address the root cause of disease and accelerated aging. Most of the root causes for health problems stem from a lack of nutrients, movement, sleep, and mindset. Each of these impacts the body’s natural aging process. By looking at both genetics and lifestyle, I gain insights about changes that will reduce or eliminate chronic or recurring symptoms. Only 10% of a given disease is caused by your genes, while 90% is caused by environmental factors, including the environment you create with your lifestyle choices. I call this the 90/10 rule: Genetics loads the gun, and the environment pulls the trigger.

**LE:** What are some common health problems that you see in your practice?

**SG:** Fast aging is the biggest health problem that I see in my practice and with the people I work with online. It’s the elephant in the room that no one is talking about, yet most of it is modifiable with small lifestyle tweaks. For starters, I created the Healthspan Quiz to help determine the rate at which you are aging and set your baseline for calculating improvement. This quiz is online at youngerquiz.com

The Healthspan Score gives you a baseline measurement of the most important factors determining your rate of aging: demographics, lifestyle, stress, exposures, medical and family history, antioxidant status, connectedness, and brain function. These measurements indicate how your genes are performing. Every one of them affects your genetic expression and helps highlight, even prioritize, the functional medicine solution. Each measurement reflects a key aspect of aging, from disease risk to oxidative stress, and therein suggests where you need the most help.

Since mapping the human genome, scientists developed an important complementary concept called the exposome—the sum of all exposures in an individual over a lifetime from diet, lifestyle, and behaviors, how the body responds to them, and, finally, how these exposures relate to health. These factors have the power to work for or against you, and these can also adjust how your genes are expressed in your DNA sequence.

If you decide to pursue genetic testing, the good news is that it is increasingly more affordable. As of March 2017, it costs about $200 to map important genes. I predict that in the near future, many of us will carry our own genomes printed out on smart cards kept in our wallets. This will allow for a more personalized approach to preventing disease and unnecessary aging. Until that day arrives, though, you can still improve your health span and reduce the rate of your body’s aging, even without genetic testing.

**LE:** Please provide a few telling examples of gene-related rejuvenating strategies that are in Younger and how these can help women.

**SG:** At age 44, I got a research opportunity few people would want. I performed a simple blood test of how fast I was aging, and I failed. I was aging 20 years faster than my chronological years according to my telomeres, which are the protective caps on chromosomes that deal with aging. Looking in the mirror, I could see the telltale signs: wrinkles, puffy skin, bags under my eyes, a lack of sparkle. My telomeres specifically, and my body generally, needed rescuing, so I rolled up my sleeves, dove into the science, and created a breakthrough protocol to fix them and slow down my aging process.

My book zeroes in on the top seven genes that can be working for or against you as you age, and for example, these include the vitamin D receptor (VDR) gene. When this gene is turned on in your body, it codes for the nuclear hormone receptor for vitamin D3, which enables your cells to absorb vitamin D. When it’s turned off, you are more likely to suffer from osteoporosis. If you have a bad variant of VDR, as I do, you need to open the vitamin D receptor by keeping your blood levels higher than recommended by conventional doctors, with a target range of 60 to
Wellness Profile

On average, they added 10 years to their health-span, the period of time where you feel vital and are relatively disease free. I’m happy to report that I’ve closed the gap: instead of being 20 years older than my chronological years as measured by my telomeres, now I’m only 3 years older biologically, and trust that the gap will continue to improve as I continue to follow the Younger protocol further. I’m a physician scientist who understands evidential hierarchy, which means that I only recommend medical strategies that have substantial scientific proof behind them.

**LE:** How is Younger especially relevant and potentially helpful to women in their 40s? Women in their 50s?

**SG:** The female body is magnificent, but it doesn’t come with a lifetime warranty or an owner’s manual. While each woman is the result of millions of years of evolution, many of the adaptations that helped her ancestors survive are now making her fat and wrinkly and are no longer needed. A woman’s genetic code—the DNA sequence that is the biochemical basis of heredity in all living organisms—is only a small part of the story. As I tell my patients, “Your DNA is a unique, one-of-a-kind blueprint that is specific to you. Even if you haven’t been dealt platinum genes, you can still look great and age more slowly.”

Science proves that degenerative diseases, like Alzheimer’s and cancer, begin in the body decades before symptoms. The good news is that you can now interpret your health through the lens of your genetic history and tendencies, particularly when it comes to aging, so that you can expand both your lifespan and your healthspan. Should you decide against genetic testing, you can consult the seven-week protocol outlined in Younger for food, sleep, exercise, stress-busting, and brain-boosting action plans that may help you slow down your aging process.

**LE:** How and why is the protocol outlined in your book authoritative?

**SG:** The 7-week protocol I write about in Younger was shown to be efficacious in a beta test of 1,000 people (99% women). My vitamin D receptor functions at half the level of a normal VDR, so I keep the amount of vitamin D in my blood at about double the recommended level in order to work around my bad variant. If you have a bad variant of VDR, your task may be to raise your intake of vitamin D beyond the standard recommendation of 1,000 to 2,000 IU per day.

Another example of a gene that many people in my practice have, and I do, too, is the fat mass and obesity associated (FTO) gene. I call this the FATSO gene because this gene is strongly associated with your body mass index and thus your risk for obesity and diabetes. When you have the variant of the FTO gene, your body has limited control over leptin, a hormone in charge of satiety. In other words, you feel hungry all the time. You can turn off the variant of the FTO gene with a regular exercise program and a low-carbohydrate food plan that’s high in fiber.

Another of your genes that’s vital to understand is the Detox Gene, also known as MTHFR. This provides instructions for making an enzyme that plays an important role in the processing of folic acid and amino acids, the building blocks of proteins. MTHFR is also important as it also helps you detoxify alcohol and homocysteine.

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leveraging epigenetics, the turning on and off of certain genes that age you prematurely. You have the power to increase your healthspan and get your body to work for you instead of against you. It’s about the daily choices that defy your genetic tendencies and fight diseases of aging by turning on the right genes at the right time and in the right sequence.

For women in their 40s, I would hone the focus on FOOD, SLEEP, MOVE, and EXPOSE. For women in their 50s, I would hone the focus on the postmenopausal aspects of SLEEP (keep bedroom 64 degrees or cooler to prevent hot flashes), MOVE (exercise to prevent osteoporosis and injury), EXPOSE, SOOTHE, and THINK (particularly the ways to silence the APOE4 gene for women. This gene is responsible for approximately 20% of Alzheimer’s cases; women who carry the APOE4 gene are more likely to get Alzheimer’s than men.)

SUPPLEMENT SUGGESTIONS

For women looking to age optimally and stay strong, the following supplements are some of those cited in Dr. Gottfried’s book Younger as potentially health-enhancing:

- A multivitamin mineral supplement.
- Vitamin D for sleep regulation, bone health, and osteoporosis prevention.
- Activated charcoal tablets for detoxification or after eating a restaurant meal.
- According to Dr. Gottfried, “Resveratrol, which has been shown to fight the effects of aging on a cellular level and to mimic the benefits of caloric restriction. The dose is 200 mg once per day.”
- “Magnesium counters the stress response, helps your muscles release and may even enhance your sleep. Take 300 to 1,000 mg a day, unless you have kidney disease, in which case you should consult your healthcare practitioner.”
- “Lipoic acid can be helpful because even with a whole-foods diet, it’s hard to get enough to keep your oxidant/antioxidant status in balance,” Dr. Gottfried notes. “Lipoic acid repairs damaged cells, and it’s one of the most crucial anti-aging, anti-inflammatory, and antioxidant agents you can ingest—or apply to your skin. Lipoic acid may also protect your bones as you age and keeps your cells sensitive to insulin so that your blood sugar doesn’t climb.”
- “Take omega-3 fatty acids—1 to 2 grams a day. It lowers your cortisol levels, increases lean body mass, and improves vagal tone as measured via heart rate variability.”
Wellness Profile

about the risks, benefits, and alternatives of hormone therapy in the context of her values, philosophy, and quality of life.

Regarding hormones and the aging process, both men and women make less testosterone as they age, leading to more fat deposits at the breasts, hips, and buttocks. Women produce less estrogen, which normally protects the hair follicles and skin. Lower levels of estrogen and testosterone may weaken your bones and your sex drive, and furthermore, lower estrogen-to-testosterone ratios may trigger hair loss and heart disease.

Unfortunately, your thyroid gland slows down and, along with it, your metabolism, so the bathroom scale climbs a few pounds per year (or even per month). You get cold more easily. Your cells become increasingly insensitive to the hormone insulin, which leads to rising blood sugar in the morning. As a result of higher blood sugar, you may feel foggier and experience stronger cravings for carbs, then notice more skin wrinkling along with an older-looking facial appearance. The key point is that the right food, sleep, exercise, and support for detoxification can reverse many hormone problems associated with aging.

•

For daily use, I suggest a high-potency multivitamin that covers the B vitamins (particularly folic acid, since the MTHFR gene is commonly flawed among people in the United States), and minerals. For detoxification, I recommend n-acetyl-cysteine (NAC) and activated charcoal.

LE: You maintain an innovative practice that involves your rigorous study of patients’ evidence-based medical testing, virtual consultations and online teaching programs for women who want to upgrade their health. Please describe a typical “virtual” patient in their 50s. How do you help them?

SG: My approach is the basic functional medicine process, which I’ve personalized over the past 20 years. I follow the GOTOIT heuristic, complete the functional medicine timeline, and complete the functional medicine matrix for every patient. Your readers can find this at: functionalmedicine.org/getstarted/IFMTools/

After 25,000 patients, I’d say my average is like the woman I had a session with today by Skype: a 59-year-old, healthy, active, and wise woman who eats well but feels more flat in terms of energy and cognition. Her libido is flagging and she wakes up at 4 am. Her joints are achier than 10 years ago, and she recently was diagnosed with frozen shoulder. Her main question is whether she should consider bioidentical hormone therapy.

I help a woman like this by going through the functional medicine tool kit for intake, as a means to identify the root causes of her symptoms, and then apply the Gottfried Protocol:

Step 1: What are the micronutrient deficiencies and perhaps nutritional excesses that we could address to reduce “inflammaging”—the unfortunate hybrid of increasing inflammation, stiffness, and accelerated aging. For instance, this woman appears to have symptoms of inflammation and low estrogen, and we are performing confirmatory laboratory tests. She may have leaky gut and an overactive immune system. She could have a food intolerance. She drinks coffee and eats dairy and gluten, which may or may not be increasing inflammation. We will look at her DNA for specific SNPs that may guide us with her micronutrients and targeted lifestyle therapies, and ultimately with the question about hormone therapy.

Step 2: Are there herbal therapies that may address her root cause? For instance, the supplement called maca, derived from a root vegetable indigenous to the Andes Mountains, raises estrogen levels and has been shown in randomized trials to improve sex drive. If she has blood sugar issues, I may also add a supplement to help regulate blood sugar.

Step 3: If steps 1 and 2 do not resolve her symptoms, would a small-to-moderate dose of bioidentical hormone therapy be helpful? We will continue to have a very thorough conversation about the risks, benefits, and alternatives of hormone therapy in the context of her values, philosophy, and quality of life.

For more information, check out Dr. Sara Gottfried’s website at: saragottfriedmd.com
“D”-fend Your Health

VITAMIN D3
For Heart Health, Strong Bones, Skin Health, and a Vital Immune Function

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.

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  In the cardiovascular system ApoE is involved in the transportation of fat molecules into your cells. E4 is associated with increased levels of cholesterol and triglycerides, which leads to atherosclerosis, heart disease and stroke.

- Neurotransmitter Basic Panel** (LC100058) $199
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- New Genetic Testing

- DNA Genetic Cancer Risk Profile** (LC100057) $299
  With only a saliva sample, you can identify your risk for 25 hereditary cancers by analyzing 98 genes from your DNA including the well-known BRCA1, BRCA2, TP53, and APC. Not available in FL, NY, and RI.

- ApoE Genetic Test for Alzheimer’s and Cardiac Risk** (LC100059) $149
  Apolipoprotein E (ApoE) is an important regulator of cholesterol and triglycerides levels in your blood and supports lipid transport and injury repair in your brain. Genetically, E4 is the strongest risk factor for developing Late Onset Alzheimer’s disease. According to the National Institute of Health, inheriting a single copy of ApoE4 increases the risk of Alzheimer’s disease by about three-fold. Inheriting two copies increases the risk by about 12-fold. In fact, almost 40% of AD patients have inherited an E4 allele.
  In the cardiovascular system ApoE is involved in the transportation of fat molecules into your cells. E4 is associated with increased levels of cholesterol and triglycerides, which leads to atherosclerosis, heart disease and stroke.

- Neurotransmitter Basic Panel** (LC100058) $199
  Serotonin, Dopamine, Epinephrine, Norepinephrine, GABA, Glutamate. Alternations in these six neurotransmitters play a significant role in contributing to symptoms such as cognitive disorders, depression, anxiety, diminished drive, fatigue and sleep difficulties, cravings, addictions, pain and more! Not available in NY.

- Food Safe Allergy Test – Basic** (LCM73001) $198
  This test measures delayed (IgG) food allergies for 95 common foods.

- Food Safe Allergy Test – Extended** (LCM73002) $198
  This test measures delayed (IgG) food allergies to an additional 95 foods.

- Food Safe Allergy Test – Combo** (LCM73003) $375
  This test measures delayed (IgG) food allergies to all 190 foods found in our Basic and Extended panels.

- Homocysteine (LC100061) $54
  High homocysteine is associated with heart attack, stroke, and dementia. Find out your homocysteine level so you can take steps to lower it if necessary. Order a homocysteine test by August 31, 2017, and you’ll also receive, at NO extra charge, the CBC/Chemistry panel offered by Life Extension. See below our CBC/Chemistry panel that provides far more tests than most conventional labs:

- CBC/Chemistry Profile (LC381822) includes:
  - Lipid Profile:
    - Total cholesterol • Triglycerides
    - HDL cholesterol • LDL cholesterol (calc.)
    - VLDL cholesterol (calc.)
    - Total cholesterol/HDL ratio
  - Estimated Coronary Heart Disease risk
  - Kidney Function:
    - Uric acid • BUN (blood urea nitrogen)
    - Creatinine • BUN/creatinine ratio
  - eGFR (estimated glomerular filtration rate)
  - Complete Blood Count:
  - Serum Protein
  - Hemoglobin
  - Platelet count
  - Free 
  - YOUR $35
  - ON AUGUST 31, 2017, AND YOU’LL ALSO RECEIVE, AT NO EXTRA CHARGE, THE CBC/CHEMISTRY PANEL

- New Genetic Testing

- DNA Genetic Cancer Risk Profile** (LC100057) $299
  With only a saliva sample, you can identify your risk for 25 hereditary cancers by analyzing 98 genes from your DNA including the well-known BRCA1, BRCA2, TP53, and APC. Not available in FL, NY, and RI.

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  In the cardiovascular system ApoE is involved in the transportation of fat molecules into your cells. E4 is associated with increased levels of cholesterol and triglycerides, which leads to atherosclerosis, heart disease and stroke.
**BLOOD TEST PANELS**

<table>
<thead>
<tr>
<th>Blood Test Panel</th>
<th>Your Price</th>
<th>Retail Price</th>
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<tr>
<td>MALE LIFE EXTENSION PANEL (LC322582)</td>
<td>$269</td>
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<tr>
<td>CBC/Chemistry Profile • DHEA-S • PSA (prostate-specific antigen) Homocysteine • C-Reactive Protein (high-sensitivity) Free Testosterone • Total Testosterone • Estradiol • TSH for thyroid function • Vitamin D (25-hydroxyvitamin D) • Hemoglobin A1c</td>
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<td>MALE HORMONE ADD-ON PANEL* (LC100016)*</td>
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<td>ABC/Chemistry Profile • Free and Total Testosterone • Total Estrogens Estradiol • DHEA-S • Progesterone • Pregnenolone • DHT • FSH • LH • TSH Free T3 • Free T4 • Reverse T3 • Free and Total PSA • IGF-1 • SHBG • HbA1c Vitamin D 25-0H • hs-CRP, ferritin • Homocysteine • Hemoglobin A1c</td>
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<td>MALE ELITE PANEL (LC100016)*</td>
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<td>CBC/Chemistry Profile • Free and Total Testosterone • Total Estrogens Estradiol • DHEA-S • Progesterone • Pregnenolone • DHT • FSH • LH • TSH Free T3 • Free T4 • Reverse T3 • Free and Total PSA • IGF-1 • SHBG • HbA1c Vitamin D 25-0H • hs-CRP, ferritin • Homocysteine • Hemoglobin A1c</td>
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<td>MALE COMPREHENSIVE HORMONE PANEL (LC100010)*</td>
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<td>DHEA-S • Estradiol • Total and Free Testosterone • PSA</td>
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<td>THYROID ADD-ON PANEL (LCTHYROID)</td>
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<td>Free T3 &amp; Free T4.</td>
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<tr>
<td>OMEGA CHECK** (LCOMEGA)</td>
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<td>Provides valuable information on your risk of developing heart disease, sudden heart attack, and cardiac death. The Omega Check** also includes your AA: EPA ratio, allowing you to determine and track a major factor in total body inflammation.</td>
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<tr>
<td>INSULIN (LC004333)</td>
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<td>Helps to assess insulin resistance.</td>
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<tr>
<td>NMR LIPOPROFILE* (LC123810)</td>
<td>$99</td>
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<td>The NMR Lipoprobe** 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.</td>
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<tr>
<td>ADVANCED OXIDIZED LDL PANEL* (LC100035)</td>
<td>$285</td>
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<td>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.</td>
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**Blood tests available in the continental United States only. Restrictions apply in NY, NJ, RI, and MA. Not available in Maryland. Kits not available in Pennsylvania.**
Amino Acids
- Arginine/L-Ornithine Capsules
- Arginine Ornithine Powder
- Branched Chain Amino Acids
- D,L-Phenylalanine Capsules
- L-Arginine Caps
- L-Carnitine
- L-Glutamine
- L-Glutamine Powder
- L-Lysine
- L-Taurine Powder
- L-Tyrosine Powder
- Super Carnosine
- Taurine

Blood Pressure & Vascular Support
- Advanced Olive Leaf Vascular Support with Celery Seed Extract
- Arterial Protect
- Blood Pressure Monitor Arm Cuff
- Dual Action Blood Pressure
- Endothelial Defense™ with Pomegranate Complete and CORDIART™
- Endothelial Defense™ with GliSODin®
- Natural BP Management
- NitroVasc with CORDIART™
- Pomegranate Complete
- Pomegranate Fruit Extract
- Triple Action Blood Pressure AM/PM
- VenoFlow™

Bone Health
- Bone Restore
- Bone Restore with Vitamin K2
- Bone Strength Formula with KoAct®
- Bone-Up™
- Calcium Citrate with Vitamin D
- Dr. Strick’s Intensive Bone Formula
- Strontium Caps

Brain Health
- Acetyl-L-Carnitine
- Acetyl-L-Carnitine Arginate Blast™
- Brain Shield® Gastrodin
- CocoaMind™
- Cognitex® Basics
- Cognitex® with Brain Shield®
- Cognitex® with Pregnenolone & Brain Shield®
- Cognizin® CDP-Choline Caps
- DMAE Bitartrate (dimethylaminoethanol)
- Dopa-Mind™
- Ginkgo Biloba Certified Extract™
- Huperzine A
- Lecithin Granules
- Memory Protect
- Migra-Eeze™
- Neuro-Mag® Magnesium L-Threonate
- Neuro-Mag® Magnesium L-Threonate with Calcium and Vitamin D3
- Optimized Ashwagandha Extract
- PS (Phosphatidylserine) Caps
- Vinpocetine

Cholesterol Management
- Advanced Lipid Control
- Cho-Less™
- CHOL-Support™
- Red Yeast Rice
- Theaflavins Standardized Extract
- Vitamin B3 Niacin Capsules

Digestion Support
- Artichoke Leaf Extract
- Digest RC®
- Effervescent Vitamin C - Magnesium Crystals
- Enhanced Super Digestive Enzymes
- Enhanced Super Digestive Enzymes with Probiotics
- Esophagase™
- Esophagase Guardian
- Extraordinary Enzymes
- Fiber-Immune Support
- Gastro-Ease™
- Ginger Force™
- Pancreatin
- Regimint
- Tranquil Tract™
- TruFiber™
- WellBetX PGx plus Mulberry

Energy Management
- Adrenal Energy Formula
- Asian Energy Boost
- D-Ribose Powder
- D-Ribose Tablets
- Forskolin
- Mitochondrial Basics with BioPQQ®
- Mitochondrial Energy Optimizer with BioPQQ®
- NAD+ Cell Regenerator™
- Optimized NAD+ Cell Regenerator™
- Resveratrol
- PQP Caps with BioPQQ®
- Rhodiola Extract
- RiboGen™ French Oak Wood Extract
- Triple Action Blood Pressure

Eye Health
- Astaxanthin with Phospholipids
- Brite Eyes III
- Certified European Bilberry Extract
- Eye Pressure Support with Mitogenella®
- MacuGuard® Ocular Support
- MacuGuard® Ocular Support with Astaxanthin
- Tear Support with MaquiBright®

Fish Oil & Omegas
- OMEGA FOUNDATIONS® Mega EPA/DHA
- OMEGA FOUNDATIONS® Mega GLA with Sesame Lignans
- OMEGA FOUNDATIONS® Super Omega-3 EPA/DHA with Sesame Lignans & Olive Extract
- OMEGA FOUNDATIONS® Super Omega-3 Plus EPA/DHA with Sesame Lignans, Olive Extract, Krill & Astaxanthin
- OMEGA FOUNDATIONS® Provalin® Purified Omega-7
- OMEGA FOUNDATIONS® Vegetarian DHA Organic Golden Flax Seed

Food
- California Estate Extra Virgin Olive Oil
- Rich Rewards® Breakfast Blend
- Rich Rewards® Breakfast Blend Natural Mocha Flavor
- Rich Rewards® Breakfast Blend Natural Vanilla Flavor
- Rich Rewards® Breakfast Blend Whole Bean Coffee
- Rich Rewards® Decaf Roast
- Stevia Sweetener

Glucose Management
- CinSulin® with InSea2® and Crominex 3+®
- Mega Benforamine
- Tru Sugar Shield®

Heart Health
- Aspirin (Enteric Coated)
- BioActive Foliate & Vitamin B12 Caps
- Cardio Peak™ with Standardized Hawthorn and Arjuna
- Homocysteine Resist
- Optimized Carnitine with Gycosamide®
- Super Ubiquinol CoQ10
- Super Ubiquinol CoQ10 with BioPQQ®
- Super Ubiquinol CoQ10 with Enhanced Mitochondrial Support™
- Super-Absorbable CoQ10 Ubiquinone with d-Limonene
- TMG Powder
- TMG Liquid Capsules

Hormone Balance
- DHEA (Dehydroepiandrosterone)
- Inner Power
- Pregnenolone
- Triple Action Cruciferous Vegetable Extract with Resveratrol

Immune Support
- AHCC®
- Enhanced Zinc Lozenges
- Immune Modulator with Tinofend®
- Immune Protect with PARACTIN®
- Immune Senescence Protection Formula™
- Kinoko® Gold AHCC
- Kinoko® Platinum AHCC
- Kyolic® Garlic Formula 102
- Kyolic® Reserve
- Lactoferrin (apolactoferrin) Caps
- NK Cell Activator™
- Optimized Garlic
- Optimized Quercetin
- Peony Immune
- ProBoost Thymic Protein A
- Reishi Extract Mushroom Complex
- Standardized Cistanche Ten Mushroom Formula®
- Zinc Lozenges

Inflammation Management
- 5-LOX Inhibitor with AprèsFlex®
- Advanced Bio-Curcumin® with Ginger & Turmeric
- Black Cumin Seed Oil
- Black Cumin Seed Oil with Bio-Curcumin®
- Boswellia
- Cytokine Suppress™ with EGCG
- Serraffzyme
- Specially-Coated Bromelain
- Super Bio-Curcumin®
- Zylamend® Whole Body

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

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

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

Longevity & Wellness
- Ageless Cell™
- Alpha-Lipoic Acid
- AMPK Activator
- AppleWise Polyphenol Extract
- Berry Complete
- Blueberry Extract
- Blueberry Extract with Pomegranate
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<td><strong>Health</strong></td>
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<td>Mega Lycopene Extract</td>
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<td>PalmettoGuard® Saw Palmetto/Nettle Root Formula with Beta-Sitosterol</td>
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<td>Prenola® French Maritime</td>
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<td>Natural Cortisol Balance</td>
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<td>Natural Stress Relief</td>
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<td>Vitamin B6</td>
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<td>Vitamin D3 with Sea-Iodine™</td>
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<td>Vitamins D and K with Sea-Iodine™</td>
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<td>Progesterone Care®</td>
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**SUBTOTAL OF COLUMN 1**

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<td>01438</td>
<td>BLUEBERRY EXTRACT W/ POMEGRANATE  • 60 veg. caps</td>
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<td>01661</td>
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<td>BRAIN SHIELD® GASTRODIN®  • 300 mg, 80 veg. caps</td>
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<td>BREAST HEALTH FORMULA  • 60 caps</td>
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<td>00693</td>
<td>BRITE EYES III  • 2 vials, 5 ml each</td>
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<td>01203</td>
<td>BROMELAIN (Specially-coated)  • 500 mg, 60 enteric coated tablets</td>
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<td>15.75</td>
<td>14.25</td>
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**SUBTOTAL OF COLUMN 2**

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

**Annual Membership**

The Annual Membership includes access to all supplements and formulas in our catalog, along with special discounts, free shipping on orders over $100, and exclusive access to new products. Sign up now for your personal discount code!
### COSMESIS

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<tr>
<th>ITEM No.</th>
<th>PRODUCT</th>
<th>Retail Each $</th>
<th>1 Unit Each</th>
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**RECEIVE 25% OFF THE RETAIL PRICE OF ALL PRODUCTS**

AUGUST 2017
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<td>DR. PROCTOR’S ADVANCED HAIR FORMULA + 2 oz</td>
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<tr>
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<td>DR. PROCTOR’S HAIR SHAMPOO + 8 oz</td>
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<td>01997</td>
<td>ENDO THEL IAL DEFENSE™ w/POMEGRANATE COMPLETE AND CARDIARY™ + 60 softgels</td>
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<td>ENDO THEL IAL DEFENSE™ w/GLYCOSIDIN™ + 60 veg. caps</td>
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<td>EPA/DHA (Mega) • 120 softgels</td>
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<td>02009</td>
<td>ESOPHACOL™ • 120 chewable tablets</td>
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<td>ESOPHAGEAL GUARDIAN (Berry flavor) • 60 chewable tablets</td>
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<td>EUROPEAN LEG SOLUTION DIGI MIN 95 600 mg, 30 veg. tabs</td>
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<td>EXTRAORDINARY ENZYMES + 60 caps</td>
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<td>02008</td>
<td>(BERRY FLAVOR) • 60 chewable tablets</td>
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<td>EYE PRESSURE SUPPORT W/MIRT OGENOL® + 30 veg. caps</td>
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<td>FACE MASTER® PLATINUM • Facial Toning System</td>
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<td>FAST-ACTING JOINT FORMULA + 30 caps</td>
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<td>FAST-C® • DIHYDROQUERCETIN + 120 veg. tabs</td>
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<td>FEMMENESSENCE MACA PUSS™ + 120 veg. caps</td>
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<td>FIBER-IMMUNE SUPPORT (Apple Cinnamon) • 235 grams</td>
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<td>FLORASSIST® GI W/PHAGE TECHNOLOGY•30 liquid veg. caps</td>
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<td>FLORASSIST® HEART HEALTH + 60 veg. caps</td>
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<td>FLORASSIST® ORAL HYGIENE + 30 lozenges</td>
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<tr>
<td>01825</td>
<td>FLORASSIST® BALANCE + 30 liquid veg. caps</td>
</tr>
<tr>
<td>02000</td>
<td>FLORASSIST® MOOD + 60 caps</td>
</tr>
<tr>
<td>01920</td>
<td>FLORASSIST® THROAT HEALTH + 30 lozenges</td>
</tr>
<tr>
<td>01930</td>
<td>FOLATE HIGH POTENCY (Optimized) • 5,000 mcg, 30 veg. tablets</td>
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<tr>
<td>01939</td>
<td>FOLATE (Optimized) • 1,000 mcg, 100 veg. tablets</td>
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<tr>
<td>01842</td>
<td>FOLATE + VITAMIN B12 (BioActive) • 90 veg. caps</td>
</tr>
<tr>
<td>01544</td>
<td>FORSKOLIN • 10 mg, 60 veg. caps</td>
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<tr>
<td>01513</td>
<td>FUCOIDAN W/MARITECH® 926 (Optimized) • 60 veg. caps</td>
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<tr>
<td>02070</td>
<td>GAMMA E MIXED TOCOPHEROL/TOCOTRIENOLS + 60 softgels</td>
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<tr>
<td>02075</td>
<td>GAMMA E MIXED TOCOPHEROL W/ENHANCED SESAME LIGNANS + 60 softgels</td>
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<tr>
<td>01394</td>
<td>GARLIC (Optimized) • 200 veg. caps</td>
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<tr>
<td>02100</td>
<td>GASTRO-EASE™ + 60 veg. caps</td>
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<tr>
<td>01122</td>
<td>GINGER FORCE® + 60 liquid caps</td>
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<tr>
<td>01658</td>
<td>GINKGO BILOBA CERTIFIED EXTRACT™ 120 mg, 365 veg. caps</td>
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<tr>
<td>00756</td>
<td>GLA WITH SESAME LIGNANS (Mega) • 60 softgels</td>
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<tr>
<td>00345</td>
<td>(L-) GLUTAMINE CAPSULES • 500 mg, 100 veg. caps</td>
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<tr>
<td>00141</td>
<td>(L-) GLUTAMINE POWDER + 100 grams</td>
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<tr>
<td>00522</td>
<td>GLUCOSAMINE/CHONDROITIN CAPSULES + 100 caps</td>
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<tr>
<td>01541</td>
<td>GLUTATHIONE, CYSTEINE &amp; C + 100 veg. caps</td>
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<tr>
<td>01669</td>
<td>GLYCINE + 1,000 mg, 100 veg. caps</td>
</tr>
<tr>
<td>01411</td>
<td>GRAPE SEED EXTRACT W/RESVERATROL &amp; PTEROSTILBENE 100 mg, 60 veg. caps</td>
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**SUBTOTAL OF COLUMN 5**

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<tr>
<th>ITEM No.</th>
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<td>GREEN COFFEE EXTRACT COFFEGENIC® 400 mg, 90 veg. caps</td>
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<td>00953</td>
<td>GREEN TEA EXTRACT (Mega)(lightly caffeine,100 veg. caps</td>
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<tr>
<td>00954</td>
<td>GREEN TEA EXTRACT (Mega)(decaffeinated, 100 veg. caps</td>
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<tr>
<td>01704</td>
<td>IMMUNE MODULATOR W/TINOFEND® + 60 veg. caps</td>
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<tr>
<td>00955</td>
<td>IMMUNE PROTECT W/PARA CIN® + 30 veg. caps</td>
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<tr>
<td>02005</td>
<td>IMMUNE SENSENCE PROTECTION FORMULA®•60 veg. tabs</td>
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<tr>
<td>01049</td>
<td>INNERPOWER® + 530 grams powder</td>
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<td>01674</td>
<td>INOSITOL CAPSULES + 1,000 mg, 360 veg. caps</td>
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<td>01292</td>
<td>INTEGRA-LEAN® AFRICAN MANGO IRVINGIA 150 mg, 60 veg. caps</td>
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<tr>
<td>03071</td>
<td>IONIC SELENIUM • 2 oz, 300 mcg</td>
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<tr>
<td>01677</td>
<td>IRON PROTEIN PLUS • 300 mg, 100 caps</td>
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<td>01492</td>
<td>IRVINGIA W/PHASE 3RD CALORIE CONTROL COMPLEX (Optimized African Mango) + 120 veg. caps</td>
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**SUBTOTAL OF COLUMN 6**

RECEIVE 25% OFF THE RETAIL PRICE OF ALL PRODUCTS
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<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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<td>4 Unit Each</td>
<td>10 Unit Each</td>
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<td>01343</td>
<td>Saffron W/Satiereal® (Optimized) • 60 veg. caps</td>
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<td>SAMe (S-ADENOSYL-METHIONINE) 200 mg, 30 enteric coated tablets</td>
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<td>SEA-IDIOINE® • 1,000 mcg, 60 veg. caps</td>
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<td>SE-Methyl L-Selecnoceystine • 200 mcg, 90 veg. caps</td>
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<td>00318</td>
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<td>01938</td>
<td>Shade Factor® • 120 veg. caps</td>
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<td>02110</td>
<td>Shade Factor® Sunscreen Lotion • 4 fl. oz</td>
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<td>Shade Factor® Sunscreen Spray • 6 fl. oz</td>
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<td>Silymarin • 100 mg, 90 veg. caps</td>
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<td>02129</td>
<td>Skin Care Collection Anti-Aging Serum • 1.75 fl. oz</td>
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**SUBTOTAL OF COLUMN 9**

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<th>4 Unit Each</th>
<th>10 Unit Each</th>
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<td>Skin Care Collection Day Cream • 1.65 fl. oz</td>
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<td>Skin Care Collection Night Cream • 1.65 fl. oz</td>
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<td>00661</td>
<td>Sodiyme® w/Glisodin® &amp; Wolfberry® • 90 veg. caps</td>
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<td>Solarshield® Sunglasses • Smoke color</td>
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<td>Soy Isoflavones (Super Absorbable) • 60 veg. caps</td>
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<td>00432</td>
<td>Stevia® (Better) • 100 packets, 1 gram each</td>
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**SUBTOTAL OF COLUMN 10**

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

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<th>PRODUCT</th>
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<th>1 Unit Each</th>
<th>4 Unit Each</th>
<th>10 Unit Each</th>
<th>QTY Total</th>
<th>YOUR PRICE</th>
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<td>YOUR PRICE</td>
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<td>VITAMIN B3 NIACIN • 500 mg, 100 caps</td>
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<td>02828</td>
<td>VITAMIN B5 • 500 mg, 100 veg. caps (Pantherinic Acid)</td>
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<td>8.25</td>
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<td>01535</td>
<td>VITAMIN B6 • 250 mg, 100 veg. caps</td>
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<td>00684</td>
<td>VITAMIN B POWDER (BUFFERED) • 454 grams</td>
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<td>01736</td>
<td>VITAMIN C-MAGNESIUM CRYSTALS (EFFERVESCENT) 180 grams</td>
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<td>01723</td>
<td>VITAMIN D3 • 2,000 IU, 1 fl. oz, Mint flavor</td>
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<td>21.00</td>
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<td>01753</td>
<td>VITAMIN D3 • 1,000 IU, 90 softgels</td>
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<td>01751</td>
<td>VITAMIN D3 • 1,000 IU, 250 softgels</td>
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<td>00864</td>
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<td>VITAMIN K2 (Low dose) • 45 mcg, 90 softgels</td>
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**SUBTOTAL OF COLUMN 11**

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<th>4 Unit Each</th>
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** Due to license restrictions, this product is not for sale to customers outside of the USA.
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† Due to license restrictions, this product is not for sale to customers outside of the USA and Canada.
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**SUBTOTAL OF COLUMN 12**

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| SUBTOTAL COLUMN 1 |   |
| SUBTOTAL COLUMN 2 |   |
| SUBTOTAL COLUMN 3 |   |
| SUBTOTAL COLUMN 4 |   |
| SUBTOTAL COLUMN 5 |   |
| SUBTOTAL COLUMN 6 |   |
| SUBTOTAL COLUMN 7 |   |
| SUBTOTAL COLUMN 8 |   |
| SUBTOTAL COLUMN 9 |   |
| SUBTOTAL COLUMN 10 |   |
| SUBTOTAL COLUMN 11 |   |
| SUBTOTAL COLUMN 12 |   |

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| EXP. DATE |

**SHIP TO ADDRESS**

| NAME | E-MAIL |
| ADDRESS |
| CITY/STATE/ZIP-POSTAL CODE |
| COUNTRY |
| PHONE | FAX |
| SIGNATURE |

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Rising homocysteine levels increase risk for heart attack and dementia. A simple blood test can determine homocysteine levels that can be safely lowered with the proper forms of B-vitamins.

Clinical studies reveal specific nutrients that can help reverse endothelial dysfunction and improve male sexual performance.

The US Department of Agriculture has filed a patent application on a water-soluble cinnamon extract based on its glucose-lowering properties.