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For those taking **Super K** or **Health Booster**, additional vitamin K2 is not needed. **Bone Restore** (without vitamin K) is available as **Item #01726** at a slightly lower price.

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Take one capsule of Tri-Sugar Shield® twice daily before carbohydrate containing meals.
Loss of **eyesight** was once an inevitable consequence of aging.

Modern medicine has virtually eliminated the blinding impact of **cataracts**.

**Macular degeneration** is today’s leading cause of vision loss.¹ The challenge up until now is that **macular degeneration** is still viewed as being incurable.²

In 1985, Life Extension® introduced a carotenoid complex called **xanthophylls**. The three yellow pigments that make up xanthophylls are **zeaxanthin**, **lutein**, and **meso-zeaxanthin**.

What makes these carotenoids unique is that they provide **structural density** for the **macula** and protect it from UV light and oxidation.³⁻⁷

Previous studies looking at dietary intake of xanthophyll-rich foods have found protective effects against macular degeneration.⁸⁻¹¹ It was not clear, however, if these carotenoids could slow the **worsening** of macular degeneration after it occurs.

This concern has been clarified in a study published by the **American Medical Association** involving over 102,000 people who were followed for an average of 25 years.¹² Intense and frequent monitoring of food intake enabled the researchers to develop predicted plasma **carotenoid** scores.

The findings showed that men and women with the highest **lutein/zeaxanthin** scores had a striking 41% **lower** risk of advanced macular degeneration that often causes **blindness**. The researchers also discovered that **alpha-carotene** reduced the progression of macular degeneration towards blindness.¹²

The thoroughness of this long-term study provides fresh insight into how **macular degeneration** can be markedly delayed even **after** it is diagnosed.

This editorial describes how incidence of this blinding disease may soon dramatically **decline**.

The first article in this month’s issue will enlighten you to brand new findings showing how typical **vision loss** that occurs with aging can be partially **restored**!
Scurvy was an epidemic disease when access to vitamin C-containing foods was limited. Simple measures like eating lemons or limes during times of food scarcity eliminated scurvy.

We may be moving towards a similar era when blindness-caused macular degeneration may no longer be a prevalent health issue. Here are three major controllable causes of macular degeneration:

- Cigarette smoking
- Exposure to ultraviolet solar rays
- Deficiency of lutein, zeaxanthin, and *meso*-zeaxanthin.

The prevalence for smoking has been declining, use of UV-blocking sunglasses is widespread, and intake of nutrients like lutein/zeaxanthin from spinach or supplements has increased.\(^{13,15}\)

Younger people thus have the opportunity to potentially avoid the sight-robbing impact of macular degeneration as they grow older.

**The Problem with Baby Boomers**

I’m 61 years old. In my youth, I never wore sunglasses. Even if I did, most sunglasses did not shield against oxidizing UV rays. Failure to wear protective sunglasses in youth was common in those who are over age 50 now. We didn’t know back then how damaging solar rays were to our eyes.

Increased consumption of cooked spinach can provide a good deal of lutein/zeaxanthin.\(^{16,17}\) To obtain higher doses of these carotenoids, low-cost supplements are readily available.

So what this means is that with proper education, younger people will wear UV-blocking sunglasses, avoid cigarettes, eat healthier and/or take the proper supplements. This will not only slash their risk of macular degeneration, but also delay cataract formation.

Most of us did not have this vision-protecting knowledge in our youth. As a result, many of us are in early stages of developing macular degeneration.

Fortunately, a large human study shows that it is not too late to initiate protective steps before advanced blinding macular degeneration manifests.

**Findings from the Latest Human Study**

A number of human studies reveal that those ingesting *lutein* and *zeaxanthin* have lower rates of macular degeneration.\(^{22-25}\) Some of these studies show improvement in

**What is Macular Degeneration?**

Macular degeneration is the leading cause of blindness in aging adults.\(^{18,19}\)

It results from progressive loss of light-sensing nerve cells in the macula, or central part of the retina. This is the area where these cells are most densely packed, which is why the macula provides us with the greatest level of visual acuity (the ability to distinguish fine details).\(^{1,20}\)

As macular degeneration progresses, central vision is lost, gradually diminishing one’s ability to engage in the many daily activities that require sharp vision.\(^{21}\)
vision in those who take the higher amounts of these carotenoids found in certain dietary supplements.\textsuperscript{26-29}

The question doctors have been asking is whether these carotenoids can prevent \textit{worsening} of macular degeneration after it occurs. This and other questions about macular degeneration and carotenoids motivated researchers to perform an analysis of over 102,000 people aged 50 years or older.\textsuperscript{12}

The study period lasted over 20 years and adjusted for confounding factors like cigarette smoking and eating patterns. The focus was to meticulously assess blood levels of \textit{carotenoids} based on exhaustive and frequent food questionnaires. This well-designed study was published in the \textit{Journal of the American Medical Association-Ophthalmology}.\textsuperscript{12}

The results showed that those with the \textit{highest} intake of \textit{lutein/zeaxanthin} had a marked 41\% lower risk of progressing to advanced macular degeneration.\textsuperscript{12}

This kind of advanced eye disease is referred to as “neovascular” or “wet” macular degeneration. What happens in these advanced cases is that new blood vessels abnormally grow into the damaged macula. These new blood vessels may then bleed and leak fluid, causing the macula to bulge or lift up from its normally flat position, thus distorting or destroying central vision. Under these circumstances, vision loss may be rapid and severe.\textsuperscript{1}

In this huge human study, those who consumed the most spinach had the highest \textit{lutein/zeaxanthin} score and the lowest rate of advanced macular degeneration. The authors also found a 31\% lower risk of progression in those who consumed the most \textit{alpha-carotene}.\textsuperscript{12}

The conclusion of the study was:

\textit{Higher intakes of bioavailable carotenoids, particularly lutein/zeaxanthin and \textit{\textalpha}-carotene, are associated with reduced risk of advanced AMD [age-related macular degeneration].}\textsuperscript{12}

\section*{Even Greater Benefits Possible}

In determining this 41\% reduction in advanced macular degeneration, the researchers adjusted their data to reflect smoking and other factors so that they could pinpoint that it was the \textit{lutein/zeaxanthin} and \textit{alpha-carotene} that was conferring the protection.

What’s remarkable is that high intake of these carotenoids also protected former \textit{smokers}.\textsuperscript{12} The incidence of macular degeneration in former smokers is up to \textit{three-fold} higher than non-smokers.\textsuperscript{30,31} This study showed that past smokers with the highest \textit{lutein/zeaxanthin} scores also had sharply lower risk of advanced macular degeneration.\textsuperscript{12}

This does not mean that anyone should continue smoking. It does corroborate published data showing the importance of making sure to ingest enough \textit{lutein/zeaxanthin} in your diet and/or supplement program. The value of wearing \textit{sunglasses} that provide full-spectrum protection should not be overlooked.
While the 41% reduction in developing advanced macular degeneration is a spectacular finding, compelling evidence exists to show an even greater defense against blindness is possible when an additional protective measure is taken.

**A Missing Link in Maintaining Macular Density**

Over the past 25 years, researchers discovered that people who regularly ate spinach, collard greens, and certain other vegetables had lower rates of age-related macular degeneration.32

Compared to those with the lowest carotenoid intake, people with the highest carotenoid intake have a 43% reduction in their macular degeneration risk. Those who regularly ate spinach have an even greater reduction in macular degeneration incidence.32

When investigating what constituents of these vegetables protected the macula, lutein and zeaxanthin stood out as the most likely candidates. This was supported by research that involved testing the blood of people who contracted macular degeneration. Those with the highest plasma levels of lutein/zeaxanthin had the lowest rates of macular degeneration.24

Another reason scientists were so certain of their discovery is that in humans stricken with macular degeneration, the lutein/zeaxanthin content of their macula is severely depleted.33

If all people had to do was consume adequate lutein/zeaxanthin, then macular degeneration would theoretically disappear as a prevalent age-related disorder. Regrettably, macular degeneration still occurs even in some of those who regularly eat spinach.

Overlooked in the prevention of this blinding disorder is a compound naturally produced in younger retinas called meso-zeaxanthin, which is needed to maintain macular density.34

Meso-zeaxanthin is not found in the normal diet.34 It has been available for ten years in a dietary supplement used by Life Extension® supporters, but has not caught on with the general public.

In youth, the lutein people consume in their diet readily converts to meso-zeaxanthin in the macula.32 As we age, this conversion process is disrupted, thus making it critical to orally ingest meso-zeaxanthin.

To fully appreciate the importance of this, please know the macular pigment is made up of the following three carotenoids:

- **Lutein 50%**
- **Zeaxanthin 25%**
- **Meso-zeaxanthin 25%**

The macular pigment is comprised of Zeaxanthin, Lutein, and Meso-zeaxanthin. Deficiencies of any of these pigments can result in macular degeneration.
Macular degeneration is characterized by a reduction in the density of the macular pigment. When taken as a supplement, meso-zeaxanthin is absorbed into the bloodstream and effectively increases macular pigment levels.

People with macular degeneration have been shown to have 30% less meso-zeaxanthin in their macula compared to healthy eyes. One reason for this deficiency of meso-zeaxanthin is lack of ingested lutein. Another explanation for the missing meso-zeaxanthin observed in macular degeneration is inability to adequately convert lutein to meso-zeaxanthin.

**Meso-Zeaxanthin Deficiency Confirmed in Macular Degeneration**

An autopsy study on donated eyes was done to measure levels of lutein, zeaxanthin, and meso-zeaxanthin in the retina of those with and without macular degeneration.

As expected, levels of all three carotenoids (lutein, zeaxanthin, and meso-zeaxanthin) were reduced in those with macular degeneration compared to control subjects.

The most significant finding, however, was the sharp decrease in meso-zeaxanthin in relation to zeaxanthin in the macula of macular degeneration subjects. This postmortem study helped confirm other studies indicating the importance of all three carotenoids (lutein, zeaxanthin, and meso-zeaxanthin) in maintaining the structural integrity of the macula.

**Macular Degeneration-Induced Blindness: A Preventable Disease**

The macula is the portion of the retina used to see details such as fine lines or the shape of an object. It is needed for both near and far vision. The macular pigment is composed exclusively of lutein, zeaxanthin, and meso-zeaxanthin. These three carotenoids protect the macula and the photoreceptor cells beneath.

Those who wear protective sunglasses, don’t smoke, and have a high intake of lutein/zeaxanthin (from either diet or dietary supplements) will likely enjoy a considerably lower incidence of macular degeneration.

The addition of alpha-carotene might afford additional protection based on the latest study published by the American Medical Association.

As I was concluding this editorial, an in-depth review of the chemistry and mechanisms of eye protection afforded by xanthophylls was being published.

I end here with a quote from this new scientific review on the prevention of eye disease:

“The macular pigment carotenoids, lutein, zeaxanthin, and meso-zeaxanthin are widely recommended as dietary supplements for the prevention of visual loss from age-related macular degeneration and other ocular diseases, but the basic and clinical science supporting such recommendations is under-appreciated by clinicians and vision scientists.”

For longer life,

William Falloon
Variable Nature of Xanthophylls Obtained from Food Sources

The quality and quantity of lutein and zeaxanthin varies considerably when ingesting these from food sources.\(^3^7\)

Factors such as species, cultivation, part of the plant, degree of maturity at harvest, and post-harvest handling practices affect carotenoid levels.\(^3^7\)

In addition, absorption of xanthophyll carotenoids from green leafy vegetables is low, and various dietary factors affect their bioavailability.\(^2^8\)

Cooked spinach makes lutein and zeaxanthin more bioavailable. When eating raw spinach in a salad, make sure to use plenty of olive oil dressing to facilitate absorption of fat-soluble lutein and zeaxanthin.\(^3^9\)

**Meso-zeaxanthin** cannot be obtained in sufficient quantities from food sources and should be taken as part of a supplement that also provides lutein and zeaxanthin.\(^2^2\)

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anthin, and meso-zeaxanthin: The basic and
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**References**

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

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References

Caution: Licorice should not be taken by women who have had breast cancer.

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Nighttime Fasting Reduces Breast Cancer Risk

According to a study published in *JAMA Oncology*, fasting for more than 13 hours a night may reduce the risk of breast cancer recurrence.*

Ruth E. Patterson, PhD, of the University of California-San Diego, and colleagues tracked 2,413 participants—all diagnosed with breast cancer between the ages 27 and 70—in the Women’s Healthy Eating and Living study to determine the potential effects of nightly fasting on breast cancer prognosis. None of the women had diabetes.

On average, 818 women reported fasting overnight for at least 13 hours. Women who fasted for fewer than 13 hours a night had a 36% higher risk for breast cancer recurrence, compared with those who fasted for 13 or more hours.

The researchers can’t say why overnight fasting may influence breast cancer risk, but they found that with every additional two hours of fasting, a woman’s average blood sugar level went down.

*Editor’s Note:* “Our study introduces a novel dietary intervention strategy and indicates that prolonging the length of the nightly fasting interval could be a simple and feasible strategy to reduce breast cancer recurrence,” say the authors.


Vitamin D Improves Heart Function

According to a new five-year study presented at the American College of Cardiology 65th Annual Scientific Session & Expo in Chicago, a daily dose of vitamin D3 improves heart function in people with chronic heart failure.*

The study by the University of Leeds School of Medicine included over 160 patients who were already being treated for their heart failure using proven treatments including beta-blockers, ACE-inhibitors, and pacemakers. Participants took either vitamin D or a placebo for one year.

In the 80 patients who took vitamin D3, the heart’s pumping function improved from 26% to 34%. There was no change in cardiac function in the control group.

*Editor’s Note:* This means that for some heart disease patients, taking vitamin D3 regularly may lessen the need for them to be fitted with an implantable cardioverter defibrillator (ICD), a device that detects dangerous irregular heart rhythms and can shock the heart to restore a normal rhythm. “ICDs are expensive and involve an operation,” said study author Dr. Klaus Witte. “If we can avoid an ICD implant in just a few patients, then that is a boost to patients… as a whole.”

Broccoli May Provide Benefits against Liver Diseases

The March 1, 2016, issue of the Journal of Nutrition reported an association between a broccoli-supplemented diet and a lower risk of fatty liver and liver cancer in obese mice.*

“We decided that liver cancer needed to be studied particularly because of the obesity epidemic in the US,” said lead researcher Elizabeth Jeffery, of the University of Illinois. “It is already in the literature that obesity enhances the risk for liver cancer and this is particularly true for men.”

The researchers fed mice a Western diet high in lard and sucrose with or without freeze-dried broccoli, or a standard control diet. The animals subsequently received weekly injections of a carcinogen that has the potential to induce tumors in the liver and other organs.

“We found that the Westernized diet did increase fatty liver, but we saw that the broccoli protected against it. Broccoli stopped too much uptake of fat into the liver by decreasing the uptake and increasing the output of lipid from the liver,” said Jeffrey.

Editor’s Note: Previous research conducted by Dr. Jeffery found that chopping or steaming broccoli was the best way to enhance the availability of sulforaphane, broccoli’s anti-cancer compound.


Higher Vitamin C Intake Helps Slow Cataract Progression

Findings from a study published in the journal Ophthalmology suggest that consuming a high amount of vitamin C could slow the risk of cataract progression by a third compared to a low intake.*

Researchers at King’s College London examined data from over 1,000 pairs of twins enrolled in the Twins UK registry. Questionnaire responses provided information concerning the intake of vitamin C and other nutrients. Digital imaging evaluated lens opacity in all subjects at age 60 and in 324 sets of twins 10 years later.

At the beginning of the study, participants whose diets contained abundant amounts of vitamin C had a 20% lower reduction in cataract risk compared to those who consumed low amounts. After 10 years, subjects who consumed a high amount of the vitamin had a 33% lower risk of cataract progression.

Editor’s Note: Genetic factors were determined to account for 35% of the difference in progression and environmental factors, including diet, accounted for the remainder. The study is the first to suggest that genetic factors are less important in cataract progression than those attributed to environment.

Isoflavone Extends Life of Fruit Fly

A study reported in the February 2016 issue of The FASEB Journal found an association between supplementation of the diet with the isoflavone prunetin and longer life in males of the fly species Drosophila melanogaster.*

“...To the best of our knowledge, the current study is the first to show that prunetin significantly improves both survival and long-term health in male D. melanogaster, the latter of which was indicated by improved climbing activity in aged flies,” Anika Wagner, PhD, of Christian-Albrechts-University-Kiel in Germany and colleagues announced.

Dr. Wagner’s team gave adult male flies diets with or without prunetin and monitored them every other day. They found that flies given prunetin had increases in expression of the longevity gene SIRT1, AMPK activation, fitness and average life span compared to the controls. Since female flies live longer than males, the authors suggest prunetin’s estrogenicity as a mechanism supporting the effects uncovered by the study.

Editor’s Note: Prunetin is a phytoestrogenic metabolite derived from soy or lima beans that had previously been found to affect cell signaling in experiments with cultured cells, yet little had been known of its effects in living organisms.


Higher Lycopene Levels Linked to Lower Mortality Risk

The journal Nutrition Research recently published an article that revealed a significantly lower risk of dying over follow-up among metabolic syndrome patients who had high levels of lycopene.* Lycopene is a carotenoid that gives such food as tomatoes and watermelon their vivid red color.

A team from the University of Nebraska Medical Center in Omaha evaluated data from 2,499 participants who enrolled in the National Health and Nutrition Examination Survey (NHANES) from 2001-2006. Subjects were limited to those 20 years of age and older with metabolic syndrome. Blood samples collected upon enrollment were analyzed for serum lycopene concentrations.

Among subjects whose lycopene levels were among the top third of participants, the risk of dying over follow-up was 39% lower than those in the lowest group, and for those whose levels were among the middle third, the risk was 33% lower.

Editor’s Note: The authors remark that, “Although the biological mechanisms by which metabolic syndrome increases the risk of mortality are not entirely clear, increased oxidative stress and inflammation may play an important role in the higher rate of mortality of individuals with metabolic syndrome.”

*Taurine Improves Erectile Dysfunction in Experimental Research

A study reported in the Journal of Sexual Medicine found improvement in the erectile function of rats with type I diabetes that received the amino acid taurine.* Diabetic humans are almost three times likelier to experience erectile dysfunction than nondiabetics.

The study utilized 18 rats that developed erectile dysfunction after being rendered diabetic by injection with streptozotocin. Eight nondiabetic rats served as controls. Half of the diabetic animals received intraperitoneally administered taurine and the remainder of the group received saline for four weeks.

At the end of the study, all erectile function variables were lower in diabetic compared to nondiabetic rats, however diabetic animals that received taurine experienced partial but significant recovery of erectile function. Taurine-treated animals had significantly reduced penile fibrosis as well as upregulation of endothelial nitric oxide synthase expression and improvement in other factors.

Editor’s Note: Additionally, diabetic rats treated with taurine had higher testosterone levels than those that received saline.

**Vitamin C Improves Survival in Deficient Mice**

Supplementation with vitamin C corrects some of the deficits observed in mice bred to lack an enzyme that rendered them, like humans, unable to manufacture the vitamin.*

After weaning, the animals were supplemented with a low dose, high dose, or no vitamin C, and serum metabolites and other factors were measured at four months of age. Those that were not supplemented with the vitamin were euthanized within six weeks due to poor health and significant weight loss. While mice that received the low dose of vitamin C survived longer than unsupplemented mice, they also experienced poor health and weight loss over up to 16 months. However, animals that received the high dose experienced a median life span of 23 months and a maximum life span of 32 months, while the median achieved in non-modified untreated animals was 23.8 months and the maximum was 30 months.

**Editor’s Note:** Supplementation with vitamin C was additionally associated with improved levels of several lipids and cardiovascular risk factors.


**Nutrients Affect Gene Behavior**

An article published in *Nature Microbiology* reveals that genes not only influence metabolism, but that metabolic byproducts influence the behavior of genes as well.*

“‘The classical view is that genes control how nutrients are broken down into important molecules, but we’ve shown that the opposite is true, too: How the nutrients break down affects how our genes behave,’” stated lead researcher Markus Ralser of the University of Cambridge.

Previous research findings suggested that biochemical reactions occurring within an organism can affect gene regulation. These reactions depend on available nutrients, including sugars, amino acids, fatty acids, and vitamins derived from food. By manipulating the levels of metabolites in *Saccharomyces cerevisiae* (yeast) cells, Dr. Ralser and colleagues found that nearly nine out of 10 genes and their products were affected by the changes. “Cellular metabolism plays a far more dynamic role in the cells than we previously thought,” Dr. Ralser stated.

**Editor’s Note:** “Nearly all of a cell’s genes are influenced by changes to the nutrients they have access to,” Dr. Ralser remarked. “In fact, in many cases the effects were so strong, that changing a cell’s metabolic profile could make some of its genes behave in a completely different manner.”


**Health Care Spending by Seniors Will Jump 21.6% by 2030**

The senior population is growing across the globe, and people are living longer all around the world. The United Nations (UN) forecasts that the 60-and-over age group will grow from 12.3% of the global population in 2015 to 16.5% of the global population in 2030.*

In 2015, consumers aged 65 and older accounted for around $7 trillion, or approximately 17%, of total worldwide consumer spending. In 2030, seniors are projected to account for around $15 trillion, or approximately 23.5%, of the total.

It is estimated that seniors accounted for around 16.1%, or $1.3 trillion, of health care spending globally in 2015; a number that will jump to 21.6%, or $3.5 trillion, in 2030.

The UN forecasts that the 60 and older age group will swell by just over 500 million between 2015 and 2030, accounting for 44% of the total global population growth of 1,152 million that is expected over the period. At this time, only two areas in the world have a population aged 60 and over that accounts for 25% of their population—Southern and Western Europe and Japan. By 2030, Northern Europe, North America, Australia/New Zealand, and China will have joined them.

Scientists continue to find healthy benefits—including DNA protection—in cruciferous plants.

But it’s not always easy to get in five servings of cruciferous vegetables a day—and even if you do, cooking can destroy many of the protective compounds found in broccoli, Brussels sprouts, cauliflower, and cabbage.

Life Extension’s Triple Action Cruciferous Vegetable Extract combines vital plant extracts into a comprehensive formula to provide optimal DNA protection. Each capsule also contains:

- Indole-3-carbinol (I3C) and di-indolyl-methane (DIM) to encourage liver detoxification and modulate estrogen metabolism
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Those who want the additional benefits of trans-resveratrol can order Triple Action Cruciferous Vegetable Extract with Resveratrol. Each vegetarian capsule contains 20 mg of trans-resveratrol in addition to the vegetable extract.

**References**


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Cosmesis Triple Action Vitamin C Cream

Research shows that replenishing the skin's age-related loss of vitamin C reduces the appearance of wrinkles, fine lines, and age spots. A new Triple Action Vitamin C Cream provides magnesium ascorbyl phosphate, sodium ascorbyl phosphate, and ascorbyl glucoside—enhanced with ferulic acid—to:

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SAFFRON IMPROVES VISION IN AGING HUMANS

SAFFRON
Improves Vision in Aging Humans
Macular degeneration is the leading cause of irreversible blindness in Americans age 50 and older.\textsuperscript{1,2}

The risk of contracting macular degeneration is reduced in those ingesting higher amounts of certain plant carotenoids. These carotenoids also delay early-stage macular degeneration from worsening.

What’s missing has been an effective strategy for countering typical forms of vision loss that impact all maturing individuals.\textsuperscript{1,3} That limitation is about to change.

Recent clinical studies show vision-enhancing benefits using extracts from a flower-derived spice called saffron.

Scientists first discovered that saffron can improve visual acuity as well as sensitivity to light, even in people with early macular degeneration.\textsuperscript{4-6} More impressively, patients experienced improvement in vision that was measured by them seeing an average of two additional lines on the eye chart commonly used by physicians to test vision.\textsuperscript{6}

In another recent finding, people with the highest intake of alpha-carotene had a 32\% lower risk for developing advanced age-related macular degeneration.\textsuperscript{7}

By supplementing with saffron extracts and alpha-carotene—in addition to other nutrients recognized for their ability to protect retinal structures—we can actively protect our eyesight before symptoms of visual loss appear.\textsuperscript{4-7}
SAFFRON IMPROVES VISION IN AGING HUMANS

Natural Sunglasses for the Eyes

Up to 11 million people in the United States have at least some degree of age-related macular degeneration. While 2% of 50 to 59 year olds suffer from the disease, that number surges to 30% in those over 75 years.2

The macula, the small spot at the center of the retina, is particularly rich in light-sensing cells, which are essential for our ability to sharply see things that are directly in front of us.1 Because of its yellow color, the macula absorbs excess blue and ultraviolet light in order to prevent their destructive effects on light-sensing cells.9,10 Think of it as protective sunglasses for the retina.

Age-related macular degeneration occurs in response to prolonged exposure of the eye to visible and ultraviolet light, as well as chemical stresses from a glucose- and oxygen-rich blood supply. Over time, these factors all contribute to the breakdown of our retinal light-sensing cells.

As degeneration of cells in the macula progresses, victims lose their central vision and become less able to see what they are trying to focus on.1,12 Consequently, the ability to read, drive, do intricate work, and perform many other daily tasks can become impaired, even before the onset of legal blindness.

It is important to protect the structural integrity of the macula early in order to prevent it from degenerating to its more advanced stages.

Saffron Benefits Early Age-Related Macular Degeneration

Saffron is a culinary spice derived from parts of the crocus (Crocus sativus) flower. Newly published scientific studies demonstrate its ability to improve visual acuity and to improve sensitivity of the retina to light in people with early macular degeneration.4-6

Saffron protects and prevents the steady breakdown of light-sensitive cells in the center of the retina, the macula. This addresses the root cause of age-related macular degeneration and improves light sensitivity, a major manifestation of the disease.

In the first study, patients with early age-related macular degeneration were randomly assigned to receive either 20 mg per day of saffron or a placebo.

During the supplement phase, patients had stronger electrical responses to light overall.4 Researchers were able to determine these improvements by using sophisticated testing that measures the electrical output of retinal cells in response to light stimulation. If these tests show relatively poor responses to light, it is an indicator of ailing retinal cells.13

The patients also had a better response to dim light during the supplement phase (meaning that their eyes were more sensitive to dim light images). No such changes were apparent during the placebo phase. This means that saffron supplementation improved the light-sensing abilities of retinal cells in early age-related macular degeneration.4 This is an unprecedented finding.

In a second observation of this study, subjects who took saffron had a significant increase in visual acuity, a term that refers to the sharpness of vision at a distance. After three months of supplementation, patients had an average increase in visual acuity at a distance of one full line (14.3% better than baseline) on the familiar Snellen vision chart which measures visual acuity at a distance of 20 feet.4 That means, for example, that someone whose visual acuity at a distance was 20/40 prior to supplementation would see with 20/30 vision afterwards. Once again, no improvement in distance vision was seen in placebo recipients.

These findings were replicated after three months, when the supplement/placebo treatments were re-assigned and then continued for another three months.4 This suggests consistency and reproducibility of benefit for the dietary supplement with improving visual acuity at a distance.
What You Need to Know

Longer-Term Benefits of Saffron

While these initial observations demonstrated meaningful and rapid visual improvements, scientists wanted to see if saffron could produce more long-term effects. That’s why, in a follow-up study, the same researchers examined saffron supplementation (20 mg per day) in subjects with early macular degeneration over an average treatment period of 14 months.

In a similar finding to the first study, retinal sensitivity to light increased significantly by the end of three months—and impressively, it remained elevated for the entire course of the study. Even more impressive, the average visual acuity improved by not one, but two lines on the Snellen chart. This shows us that longer supplementation periods produce further vision improvement.

A third human study confirms the previous findings and demonstrates nearly identical improvements in retinal light sensitivity over an average 11-month period. This study went a step further because it determined that saffron produces improvements in early age-related macular degeneration regardless of one’s heredity. This is important because it means that the results of these studies can be generalized to all adults with early age-related macular degeneration, not just those with specific genetic risk factors.

Reducing Risk of Advanced Age-Related Macular Degeneration

Alpha-carotene is another yellow pigment that offers a complement to saffron. Similar to saffron’s key components, alpha-carotene is a carotenoid that protects the pigmented cells of the retina from light-induced oxidative damage. People who consume the most dietary alpha-carotene have a 32% reduced risk for developing advanced age-related macular degeneration compared to those with the lowest consumption.

This was demonstrated in the Nurses’ Health Study and Health Professionals Follow-Up Study, which analyzed data from 63,443 women and 38,603 men 50 years old or older. These findings make it clear that alpha-carotene may be the perfect complement to saffron’s ability to improve retinal function in early age-related macular degeneration.

Saffron Protects against Vision Loss

- Age-related macular degeneration (AMD) threatens all Americans with eventual vision loss and even blindness.
- To date, only advanced age-related macular degeneration has proved amenable to treatment, while prevention efforts have failed to slow the disease in its earliest stages, before substantial retinal damage has occurred.
- New studies reveal that saffron can enhance retinal responses and sensitivity to light and significantly improve visual acuity in people with early age-related macular degeneration.
- Saffron’s benefits can be augmented by other proven vision-preserving nutrients, including alpha-carotene, lutein, zeaxanthin, and astaxanthin, as well as cyanidin-3-glucoside, which preserves dim-light vision.
- Together, these nutrients appear applicable to all people 50 years and older, offering protection against age-related macular degeneration at its earliest stages.
The Stages of Age-Related Macular Degeneration

Macular degeneration is characterized by drusen, yellowish deposits of fat and protein beneath the retina that can only be seen in an examination conducted by a skilled vision professional. Small numbers of drusen appear to be a natural part of aging, but larger numbers, especially of medium to large drusen, suggest age-related macular degeneration. In early age-related macular degeneration, drusen are of medium size and rarely produce symptoms. In intermediate macular degeneration, drusen are larger and dark clumps of pigment from broken-down retinal cells may appear on an eye examination. Again, even at this intermediate stage of retinal changes, symptoms are usually absent.

Late age-related macular degeneration is signaled by the appearance of visual symptoms, including blurring in the center of the visual field, blank spots in vision, and an apparent dimming of objects. Late age-related macular degeneration has two forms, known as dry and wet (or neovascular) degeneration. Dry age-related macular degeneration is by far the most common type, affecting 90% of those with the condition. People with this form of the disease continue to have progression and growth of retinal drusen and a gradual breakdown of retinal light-sensing cells, eventually leading to vision loss. Wet age-related macular degeneration only occurs in about 10% of people with the condition, but it accounts for about 90% of cases of blindness. Wet age-related macular degeneration is defined by the presence of tiny new blood vessels growing in the tissue layer beneath the retina, which can leak to produce swelling and damage to the macula itself. Wet age-related macular degeneration tends to progress rapidly and to greater severity than the dry form and is much likelier to produce severe vision loss.

Additional Nutrients for Eye Health

Lutein and zeaxanthin are found in high concentrations in several components of the eye, including the lens, the retina, and the sensitive macula. These carotenoids have been used by most Life Extension® supporters for the past several decades.

As with saffron and alpha-carotene, lutein and zeaxanthin are yellow pigments that efficiently absorb higher-energy (blue and ultraviolet) light, preventing it from damaging retinal tissues. As an added benefit, lutein and zeaxanthin scavenge oxygen free radicals and reduce their damaging impact on retinal cells.

Studies of adults with age-related macular degeneration show that supplementing with 10 to 12 mg of lutein per day raises the density of protective pigmented cells in the retina by up to 175% compared with patients taking placebo. This means that it enhances the eye’s own ability to protect against damaging blue and ultraviolet light. It is important to note that lower doses, such as 6 mg per day, have proved insufficient to significantly improve pigment density, and have only borderline effects on vision.

In patients with early age-related macular degeneration, 48 weeks of supplementation with lutein at 10 or 20 mg alone (or at 10 mg in combination with zeaxanthin) produced significant increases in electroretinogram signals. This is a measure of the power of light-sensitive cells to produce electrical impulses after stimulation by light.

Multiple large clinical studies have now demonstrated that supplementation with lutein and/or zeaxanthin can improve retinal function, increase the ability to see contrasting colors and shapes, and improve visual acuity.
SAFFRON IMPROVES VISION IN AGING HUMANS

JULY 2016 | LIFE EXTENSION | 29

Protect against Night-Blindness

*Cyanidin-3-glucoside* (C3G) is a flavonoid compound found in many berries that is particularly beneficial for night vision.

That’s because *cyanidin-3-glucoside* enhances both the quality and function of *rhodopsin*, a light-sensitive protein found in the rod cells of the retina. Rod cells are the eye’s most sensitive cells and they allow us to see in very dim light. Loss of rod cells is associated with night-blindness or reduced vision in dim light.

*Cyanidin-3-glucoside* hastens the ability of rhodopsin to regenerate.

It is this rapid regeneration of rhodopsin that has vision scientists excited about its potential benefits to enhance night vision.

A study of healthy volunteers showed that just 50 mg of a berry extract concentrate containing *cyanidin-3-glucoside* allowed aging individuals to see better in darkness after 30 minutes.

Protect against Retinal Cell Death

*Astaxanthin* is a reddish carotenoid molecule derived from marine algae. It has powerful free radical scavenging and anti-apoptotic properties that help protect retinal cells from death induced by chemical and physical stresses.

Astaxanthin has been found to prevent the vision-damaging effects of wet macular degeneration and can also prevent cell damage related to increased pressure in the eye (glaucoma).

Astaxanthin could be especially beneficial for diabetics. Eighty percent of people who have had diabetes for more than 10 years suffer from *diabetic retinopathy*, a condition that occurs when high blood sugar concentrations cause progressive damage to the retina. Studies in mice have demonstrated that astaxanthin prevents the early cell death in retinal nerve cells that results from high blood sugar concentrations.

Two human studies have shown that the combination of astaxanthin, lutein, and zeaxanthin led to significant improvements in visual acuity in supplemented patients compared with untreated patients.

Summary

*Macular degeneration* threatens every American over 50 with vision loss.

Certain *carotenoids* have been shown to help prevent this condition and delay progression in its intermediate to advanced (blinding) stages. The dilemma up until now was how to protect against so-called “normal” loss of visual acuity that occurs with aging.

New human studies indicate that supplementing with *saffron* can, for the first time, produce meaningful changes in the retina and improve visual acuity, even in people with *early* macular degeneration. This knowledge should allow everyone to protect their vision before symptoms appear, and before significant breakdown of retinal light-sensing cells occurs.

*Saffron* and *alpha-carotene* are now available in combination with other vision-protecting nutrients, including *lutein, zeaxanthin* (and their related compounds), and *astaxanthin*. These plant pigments powerfully absorb blue and ultraviolet light, which are the most damaging to retinal cells. The addition of *cyanidin-3-glucoside* helps protect against night blindness and reduced vision in dim light.

Widespread use of these plant-derived extracts could have enormous public health implications in providing meaningful ocular support as populations move into older age.

If you have any questions on the scientific content of this article, please call a Life Extension Wellness Specialist at 1-866-864-3027.
SAFFRON IMPROVES VISION IN AGING HUMANS

Can Alpha-Carotene Prevent Premature Death?

Alpha-carotene is getting a lot of attention as a vision-enhancing, retinal-protecting supplement. Recent studies, however, suggest another intriguing—and potentially ground-breaking—effect of alpha-carotene in the blood: prolonging life. There is now good support for a mechanism by which it could do so.

Large-scale studies have shown a significant association between serum levels of the carotenoid alpha-carotene and the risk of dying. In a study of more than 15,000 people, individuals with the highest alpha-carotene levels were 39% less likely to die from all causes compared to those with the lowest levels.40

A 2016 study suggests one possible reason for this longevity-promoting feature of alpha-carotene: preventing the shortening of telomeres, which are the stretches of DNA at the ends of chromosomes that are associated with aging. Shorter telomeres are associated with more advanced aging.

In a study of more than 3,600 people, those with higher levels of alpha-carotene and other carotenoid pigments in their blood had longer telomeres. Indeed, a doubling in blood alpha- and beta-carotene and beta-cryptoxanthin was associated with 2% longer telomeres, and those with the highest levels had telomeres 5% to 8% longer than those with the lowest levels.41

Thus, a high intake of alpha-carotene and other carotenoid pigments could help aging individuals achieve a longer life through slowing telomere shortening.

References


Ultra Natural Prostate is scientifically designed to support healthy prostate structure and function, as well as a more youthful urinary flow.

Ultra Natural Prostate provides a comprehensive blend of nutrients to combat issues associated with the aging prostate gland.

Ultra Natural Prostate provides validated potencies of the following nutrients:

- Standardized lignans
- Beta-sitosterol
- AprèsFlex® (an extract of Boswellia)
- Graminex® Flower Pollen Extract™
- Saw palmetto CO₂ Extract
- Lycopene
- Pygeum
- Phospholipids
- Pumpkin seed oil
- Boron
- Stinging and dwarf nettle root

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

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These statements have not been evaluated by the Food and Drug Administration. This product is not intended to diagnose, treat, cure, or prevent any disease.
People supplementing with saffron showed an improvement in vision as measured by them seeing an average of two additional lines on the eye chart commonly used by doctors to test vision.\(^1\)

**MacuGuard® Ocular Support** provides lutein, trans-zeaxanthin, and meso-zeaxanthin to help maintain structural integrity of the macula.\(^2,4\)

**Alpha-carotene** has been added based on new evidence that it helps support the macular pigment.\(^2\)

This formula also includes the optimal dose of saffron along with cyanidin-3-glucoside to support healthy vision.\(^3,6\)

Just one daily softgel of the new **MacuGuard® Ocular Support** formula provides:

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**MacuGuard® Ocular Support**

Item #01992 • 60 softgels • Non-GMO

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Retail price is $44. If you buy four bottles, the price is reduced to $30 per bottle. Item #01993.

Many people already obtain astaxanthin by taking Astaxanthin with Phospholipids (Item #01923), Super Omega-3 Plus EPA/DHA with Sesame Lignans, Olive Extract, Krill & Astaxanthin (Item #01988), and Krill Healthy Joint Formula (Item #01600).

**Avoid use during pregnancy.**

**References**

Maintaining eye support is essential for optimal eye health.

**Brite Eyes III** provides a powerful dose of two well-established lubricants in every drop, soothing eye discomfort without irritation. **Hydroxymethyl-cellulose** and **glycerin** are FDA-approved for ophthalmic use.

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To order **Brite Eyes III**, call 1-800-544-4440 or visit [www.LifeExtension.com](http://www.LifeExtension.com).
SAFEGUARD Your SKIN from the Inside OUT

**Shade Factor** is an oral supplement designed to support healthy skin before, during, and after you spend time outdoors.

The **Shade Factor** formula contains:

- *Polypodium leucotomos*
- Nicotinamide
- **Red Orange Complex®**

**Shade Factor** supports the body’s natural photo-protection and immune response against the age-related effects of ultraviolet exposure.¹

According to a study published in the *New England Journal of Medicine*, nicotinamide:

- Promotes healthy DNA function after ultraviolet exposure
- Encourages protective ATP production
- Boosts cellular energy

The good news is that **Shade Factor** cannot be removed by perspiring or bathing, meaning it provides all-day protection.

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**References**


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This product is not a substitute for topical sunscreens. Gastric disturbances may occur. Consult with your healthcare provider before taking this product if you have gout or liver disease. **Red Orange Complex®** is a registered trademark of Bionap S.r.l.

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To order **Shade Factor**, call 1-800-544-4440 or visit [www.LifeExtension.com](http://www.LifeExtension.com)
As we age, our vitality declines as cells can no longer produce the energy of youth. An essential co-factor required for cellular energy transfer is NAD+, which plays a critical role in regulating the rate at which we biologically age. NAD+ is used by every cell in the body. Harvard researchers have shown that increasing NAD+ levels in mammals can reverse several biochemical parameters associated with the aging process.¹

In a recent study,² researchers have shown that NAD+ works in two distinct ways to mitigate aging. First, it increases mitochondrial activity and secondly, it activates specific sirtuins shown to regulate life span.³⁻⁶

The good news is that higher levels of NAD+ can be restored via a unique form of vitamin B3 called nicotinamide riboside. With this advance, it is possible for aging individuals to boost their NAD+ cellular levels.
NAD+: An Essential Component of Life

Nicotinamide adenine dinucleotide (NAD+) is found in every cell in the body and is critical for regulating genes that accelerate aging.7

NAD+ also plays an important part in the transfer of energy released from fatty acids and glucose to the mitochondria to be converted into cellular energy.6,9

When NAD+ levels decline, energy transfer in cells breaks down, leading to mitochondrial dysfunction that results in many of the physical symptoms of aging.1,10,11 Fortunately, by increasing intracellular levels of NAD+, age-related mitochondrial dysfunction can be reversed.1

NAD+ battles aging by activating key anti-aging enzymes called sirtuins, specifically SIRT1 and SIRT3. Sirtuins contribute to longevity by favorably controlling gene expression.8,11-15

SIRT1 and SIRT3 modulate multiple biological processes summarized in the table at the end of this article.3

Sirtuins can be activated at any age through caloric restriction. In response to undereating, cellular levels of NAD+ increase.8

Studies in yeast have shown that increasing NAD+ levels positively affects the function of sirtuins and significantly extends yeast life span.18 A study done in worms (C. elegans) showed that older worms had lower levels of NAD+ when compared to younger worms. When NAD+ levels were decreased even further, the worms aged faster. When worms had their NAD+ levels restored, it prevented metabolic changes of aging and increased their life span.5

Of course, it is a large step—evolutionarily and biologically—from yeast and worms to mammals. However, studies done in mammals have also shown that NAD+ levels are critical for not only healthy cellular and mitochondrial functioning, but aging itself.

A study done at Harvard has shown that increasing NAD+ levels in mammals can reverse the aging process.1 This study was done on mice that were bred to have a defect in SIRT1. These mice exhibited multiple signs of accelerated aging, including mitochondrial dysfunction. However, when the levels of NAD+ were increased in these 22-month-old mice, the results were nothing short of amazing: Key markers of aging, including insulin resistance, inflammation, and muscle wasting—all processes commonly associated as a “normal” part of aging—were lowered to that of mice aged 6 months.

Knowing that NAD+ is vital to cellular functioning and that NAD+ levels decrease as we age, many scientists believe a key process in slowing, stopping, or even reversing the aging process is to maintain healthy, youthful NAD+ levels. The interest in finding ways to maintain youthful NAD+ levels has given rise to a form of vitamin B3, nicotinamide riboside, which converts to NAD+ in the body.19,20

By increasing NAD+ levels, nicotinamide riboside has been shown in multiple studies to positively affect mitochondria. In addition, a recently released study2 has shown that nicotinamide riboside can both increase healthy mitochondrial activity and activate specific sirtuins shown to regulate life span.3-6
SIRT1 is emerging as an outstanding housekeeper for the maintenance of stem cells by fighting cellular senescence. This was seen in a study involving human mesenchymal stem cells in which the reduction of SIRT1 activity resulted in accelerated cellular senescence. However, when SIRT1 activity was increased in bone marrow-derived stem cells, it showed that senescence was delayed, leading the authors to conclude that SIRT1 may contribute to the prevention of human mesenchymal stem cell senescence.

A more recent study discussed the importance of SIRT1 in the maintenance of hematopoietic stem cells’ homeostasis and that loss of SIRT1 in hematopoietic stem cells resulted in DNA damage. It is well established that genomic instability and impaired DNA damage repair are some of the contributing factors that result in accelerated aging and cellular senescence.40 Exciting findings show that SIRT1 fosters DNA damage repair41 and that it protects vascular smooth muscle cells against DNA damage and atherosclerosis.42 Neurodegenerative disorders and age-related cognitive decline have been linked with defects in DNA repair.

Researchers at MIT determined that SIRT1 activation reduces DNA damage and provides an important therapeutic path in neurodegenerative diseases.43 Together, these findings confirm the protective roles that SIRT1 has not only in maintaining genomic integrity but also against neurodegeneration.

Let’s now examine some of the well-studied mammalian sirtuins to better understand the importance of maintaining healthy NAD+ levels in preventing premature aging.

### SIRT1 and Longevity

SIRT1 is the most extensively studied mammalian sirtuin. It plays an important part in multiple biological functions, including tumor suppression, apoptosis, metabolic regulation, and the aging process. Several mouse studies have demonstrated the influence of SIRT1 activity on extending life span.34,35 Delayed bone loss, reductions in the incidence of sarcomas and carcinomas, and improved glucose control and wound healing have been shown in a model of SIRT1 transgenic mice.34 In another transgenic mouse model, increased activity of brain-specific SIRT1 resulted in an approximate 11% increase in median life span.35

An array of research has shown the connection of SIRT1 with premature cellular senescence, a process that contributes to accelerated aging.36,37 By interacting with biological molecules like p53, SIRT1 regulates cellular senescence, apoptosis, metabolism, and cell cycle.38 A study examining the effects of SIRT1 inhibition in human umbilical vein endothelial cells suggested the role of this enzyme in protecting against endothelial dysfunction, one of the consequences of cellular senescence.36
A recent report found that increased SIRT3 activity improved the regenerative capacity of hematopoietic stem cells.47 It is also recognized that this sirtuin is important in neurodegenerative disorders like Huntington’s disease.48 Clearly, the impact that SIRT3 has on metabolic regulation, neurodegenerative disorders, and stem cell regeneration plays a crucial role in premature aging when impaired.

**Summary**

Nicotinamide adenine dinucleotide, or NAD+, is a critically important molecule for multiple biochemical processes in the body. Numerous studies show that maintaining optimal levels of NAD+ through the use of natural compounds such as nicotinamide riboside are necessary for the health of mitochondria. Sirtuins, which are enzymes that play a crucial role in the aging process, are dependent upon NAD+ to perform their life-giving functions.

New and groundbreaking studies are showing that maintaining optimal NAD+ levels can positively impact indicators of aging such as insulin resistance, muscle wasting, and inflammation. This gives credence to the hypothesis that aging itself is not only preventable, but reversible.

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**

### Pathways that contribute to premature aging when dysregulated

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✓: Confirmed roles  ?: Possible roles


Metabolically Active
FOLATE
Supports Cardiovascular Health

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.

For those whose homocysteine levels remain stubbornly high, the answer lies with the bioactive form of folate called 5-MTHF, which is up to 7 times more bioavailable than ordinary folic acid. This unique compound 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.

The demand for 5-MTHF has surged as more consumers have discovered its potent homocysteine-lowering effects.

Non-GMO Quatrefolic® is a registered trademark of Gnosis, S.p.A. Patent number 7,947,662.

References

Optimized Folate (1,000 mcg)
Item #01939 • 100 vegetarian tablets

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High Potency Optimized Folate (5,000 mcg)
Item #01913 • 30 vegetarian tablets

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

To order either of these Optimized Folate formulas, call 1-800-544-4440 or visit www.LifeExtension.com

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If you are experiencing fatigue and lack of motivation, it may be due to the age-related decline in NAD+ levels and changes in healthy cellular metabolism.

NAD+ (nicotinamide adenine dinucleotide) is found in every cell in the body and plays an essential role in regulating genes that control aging. Newly patented nicotinamide riboside increases cellular levels of NAD+ in the body.

**Increasing NAD+ Cellular Levels**

Nicotinamide riboside has been documented to help replenish cellular NAD+ and in the process:

- Promote sirtuin (SIRT1 and SIRT3) gene activation,
- Enhance growth of mitochondria—supporting energy levels and physical performance,
- Favorably modulate metabolism,
- Contribute to neuronal health and cognitive function during aging,
- Promote insulin activity—supporting healthy blood sugar in those within the normal range.

The suggested daily dose of one NAD+ Cell Regenerator vegetarian capsule provides 100 mg of NIAGEN® Nicotinamide Riboside.

**References**


**NAD+ Cell Regenerator™**

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To order NAD+ Cell Regenerator™, call 1-800-544-4440 or visit www.LifeExtension.com

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How Omega-3 Fights Depression
In a brand new study, scientists in Japan have documented a strong correlation between low blood levels of **omega-3** fatty acids and higher symptoms of **depression**.¹

This study is important since depression is a growing worldwide health problem.¹

Drugs to treat depression are only partially effective and produce side effects.

A growing body of consistent findings reveals a close link between **depressive symptoms** and **chronic inflammation**.²⁻⁴

What this means is that compounds like **omega-3s**, with proven anti-inflammatory effects, may also alleviate **depression**—and that’s what new studies are finding!
New Study from Japan

A Japanese study published in 2016 evaluated the connection between blood levels of omega-3 fatty acids (EPA/DHA) and clinical depression scores.

This was a large rigorous “cross-sectional” study of 2,123 subjects (1,050 men and 1,073 women) aged 40 years or older. The researchers used a standard 20-question scale of depressive symptoms, which has previously been validated to show that scores of 16 or higher represent people with relevant depressive symptoms. Blood specimens were then drawn for analysis of various types of fatty acids.1

The first finding showed that people with the lowest levels of omega-3 fats were at the highest risk of depression, and vice versa.

What the scientists found was that those in the group with higher blood levels of omega-3s had a 43% lower risk of depression.1

In order to examine this relationship more closely, the subjects were divided into specific groups based on their blood levels of the omega-3 fats EPA (eicosapentaenoic acid) and DHA (docosahexaenoic acid).

Researchers found that subjects with the lowest level of EPA experienced more depressive symptoms. Subjects in the highest EPA range showed a 36% lower risk of depression.1

When the researchers looked at DHA levels alone, they found that those with the highest levels of DHA had a 42% lower risk for depression when compared to those with low levels of DHA.1

The implications of this latest study are profound. They strongly suggest that supplementation with fish oil rich in omega-3 fats, particularly EPA and DHA, should be considered by most people at risk for depressive illness.

And that probably means just about anyone over 40 years old should be supplementing with omega-3s, especially due to what is known about rising levels of inflammation with age and their impact not only on mental health but also on cardiovascular and metabolic health as well.5

Related Studies

There are already a number of small studies demonstrating the protective effects of fish oil/omega-3 supplementation on depression.

One study showed that, in patients with known major depressive disorder, the combination of the antidepressant drug citalopram (Celexa®) with an omega-3 supplement was superior to the drug alone in relieving depressive symptoms.6

The supplement dose was two 1 gram capsules containing a total of 900 mg EPA and 200 mg DHA taken twice daily. Total EPA/DHA intake was 2,200 mg daily, which would be considered a good daily dose of EPA/DHA by today’s standards.

Those taking the omega-3 supplement plus citalopram showed significantly greater improvement in their scores on a standard depression rating scale, beginning at four weeks after initiation of therapy, compared to those on the drug alone.5
Two studies conducted in people on hemodialysis for end-stage kidney disease (who are at high risk for depression)\(^7\) demonstrated the value of omega-3s and highlighted the connection with inflammation. One study showed that a daily omega-3 supplement totaling \textbf{360 mg EPA} and \textbf{240 mg DHA}, three times daily, produced significant reductions in markers of inflammation, while significantly reducing scores on a standard depression index after four months of therapy.\(^8\) The second study showed that the same omega-3 dosing produced a highly significant reduction in depression index scores, while producing a significant improvement in quality-of-life scores.\(^9\)

In still another study, patients taking interferon-alpha as treatment for chronic hepatitis C infection had significantly lower episodes of depression induced by the drug when they used a daily EPA supplement, compared with those taking placebo. Depression occurred in \textbf{10\%} of EPA-supplemented patients compared to \textbf{30\%} of placebo recipients. The onset of depression was delayed significantly in those on the EPA supplement.\(^2\)

As we learn more and more about the role of inflammation in producing so many age-related disorders, including cardiovascular disease, diabetes, cancer, and depression, the value of taking a daily supplement of \textbf{omega-3} fatty acids becomes increasingly clear.

\textbf{Omega-3 Fatty Acids and Depression}

\begin{itemize}
  \item Many older adults suffer from depressive symptoms and major depression.
  \item It is now recognized that chronic inflammation is an important contributor to depression risk.
  \item Omega-3 fats are well-known for their powerful anti-inflammatory properties.
  \item A new study demonstrates close links between low omega-3 blood levels and risk for depressive symptoms, helping to further strengthen the inflammation-depression link.
  \item Earlier studies have already shown that the administration of omega-3 in conjunction with antidepressant treatment is superior to antidepressant treatment alone.
  \item Omega-3 supplementation should be a major part of any serious age-decelerating regimen, because of the widespread benefits of its anti-inflammatory properties.
\end{itemize}
Summary

Depressive symptoms are widespread among older adults.

Ongoing human research has confirmed that depression has roots in chronic inflammatory processes.

A new human study has confirmed that people with higher omega-3 blood levels have significantly lower risk of depression, supporting earlier studies demonstrating both reductions in inflammatory markers and in depressive symptoms with omega-3 supplementation.

Omega-3 supplementation should be considered for anyone suffering depressive symptoms. It may take several months for beneficial effects to be realized.

References

Promote Tear Production From The Inside Out

Everyday factors can lead to dry, itchy, irritated eyes. **Tear Support with MaquiBright®** is a unique oral supplement that supports your body’s own natural tear production for continuous, all-day comfort.

The secret is the maqui berry’s rich source of delphinidins, a source of natural support for tear-producing glands. When human subjects took just 60 mg a day of Maqui berry extract, there was a 45% increase in lubricating tear production.¹²

To order **Tear Support with MaquiBright®**, call 1-800-544-4440 or visit [www.LifeExtension.com](http://www.LifeExtension.com)

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**Tear Support with MaquiBright®**
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Age-Reversal Research at Harvard Medical School
When I incorporated the Life Extension Foundation®, I envisioned a time when human longevity would not be constrained to a finite number of years.

I was confident technology would emerge to enable science to gain control over pathological aging. When this historic turning point occurs, healthy life spans will extend beyond what anyone imagines today.

Over the past two years, our early predictions have transformed into technical probability.

I am pleased that Life Extension® helped contribute to an emerging gene editing technique that you will learn about in this article.

Even more exciting are human age-reversal studies being designed right now that will be announced in upcoming issues of this publication.
“Editing” our Human Genome In Vivo

As we age, genes that maintain cellular health and vitality are down-regulated. At the same time, genes that promote disease and senescence become over-expressed.

Once physicians are able to precisely program or “edit” DNA genes, then youthful health may be systematically restored.

The name of this new technology is CRISPR. It offers a new way to rapidly transform senescent cells to regain youthful function and structure.

CRISPR is a DNA cutting system originally developed in nature by bacteria as a way to destroy the DNA of viruses that frequently attack them. A natural version of CRISPR has been adapted by scientists to enable the reprogramming of cellular DNA to rid cells of unfavorable genetic changes.

Once perfected, old cells may be rejuvenated and never age again.

Programming Our Cellular Genes like Computers

CRISPR is empowering scientists to do very controlled gene editing, which means adding, disrupting or changing the sequence of specific genes.

This has led to exciting new methods of transiently or permanently modifying gene action, either to increase or decrease the activities of targeted genes in a controllable way, potentially anywhere in the body and anywhere in one’s complete set of genes and DNA (our genome).

Since key features of aging are powerfully controlled by how genes are activated or inactivated (expressed or suppressed) in the body, these are critically important developments.

Introducing the Harvard Pioneer of CRISPR

Dr. George Church is a pioneer in the area of genome engineering and the development of gene editing tools based on the CRISPR/Cas9 system (referred to as CRISPR here).

Dr. Church has already been able to reverse aging in human cells using CRISPR technology, and expects the first clinical trials of this technology to begin within as little as one year.

In response to these breakthroughs, Life Extension Magazine® sent Dr. Gregory M. Fahy to Harvard University to interview Dr. Church. We needed to clarify the opportunities for reversing human aging to save the lives of most of those reading this article now.

The next page contains an introductory article by Greg Fahy, PhD. It then continues with highlights of an exclusive interview with Dr. Church about how CRISPR may soon reverse human aging processes. Readers should appreciate that this novel technology is being developed for the purpose of rapid integration into the human clinical setting.
Is the End of Aging Near at Hand?

BY GREGORY M. FAHY, PhD

As a student of the aging process, I have been attending scientific meetings devoted to aging since the early 1980s, and I have seen and heard a lot of very exciting things. But when I attended George Church’s talk at a conference sponsored by Aubrey de Grey’s SENS Foundation near the end of 2014, I realized that I had just heard the most exciting talk of my life.

Why? For three very simple reasons.

First, as Dr. Church’s talk highlighted, aging seems to be controlled to a large extent by the action of a rather small subset of your genes, and especially by master genes that control large numbers of other genes. Your genes, of course, are areas of your DNA that determine your eye color, your hair color, your sex, your height, and other characteristics of your body. But what is becoming more and more clear is that genes also determine how you age—and maybe even whether you age, at least in many respects—as well.

Second, Dr. Church described how science has now advanced to the point where the activity of your genes—whether the genes are “turned on” (expressed) or “turned off” (repressed, or down-regulated)—can increasingly be controlled, and not just in a test tube, but in whole bodies, and even in the brain.

And third, Dr. Church fully intends to deploy this technology clinically, i.e., in aging people!

Dr. Church’s focus is on CRISPR technology, which is a relatively new and particularly powerful method for adjusting gene activity in many different ways, and even for “editing”, or changing genes, which can be used to correct deleterious mutations, or to create deliberate mutations that can have good effects (such as in knocking out the effects of pro-aging genes).

So the implication is very clear: If aging is controlled by master genes, and if the activity of such genes can now be intentionally controlled, then we are beginning to approach the control of aging on a very fundamental level. And the same technology can be applied to the correction of many diseases as well, whether age-related or not.

It would do no good to have the power to control aging if there were no will to utilize that power and move aging control to the clinic. Fortunately, that is not the case with Dr. Church. He wants to make the control of aging a practical reality—and soon. And Dr. Church, as a highly distinguished professor of genetics and major figure at Harvard Medical School and in science worldwide, is in an excellent position to make his wishes come true.

In an interview with the Washington Post at the beginning of December 2015, Dr. Church said that his lab is already reversing aging in mice, and that human applications may only be a few years away. Dr. Church stated:

“One of our biggest economic disasters right now is our aging population. If all those gray hairs could go back to work and feel healthy and young, then we’ve averted one of the greatest economic disasters in history.”

He said he sees:

“A scenario [in which] everyone takes gene therapy—not just curing rare diseases like cystic fibrosis, but diseases that everyone has, like aging.”

Dr. Church also described his personal passion in reversing human aging when he stated:

“I’m willing to become younger. I try to reinvent myself every few years anyway.”

So, what is “CRISPR,” this new technology that may change the world, and our lives, as we know them?

The word “CRISPR” is an acronym. What it stands for is unintelligible to anyone but a geneticist, but that doesn’t matter. What matters is that it’s a technology originally developed to fight microorganisms by cutting their DNA, but that it has now been modified by scientists to enable them to make very well controlled changes in very specific places in DNA. Once physicians are able to regulate or “edit” the DNA medically, then youthful health may be restored to an individual.
How serious is the promise of CRISPR? Consider the following:

- A newer version of CRISPR was recently packed into a re-engineered virus delivery system and successfully used to correct the gene defect that causes Duchenne muscular dystrophy in a mouse model. This is done by direct injection into a leg muscle or infusion into the bloodstream. The results are improvements in the muscles throughout the body and even in the heart.2

- On January 7, 2016, Dr. Church’s company, Editas Medicine, filed papers to launch a $100 million IPO, and the company is already being backed by Google Ventures and the Bill and Melinda Gates Foundation.3

In short, in my estimation, the CRISPR revolution is a game changer, with staggering implications. If it all works out, nothing is going to remain the same. The prospects are as transformative as—if not more transformative than—such revolutions as the advent of the electric light, telephones, automobiles, airplanes, personal computers, the internet, and cell phones. Only this time, it’s not just about how you live, but whether you live, and how long you will live: your health, your longevity, and the effect that health and longevity will have on your enjoyment of life.

Will it really work? We will see. Opinions vary. Surely, there will be many tricks to learn and many twists and turns along the road ahead. And heavyweight scientist Craig Venter even says it will take 100 years to get it right. But George Church’s lab is reversing aging in the laboratory today, and so far, it’s looking very good, moving with incredible speed, and based on a very solid foundation of scientific observations about aging. My money is squarely on Church and others pursuing similar paths.

The Life Extension Foundation is dedicated to improving healthy longevity and has assisted Dr. Church by providing him data from a human supercentenarian research project Life Extension has funded.

What Dr. Church is working on pushes the ultimate limits of improving healthy longevity, with potentially open-ended possibilities. The following page begins with highlights from an extensive interview I had with Dr. Church in his office at Harvard Medical School.

I hope you appreciate the substantive nature of what we think is likely to be a coming revolution that may touch your life in important ways.
tools, and CRISPR is about **5 times** more precise than other tools. The combination of the ease of construction, improved efficiency, and great flexibility makes it the most powerful gene-editing tool to date.

**Fahy:** Right now, with CRISPR, it is possible to modify, delete, insert, activate, and tone down or completely inactivate any gene, with considerable fine-tuning, either temporarily or permanently. The implications for aging may be profound. How does CRISPR edit genes?

**Church:** The way CRISPR works classically is by cutting DNA so many times in a specific place that eventually an error in DNA repair is made at the location of the cut, and you end up with a random change in the DNA—a mutation—at that location. For that kind of change, the longer CRISPR is around, the more likely you are to accomplish a random mutation, and that can be good if you want to inactivate a troublesome gene, since usually a random mutation will in fact inactivate the gene.

But newer versions of CRISPR are more interesting because they allow you to not just make cuts in DNA, they allow you to splice a particular new piece of DNA, which can do new things, into your genome at a precise location.

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**To Read Entire Dr. Church Interview**

CRISPR technology is rapidly emerging and Greg Fahy, PhD, conducted an extensive interview with Dr. Church at Harvard that is too long to include in this issue of Life Extension Magazine®.

For those who want to read this entire interview, it is available free of charge by logging on to: LEF.org/CRISPR

Please be advised that some of the content of the expanded interview will include technical details that most readers will find difficult to comprehend.

What’s important to know is that the ability to reverse human aging processes using CRISPR/Cas9 technology may occur in as little as five years according to an article about Dr. Church’s research appearing in a recent edition of the Washington Post (Dec 2, 2015) titled:

“A Harvard professor says he can cure aging, but is that a good idea?”

Our only question is why would anyone ask whether a “cure for aging” is good idea? We at Life Extension® view it as the most momentous initiative in medical history. Life Extension is simultaneously pursuing additional research initiatives aimed at reversing human aging via other mechanisms of action.

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**Fahy:** To reverse human aging, CRISPR technology will ultimately have to be applied in the whole body, and not just to cells in a test tube. How feasible is it to apply CRISPR technology in the intact body?

**Church:** Gene therapy can be based on either ex vivo manipulations, in which cells are removed from the body, genetically modified, and then put back into the body, or on in vivo (within the body) methods, in which, for example, a modified virus might be used to carry a gene package into many different cells in the body. Each of these methods has pros and cons.

There are viral and non-viral delivery systems that could be used to deliver CRISPR constructs and that will leave the blood vessels and go into the tissues. The delivery system could contain the CRISPR plus guide RNA plus the donor DNA, or it could just comprise the CRISPR, guide RNA, and protein activator, and so on. But whether it’s a viral delivery or a non-viral delivery method, the total mass of gene editing devices that has to be delivered will have to be considerable. But there is no rush, you can deliver them slowly.

Fortunately, there are ways to manufacture biologicals that are very economical. Things like wood and even food and fuel are all roughly in the dollar-per-kilogram range. If we could similarly make a kilogram of a viral delivery system and load it up with CRISPR, then it could become inexpensive enough to apply to the whole body.

**Fahy:** Is it going to be affordable for a human to reverse his or her aging process using this kind of approach?

**Church:** If you look at the current price, it looks very unaffordable. There are about 2,000 gene therapies that are in clinical trials, but the only gene therapy that’s approved for human use costs over $1 million per dose. You only need one dose, but at that cost it’s obviously unattainable for most people. It’s the most expensive drug in history, as far as I know.

**Fahy:** What is that drug?

**Church:** It’s called Glybera®. It treats a rare genetic form of pancreatitis. But sequencing the human genome used to cost $3 billion per person, and now has come down to just $1,000 per person, so I think getting from over $1 million down to the thousands shouldn’t be that hard.

**Fahy:** Another cost saver for aging intervention would arise if we could roll back aging significantly just by modifying five to ten genes. That might get the overall cost down to something attractive.
Church: Right. The combination of having to hit, say, a trillion cells in the whole body and 10,000 genes would be daunting. But if you can do a subset of cells and a subset of genes, then it becomes more feasible to make it affordable.

Fahy: Is the fact that the FDA does not recognize aging as a disease a problem?

Church: The FDA is willing to regulate many symptoms of aging, such as osteoporosis, muscle decay, heart disease, mental agility, and so forth. It tends to be harder to prove a preventative than it is to prove a drug that cures an immediately and hugely harmful disease. And actually, since the FDA doesn’t want you making unjustified health claims of any kind, they would have to take responsibility for regulating any health-related condition that one might want to make claims about. It doesn’t have to actually be a disease.

Fahy: It has been proposed that the FDA should just evaluate safety and not efficacy. How do you feel about that?

Church: I really like that. The Internet will probably weed out the non-efficacious. The nutritional supplement market is a perfect example of safety being all that is needed for approval. You can get a nutritional supplement on the market just based on safety, but you can’t get a prescription drug on the market just based on safety. It really should be the same rule.

Fahy: Perhaps if that were altered in favor of the standards for supplements, we’d have many more drugs and would all be a lot better off.

Church: Yes. Focusing on safety is probably the right model.

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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The insidious damage caused by traumatic brain injury has emerged from the shadows and is receiving the medical focus it requires.

Much of this change has occurred due to two of the main victims of traumatic brain injury—soldiers returning from the wars in Iraq and Afghanistan and impact sports that include football and boxing.

Of course, civilians also incur traumatic brain injury from automobile accidents, falls, and assaults. According to the Centers for Disease Control, 3 to 5 million Americans are living with traumatic brain injury-related disability.¹

Current medical practice has little to provide these victims, who may go on to suffer cognitive problems ranging from dizziness and headaches to depression and dementia throughout their lifetime.

One visionary physician, Mark Gordon, MD, has successfully treated both veterans and civilians with traumatic brain injury by restoring neurosteroid levels.

Working with veterans who have sustained significant combat injuries to the brain, Dr. Gordon has restored wholeness to their lives. Hopefully, his innovative work with neurosteroids will find its way into mainstream medicine to help the millions suffering with traumatic brain injury.

Neurosteroidal Treatment for Traumatic Brain Injury
In February, the United States Office of Naval Research announced its support of university research that appears to explain how shock waves cause traumatic brain injury. Energy waves cause tiny bubbles, or “microcavitations,” to form, pop, and disappear so quickly that they can’t be detected by brain-imaging—but can seriously unbalance an array of cellular pathways. The result is a spectrum of neurological conditions that are currently difficult to treat through standard therapies.

This unbalance of cellular pathways has been successfully treated by interventional endocrinologist Dr. Mark Gordon. His approach recognizes that disrupted neurosteroidal function—not simply physical brain damage—creates traumatic brain injury’s neurological deficits.3-5

By restoring neurosteroids levels, Gordon successfully treats the depression, outbursts, anxiety, and mood swings commonly suffered by traumatic brain injury patients.

This condition constitutes an unrecognized epidemic. The nearly 1.7 million Americans afflicted annually1 include accident victims, construction workers, fall-prone individuals, and athletes. Traumatic brain injury is the leading cause of trauma-caused disability and of brain damage in children and young adults.6-8

Unfortunately, the government is slow to accept the link between traumatic brain injury and neurosteroid deficiencies, and many veterans are instead treated for post-traumatic stress disorder. Thanks to innovative therapy, growing numbers of veterans and others are getting their lives back on track.

Soldiers’ body armor can withstand bomb shrapnel. But armor cannot protect them from an invisible but devastating threat—the blast wave.

“Shock waves travel faster than sound,” says Dr. Timothy Bentley, program manager in the Warfighter Performance Department at the Office of Naval Research, “…energy waves can cause subtle yet damaging effects on the brain.”2

The Office of Naval Research is supporting research at the University of Texas at Arlington focused on the idea that shock waves cause energy-packed bubbles—under 1/25th of an inch (one millimeter) across—to form and pop so quickly that they damage surrounding cells and tissue while remaining undetectable via magnetic resonance imaging or scans.2

This research may explain why so many traumatic brain injuries often go untreated.

Brain-synthesized steroid hormones—neurosteroids—regulate neuron growth, myelination, and formation of synapses between neurons in the nervous system (synaptogenesis).9

Neurosteroid dysfunction can trigger depression, anxiety, panic attacks, phobias, psychoses, and frequently, suicide. Neurosteroids also regulate neuroactive steroids in glands throughout the body.10

Secondary Effects

Traumatic brain injury patients can suffer broad effects, often appearing decades later. Conventional medical treatment seldom achieves substantial recovery, and these symptoms can become extremely disabling.

Primary injury occurs at time of injury and is considered irreversible. However, complex secondary mechanisms crucially affect the delayed progression of brain damage—presenting unique opportunities for therapeutic strategies. One secondary process potentially promoting latent neuronal death is post-traumatic inflammation, which increases blood-brain barrier permeability, resulting in cerebral edema, intracranial pressure, and neuronal dysfunction.

Some of the 330,000 soldiers afflicted in the past 15 years with traumatic brain injury from blast waves seem to have recovered initially, but studies suggest that many suffer lingering cognitive problems.

What Dr. Gordon has discovered is that traumatic brain injury symptoms are often caused by neuro-steroid hormone deficiencies.

Multiple Imbalances

Studies demonstrate that hypopituitarism—where the pituitary gland fails to produce normal hormone levels—is relatively common following traumatic brain injury. Sometimes, however, hypopituitarism is not diagnosed for over 20 years post-injury.

Many traumatic brain injury patients have a growth hormone deficiency, exhibiting greater deficits in attention, executive functioning, memory, and emotion than patients with normal levels. Growth hormone binds to brain receptors that are especially dense in regions responsible for learning and memory—perhaps explaining why declining levels are associated with poorer cognition.

Critically, growth hormone increases survival of damaged nerve cells and promotes nerve tissue regeneration. It increases body-wide receptors for other hormones, helping overcome the effects of their deficiencies.

Growth hormone levels fall with age and are especially low in Alzheimer’s disease, the symptoms of which often mirror traumatic brain injury symptoms.

Other hormones are also closely related to cognitive stability. These hormones can function directly as neurotransmitters in the central nervous system. At least 16% of long-term traumatic brain injury survivors develop hypogonadism, meaning that male testes or female ovaries produce insufficient sex hormone levels. However, these deficiencies are not identified or treated in most individuals.

Sex-hormone insufficiency doesn’t simply relate to sexual desire. Whether due to traumatic brain injury or aging, low sex-hormone levels are increasingly linked to dementia. Age-related sex-hormone declines significantly contribute to Alzheimer’s risk. In a study involving over 500 aging men and women, optimum testosterone levels were linked with better cognitive performance. Other studies concluded that testosterone levels are positively associated with multiple aspects of cognition.

What You Need to Know

Treatment for Traumatic Brain Injury

• Shock waves leave millions of traumatic brain injury victims physically, emotionally, and cognitively impaired.
• Mainstream medicine offers little to treat these pathologies, frequently misdiagnosing them as post-traumatic stress disorder.
• Dr. Mark Gordon found that traumatic brain injury damages the hypothalamus and triggers pituitary dysfunction. He treats patients by restoring neuro-steroid deficiencies.
• Many patients are experiencing compelling success with Gordon’s innovative therapy.
Recovery of patients with traumatic brain injury is greater in those with higher testosterone.37 “For traumatic brain injury patients,” says Dr. Mark L. Gordon, “any proper diagnosis and treatment protocol should begin with baseline testing of testosterone, growth hormone, thyroid, cortisol, insulin, and vitamin D.”

Despite copious evidence that traumatic brain injury patients suffer hypothalamic-pituitary hormonal imbalances—and ample recommendations for rigorous hormone testing—few physicians bother to test neurosteroid levels in these patients.19-21 Thanks to groundbreaking work by Gordon, and a few forward-thinking physicians, there is promise for afflicted Americans.38,39

**Hope for Traumatic Brain Injury Patients**

Using neurosteroid replacement techniques, Gordon and colleagues are changing the way we think about traumatic brain injuries and effective treatment. He continues to develop new protocols that may revolutionize the devastation of traumatic brain injuries. “Whether caused by direct impact or by acceleration alone, secondary injuries that can result from brain trauma occur in the minutes and days following injury,” says Gordon. “These can include alterations in cerebral blood flow and increased intra-skull pressure—contributing substantially to damage from the initial injury.”

An array of resulting physical, cognitive, emotional, and behavioral symptoms often go unrecognized, especially in mild cases.40

### How a Dedicated Green Beret Is Helping Other Veterans

The Warrior Angels Foundation (WAF) is a nonprofit charitable organization, cofounded and managed by Andrew Marr, former Army Special Forces Green Beret—and traumatic brain injury patient of Dr. Mark Gordon.

Marr is spearheading a fund-raising campaign to allow other traumatic brain injury-affected vets to benefit from Gordon’s therapy. He says that it changed his life, while his previously prescribed medications only made things worse.

The government, slow to accept the link between traumatic brain injury and neurosteroid deficiencies, will not pay for Gordon’s protocol in spite of the fact, Marr says, that it’s vastly less costly than the multiple prescriptions and other therapies that the Veterans’ Administration (VA) currently provides.

In 2006, the army’s surgeon-general established the Traumatic Brain Injury Task Force to assess how the army addressed aspects of traumatic brain injury care and recommend improvements. However, Gordon believes a task force can do little if the military doesn’t want to pay for treatment.

Conventional medical dosage for testosterone is **200 to 300 mg** per week, which Gordon has shown is far too high for these cases.

“A typical 25- to 35-year-old male naturally generates **4-10 mg** daily or **60 mg** per week,” he explains. “Using supraphysiological dosages of testosterone—as military doctors do—can have significant side-effects if not monitored closely. We can achieve similar benefits at one-quarter the dose without the risks.”

Veterans have described to Gordon the sheer difficulty of getting anything done through the military.

“Part of the reason is that the military and doctors see testosterone as a bodybuilder drug, rather than a natural substance produced in our bodies,” explains Gordon. “It makes no sense that they can readily accept insulin use for diabetes, but not testosterone. They’re both natural hormones.”

Many Warrior Angels Foundation-assisted patients who have received Gordon’s neurosteroid-balancing protocol experienced significant turnaround within weeks of beginning treatment. “We’re taking out the middleman of the waiting room and [Veteran’s Affairs] and reducing the costs of what the VA and government spends on traumatic brain injury patients,” says Marr. He notes that, as an individual’s therapy continues—and fewer tests and treatments are required—expenses go down.

In its first year, the Warrior Angels Foundation raised over $100,000 to aid in the treatment of more than 100 service members and veterans—but the organization has a waiting list of over 700 veterans. The VA does not offer Dr. Gordon’s neurosteroid-balancing treatment, nor will they pay for it.

Those wishing to learn more or to help with fundraising can visit [http://waftbi.org/](http://waftbi.org/).
The ways that neurosteroid deficiencies can manifest are numerous, says Gordon, including:

- Depression
- Outbursts of anger
- Anxiety
- Mood swings
- Memory loss
- Inability to concentrate
- Learning disabilities
- Sleep deprivation
- Increased risk for heart attacks
- Strokes
- High blood pressure
- Diabetes
- Loss of libido
- Menstrual irregularities
- Premature menopause
- Obesity
- Loss of lean body mass
- Muscular weakness, and
- A number of other medically documented conditions.

Especially tragic among veterans, says Gordon, is the fact that psychological damage due to traumatic brain injury is often erroneously diagnosed as post-traumatic stress disorder, commonly known as PTSD.

Dr. Gordon’s neurosteroid-balancing therapy is changing lives, especially among military veterans. And this remarkable advance originated when, on a hunch, he mined published literature to better understand what was occurring in patients whose symptoms long outlasted the immediate effects of acute injury.

**The Link to Pituitary Dysfunction**

Gordon’s research strongly suggested that traumatic brain injury often causes pituitary dysfunction, confirming his hunch.41

Research suggests that 50%-76% of traumatic brain injury victims show loss of pituitary neurosteroid function.16,17 Generally, the more severe the original injury, the more profound the deficits. However, neurosteroid deficiency or insufficiency—in the low-normal range—is seen even in patients with mild traumatic brain injury.42-45

Although 58% of patients recover normal pituitary function within a year, a shocking 52% develop new pituitary neurosteroid deficiencies a year after injury.46 These deficits include reductions in many pituitary hormones, including those that regulate the thyroid, the adrenal glands (which produce cortisol, DHEA, and other vital hormones), the gonads (where estrogen and testosterone are produced), and growth hormone.5,17,18,47

The severity of neurosteroid deficiencies correlated strongly with the kinds of symptoms that Gordon was seeing. Patients with growth hormone insufficiency had worse disability scores, greater depression, greater fatigue, and poorer emotional well-being, compared to brain injury patients with normal neurosteroid levels.48,49

Gordon’s research confirmed that traumatic brain injury victims often had pituitary neurosteroid insufficiencies, especially in growth hormone. And they’re closely associated with persistent neurological, psychological, and emotional deficits tragically common in brain injury survivors.

**Changing Victims’ Lives**

Gordon’s clinic employs comprehensive testing to assess how well the hypothalamic-pituitary system is functioning, and secondary testing to determine how the target endocrine glands are affected. Those findings are correlated with a complete history and detailed physical examination to create an individualized treatment protocol.

Physiologic doses, not mega doses, are used for each neurosteroid to slowly restore levels to the middle of the optimum range, monitoring cognitive and physical functions monthly.
Gordon’s patient success stories confirm that restoring neurosteroid levels to their optimal levels produces remarkable recovery of many impaired functions. Patients typically respond dramatically within weeks.

“The military and doctors see testosterone as a bodybuilder drug,” explains Gordon, “rather than a natural substance produced in our bodies.”

“We now know exactly where growth hormone works on mood, what pathways it uses,” he says. “The military is simply not prepared to go to the depths that we have in the private sector.”

Gordon’s patient Andrew Marr is one of many veterans who can attest to that. The former Army Special Forces Green Beret suffered multiple traumatic brain injuries but is now heading a fund-raising campaign to help other veterans benefit from this therapy. He says that it has changed his life, while his numerous, previously prescribed medications only made things worse.

“It’s highly individualized,” Marr explains. “Whatever you’re found to be insufficient in, that’s exactly what’s going to be replaced.”

**Summary**

Shock waves may cause momentary “bubbles” in the brain, leaving traumatic brain injury victims with impaired physical, emotional, and cognitive health.

Military veterans’ traumatic brain injuries are often misdiagnosed as depression or post-traumatic stress disorder.

Discovering that traumatic brain injury damages the hypothalamus and triggers pituitary gland dysfunction, Dr. Mark Gordon now identifies and treats the neurosteroid deficiencies in traumatic brain injury patients.

Many now attest to the remarkable success of Gordon’s innovative, individualized therapy.

Patients with traumatic brain injury, or their family members, may visit Millennium’s website at http://www.tbimedlegal.com/, where a new patient intake form can be filled out to start the process of evaluation. Information at the website also lets patients know what a typical course of treatment involves.

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

**Dr. Mark Gordon’s Traumatic Brain Injury Neurosteroid Test Panel**

- IGF-1 (growth hormone marker)
- Free testosterone
- Estrogens (female only)
- Cortisol
- TSH
- T3/T4
- DHEA
References

Life Extension® first introduced SAMe in 1997. Since then, researchers around the world have continued to discover impressive benefits of this amino acid. While SAMe is largely known for its effects on optimal mood and brain support, it has also shown benefits for the liver and joints.

A study by Harvard Medical School and Massachusetts General Hospital cited the impressive benefits of SAMe for mood elevation: A report published in Germany showed that SAMe may help maintain healthy neurological function. This impressive report found that SAMe:

- **Increased** glutathione levels by 50% and glutathione enzyme activity by 115%,
- **Decreased** a measurement of free radical activity by 46%, and
- **Inhibited** lipid peroxidation by 55% in culture.

In addition to these findings, SAMe also improves brain cell methylation, thereby facilitating youthful DNA enzymatic actions, which may help account for SAMe’s mood-boosting properties. These enzymatic reactions are required for the healthy conversion of neurotransmitters such as serotonin and dopamine.

Non-GMO

References
DHEA is a critically important hormone, but its production declines sharply as we age. By the time you reach 70, your DHEA levels are likely to be 75%-80% lower than when you were at your peak.1-4

Scientists are discovering numerous health benefits when aging people restore their DHEA to youthful ranges. DHEA therapy has been shown to:

- Support healthy arterial structure and function5,6
- Support endothelial health by helping with blood flow7
- Promote insulin sensitivity8,9
- Benefit the normal aging brain10-12
- Improve mood and alleviate melancholy13
- Protect hip bone and spine bone mineral density14
- Enhance the increases in muscle mass and strength in the elderly with resistance exercise15
- Boost a broad array of immune system cells and signaling molecules15

Life Extension’s® convenient, economical 25 mg capsules are a popular way to consume the precise amount of DHEA your body may need.

DHEA 25 mg
Item #00335 • 100 capsules

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Each bottle lasts a typical user over three months!

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

CAUTION: Do not use DHEA if you are at risk for or have been diagnosed as having any type of hormonal cancer, such as prostate or breast cancer.

Non-GMO

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

- Reduced Sex Drive
- Less Energy
- Cloudy Thinking
- Weight Gain
- Cardiovascular Issues

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.
Obesity and persistent weight gain are caused by a host of complex factors. Researchers are extensively exploring the role the bacteria in our gut (our microbiome) have on health and disease.

A new lab study has found preliminary data that Reishi mushrooms and their extracts, long known for their immune benefits, can reduce body weight and prevent weight gain and fat accumulation in an unexpected way in mice fed a high-fat diet. While this is preliminary data, not tested in humans, the mechanism of action and the benefits are intriguing and show potential. Over time, Life Extension® will keep you informed of more developments and research with regard to Reish mushroom.

What has been discovered is the Reish mushroom act as a unique prebiotic to favorably change the composition of the intestinal microbial community in a way that favors biological weight reduction.1
What the New Study Showed

An international group of scientists has published a report of the effects of Reishi mushrooms (Ganoderma lucidum) on body weight and obesity-related disorders.1

Using a mouse model of obesity for their study, the researchers found that the mice fed a high-fat diet alone for 8 weeks had a significant increase in body and liver weight, as well as in the size of fat deposits within the body. Furthermore, the obese mice showed increased deposition of fat inside liver and fat cells, just as it is seen in obese humans.

A second group of mice was started on the high-fat diet at the same time, but received, in addition, supplementation with an extract from Reishi mushrooms at varying concentrations. Both of these mouse groups became obese in response to this high-fat diet.

Compared to the non-supplemented group, the mice supplemented with Reishi mushrooms showed:1

- A decrease in body weight of approximately 8% to 16%.
- Decreases in the fat deposited within the body cavity of about 20% to 29%.
- Decreases in the fat deposited beneath the skin of approximately 44% to 59%.
- A decrease in liver weight, the site of abnormal fat deposition that leads to fatty liver disease, of about 17%.
- Reduction in the size and fat content of adipocytes, the cells that produce and store fat.

In addition to these reductions in weight and fat distributions, this study identified significant reductions in markers of inflammation.1

This is not surprising, given that fat cells pour out inflammatory signaling molecules (cytokines).

The reduction in pro-inflammatory cytokine production was more pronounced at higher mushroom doses. The supplemented mice also showed significant reductions in the activity of a potent inflammation inducer called nuclear factor-kappa B (NFkB).

Furthermore, supplemented animals showed significant reductions in amounts of bacterial toxins in their bloodstreams, compared with obese, high-fat fed mice.1 This is critical, because overfed obese animals (and humans) develop “leaky guts,” allowing intestinal bacterial products to enter the bloodstream, where they trigger both inflammation and insulin resistance, which leads to diabetes.2

Finally, further molecular evidence of how the mushroom supplement reduced weight gain and body weight was demonstrated by the finding of reduction in the expression of genes involved in fat production.1 This led to a reduction in fat concentrations in the blood of the supplemented animals.

Previous Studies Offered Hints of Reishi’s Metabolic Benefits

Reishi mushrooms have been used for hundreds of years to promote good health and long life.1,3 And, although this is the first-ever proof of Reishi mushrooms’ direct effects on body weight and fat distribution, there had been previous hints that these time-honored fungi could favorably influence fat and sugar metabolism.

Reishi extracts are rich in compounds called triterpenes and polysaccharides, which have been shown to inhibit full development of fat cells, and to lower blood
RESEARCH UPDATE

The scientists who carried out the study reported here wondered, then, whether the beneficial effects they were seeing on body weight and fat distribution might arise from some **prebiotic** properties of Reishi mushrooms. To answer that question, they examined the composition of their animals’ intestinal microbial communities.

**Reishi Mushrooms Offer Prebiotic Support**

In response to Reishi, humans and obese mice showed a serious alteration in their intestinal microbial community. What researchers found was that both obese mice and humans had an elevated population of inflammation-promoting microbes with a decrease in anti-inflammatory microbes.1,18,19

**Importance of Prebiotics**

A more natural way to change the composition of the gut microbial community is to change what it eats.

**Prebiotics** are fermentable fiber and carbohydrate molecules that nourish specific bacterial groups in the intestine, helping to restore a natural balance.

Prebiotic treatment has been shown to reduce body weight and inflammation by boosting communities of beneficial organisms, which in turn may help suppress less beneficial groups.1,16,17

Furthermore, prebiotic treatment can enhance the “tightness” of the intestinal wall, preventing leakage of inflammatory material into the circulation.2

But antibiotics bring with them a host of problems, including not only immediate side effects, but also long-term risks of drug-resistant organisms, and no one is seriously proposing widespread antibiotics as a cure for obesity.

The scientists who carried out the study reported here wondered, then, whether the beneficial effects they were seeing on body weight and fat distribution might arise from some **prebiotic** properties of Reishi mushrooms. To answer that question, they examined the composition of their animals’ intestinal microbial communities.

**Reishi Mushrooms Offer Prebiotic Support**

In response to Reishi, humans and obese mice showed a serious alteration in their intestinal microbial community. What researchers found was that both obese mice and humans had an elevated population of inflammation-promoting microbes with a decrease in anti-inflammatory microbes.1,18,19

When the scientists examined the microbial population of the mice’s intestines, they found that the obese, high-fat-fed mice had the expected patterns of intestinal microbial imbalance associated with obesity.1 But when the obese mice were supplemented with Reishi mushrooms, the mice
displayed a more “normal” and less inflammatory microbial pattern. When the mice were fed the two higher doses of Reishi mushrooms, it restored the obese mice’s microbial patterns to levels similar to control mice.

In other words, Reishi supplementation had a prebiotic effect, feeding beneficial organisms at the expense of deleterious ones, and triggering a chain of events beginning with normalization of the microbial community, and leading to reduction of inflammation, tightening of leaky intestinal walls, reduced insulin resistance, diminished fat production, and triggering a chain of events associated with optimized metabolic health.

Given that human intestinal microbes exert similar control over metabolism and weight, there is reason to investigate whether similar results from oral supplementation with Reishi mushroom extracts will manifest in people.

### Human Studies Needed

The weight control benefits for Reishi have only been demonstrated in laboratory mammals. We hope this Research Update spurs human studies to ascertain the ideal dose of Reishi to assist humans in preventing age-associated weight gain.

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

### Summary

Reishi mushrooms and their polysaccharide extracts were shown to produce powerful prebiotic effects in obese, high-fat-fed mice, which led to distinctive changes in their intestinal microbial communities.

Those changes, in turn, set off a beneficial chain reaction resulting in reduced body weight, slower weight gain, improved fat deposition in the body, and a host of beneficial biochemical changes associated with optimized metabolic health.

Given that human intestinal microbes exert similar control over metabolism and weight, there is reason to investigate whether similar results from oral supplementation with Reishi mushroom extracts will manifest in people.

### References


Maintaining optimal vitamin B status becomes critical as we age.

B vitamins must be replenished daily because they are water soluble and easily depleted from the body. Stress, alcoholic beverages, and some medications can quickly deplete B vitamins.

**Enzymatically Active Vitamins**

When conventional B vitamins are ingested, they must be enzymatically converted in the body to metabolically active forms.

**BioActive Complete B-Complex** provides enzymatically active forms of meaningful potencies of each B vitamin. This includes the *pyridoxal 5'-phosphate* form of vitamin B6 (the metabolically active form, shown to protect lipids and proteins against glycation reactions) and the most biologically active form of folate called *5-methyltetrahydrofolate* (5-MTHF), which is up to 7 times more bioavailable than folic acid and requires no enzymatic conversion to become metabolically active.

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**BioActive Complete B-Complex**
Item #01945 • 60 vegetarian capsules

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Non-GMO

**References**

To order BioActive Complete B-Complex, call 1-800-544-4440 or visit www.LifeExtension.com

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These statements have not been evaluated by the Food and Drug Administration. This product is not intended to diagnose, treat, cure, or prevent any disease.
Life Extension® researchers have developed an innovative formula with three natural extracts—Pu-erh Tea, Cistanche, and Reishi Mushroom—that supports a more youthful immune system.

**Pu-erh tea**
- Supports decreases in inflammatory IL-6 while boosting natural killer cells and naïve T cells.¹

**Cistanche**
- Supports longer life span in animals.²
- Optimizes the ratio of CD4 to CD8 cells, indicative of a more youthful immune system.²

**Reishi**
- Helps reduce biomarkers of immune senescence.³

To order Immune Senescence Protection Formula™, call 1-800-544-4440 or visit www.LifeExtension.com

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These statements have not been evaluated by the Food and Drug Administration. This product is not intended to diagnose, treat, cure, or prevent any disease.
Reishi Extract Mushroom Complex contains multiple components shown to support healthy immune function and enhanced longevity in an experimental aging model.1

The suggested two vegetarian capsules a day of Reishi Extract Mushroom Complex provide:

- Reishi mushroom (Ganoderma lucidum) extract 980 mg (Fruit body) [std to 13.5% polysaccharides (132.3 mg) and 6% triterpenes (58.8 mg)]
- Shell-broken Reishi mushroom 150 mg (Ganoderma lucidum) spore

Reishi Extract Mushroom Complex
Item #01708 • 60 vegetarian capsules

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Non-GMO
Reference
1. FASEB. 2012;26;373.2.

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.
Scientists are increasingly discovering that probiotics impact the health of the entire body. Unfortunately, most commercial probiotics are destroyed by the stomach’s natural digestive acids before they reach their destination.

**FLORASSIST® Balance** with “dual encapsulation” technology delivers maximum probiotic protection to your small intestines.

**FLORASSIST® Balance:**
- Contains probiotic strains that are stomach acid resistant
- Has dual encapsulation technology, which keeps the capsule intact longer and ensures that the probiotic reaches the small intestine
- Provides 15 billion CFU—Colony Forming Units—per capsule*
- Contains 6 varieties of beneficial bacteria

**FLORASSIST® Balance contains the following bacterial strains:**
1. *Lactobacillus acidophilus* LA-14
2. *Lactobacillus rhamnosus* LR-32
3. *Lactobacillus paracasei* LPC-37
4. *Bifidobacterium longum* BL-05
5. *Bifidobacterium lactis* BL-04
6. *Bifidobacterium bifidum/lactis* BB-02

These potent strains of probiotic bacteria adhere to the soft lining of the intestinal tract to help maintain a healthy surface and aid in support for the digestive system.

* Colony forming units at time of manufacture.

References
In 2015, Darcy Olsen, the president and CEO of the Goldwater Institute, a national policy and litigation organization that has changed more than 200 laws nationwide, released a book titled *The Right to Try: How the Federal Government Prevents Americans from Getting the Lifesaving Treatments They Need*. Throughout the book, Olsen states that the FDA’s approval process for new lifesaving medications is needlessly costing tens of thousands of American lives each year. She reveals disturbing statistics that underscore the depth of this worsening problem.

“The FDA,” says Olsen, “takes as long as 15 years to bring a new medicine to market and Americans are waiting 60% longer for the FDA to approve lifesaving devices than they did just seven years ago. Instead of speeding medical innovation, the FDA is slowing it down—demanding more data, more tests, and more procedures on more subjects before it will approve a drug.”
In an interview with Darcy Olsen, Harada posed the question: “If I have twice shown the surgery is safe and effective, why should I have to ask the FDA for permission to do it? If I have a doctor and a drug company willing to provide this to me, and I obviously have informed consent, why should I ever have to be in a position to go hat in hand to the FDA asking for their permission for something that has been shown to work for me twice? Why should my life rest in their hands?”

You became involved in advocating for Right to Try after the then-CEO of Cancer Treatment Center of America, Steve Bonner, came to the Goldwater Institute for help in getting access to innovative treatments that could save lives.

As I listened to Bonner and his colleagues, I immediately thought of my uncle Kenny. He died when I was about four from Hodgkin’s lymphoma—a form of cancer for which there are now multiple treatments with high cure rates. He was my father’s only brother, and I remember my dad saying that Uncle Kenny died just a few months before a new treatment was approved. At that moment it hit me: If Kenny had been allowed to try that treatment earlier, my father might still have his brother and my cousins might still have their father. The idea that the federal government was standing in the way of people fighting for their lives was infuriating. It’s one thing for people to die because science has not come up with a treatment for their illness yet. It’s quite another for someone to die when a promising treatment exists, but a patient can’t get access to it because of government obstacles. If Washington would not fix the problem, then it was our job to step in.

You compare your plan of action, taking the fight to the state level as opposed to the federal level, with medical marijuana laws and the right of assisted suicide. Can you explain your thought process?

I am a firm believer in federalism, the constitutional authority and responsibility of states to check and balance Washington’s overreach. If states have the authority to give their citizens access to marijuana and drugs to end their lives, certainly they have the authority to allow patients access to investigational medicines to save their lives. If you have the Right to Die, you have the Right to Try. And you don’t have to wait for Washington to secure it.

What was involved in the initial draft law?

It would protect a person’s fundamental right to try and save his own life by expanding access to promising new drugs that await the FDA if:

1. The patient has a terminal diagnosis and has exhausted all treatment options
2. The patient’s doctor has advised the use of an investigational medication
3. The medication has successfully completed basic safety testing and is part of the FDA’s ongoing approval process
4. The patient has provided “informed consent” acknowledging the potential risk of the drug and
5. The company developing the medication is willing to make it available to the patient.
LE: The first Right to Try law passed in May 2014. In just a little over a year from that date, Right to Try has passed in 24 states and counting. When it comes to legislation, the speed with which it was voted into law is astounding.

DO: In the state legislatures, there have collectively been 3,045 votes in favor of Right to Try and just 26 against. To put that in perspective, if those were the votes in an election, Right to Try would have won by a margin of 99% to 1%. The only place in the world you’d find results more lopsided than that is North Korea!

LE: The FDA argues that they have what is called Expanded Access or a compassionate use program that allows terminal patients access to clinical trials. In fact, Richard Klein, the director of the FDA’s patient liaison program said, “The agency has a pathway. It seems to work quite well and I’m not sure what the state Right to Try bills really add to that.”

DO: Except they don’t work. Just ask the hundreds of thousands of Americans stymied each year in their efforts to get the drugs they need to save their lives. The FDA has buried its head in the sand. Its expanded access system is badly broken. Not only has the FDA created obstacles for patients and doctors, it created a system that discourages drug companies from offering innovative treatments on a compassionate basis.

LE: How many patients per year, on average, are accepted under the Expanded Access program?

DO: [There are] an average of 1,200 requests per year. The FDA says it has high approval rates [when it comes to compassionate use]. But what is striking is the infinitesimally small number of requests. About 1,615 people die of cancer every single day. Yet the FDA receives only 1,200 requests for compassionate use of investigational drugs in an entire year! According to research, 40% of all cancer patients attempt to join a clinical trial. But only 3% of adult cancer patients actually succeed in getting into a trial. And yet the FDA says it’s a system that “works quite well!”

Compassionate use is so rare that a leading cancer specialist at one of the nation’s leading cancer research hospitals has never seen it happen in the last 10 years.

LE: A complaint regarding the FDA’s compassionate use program is that the application is difficult to understand and extremely difficult to fill out. In February 2015, the FDA pledged to “simplify and accelerate” the application process.

DO: The agency promised a new application process that would take less than an hour to complete. Sadly, the agency hasn’t fulfilled that promise.

LE: One family’s experience sums up so poignantly why Right to Try is necessary to overcome government roadblocks and save lives. Let’s discuss the McNary family—Jenn and her two sons Austin and Max and the tragedy that surrounded them.

DO: Imagine the joy of watching your dying son experience a miraculous recovery thanks to an experimental medicine. Then imagine the horror of watching your other son slowly die from the exact same disease because the federal government prevented him from receiving the same lifesaving treatment as his brother. That’s the nightmare my friend Jenn has lived for the past three years.

One day Jenn began to notice that Austin was not keeping up with his friends [or] meeting developmental marks. The doctor told her that Austin had Duchenne muscular dystrophy, a disorder that leads to muscle degeneration and eventually death. When she discovered the disease was fatal, she had her 3-month-old son Max tested—and to her horror, found he also had Duchenne.

LE: Austin didn’t qualify to join any of the clinical trials testing an experimental drug called eteplirsen, which is designed to partially repair one of the common genetic mutations that causes Duchenne. Until the Food and Drug Administration approves it, no one can receive eteplirsen outside of an approved clinical trial.

What happened with both boys, who were in wheelchairs with limited mobility?

DO: Max was enrolled in a double-blind, placebo-controlled trial. About 16 weeks after his infusions began, Jenn started noticing changes in Max. He asked to play outside [and] started regaining his fine motor skills. After a year, he abandoned his wheelchair and hasn’t used it since. He was getting better.

LE: And Austin?

DO: Jenn’s joy was bittersweet. At the time she was watching one beloved son recover, she was watching her other beloved son continue to deteriorate. “Austin is very angry right now,” [Jenn said to me]. “He doesn’t understand why the grown-ups in his world can’t figure this out and make things happen faster for him. It is one thing if your child is dying from an untreatable disease, but to have your child dying from a treatable disease is devastating. I never
thought it would be the government I’d be working against.”

**LE:** Three years after Sarepta [the pharmaceutical company that developed eteplirsen] first demonstrated that it’s safe and helping Duchenne kids, the FDA still hadn’t invited Sarepta to apply for approval of the drug. How many kids were hurt by these delays?

**DO:** There are about 15,000 to 20,000 boys in the US with Duchenne, and eteplirsen can help about 13% of them. That is about 1,950 to 2,600 boys who desperately need this drug. But Sarepta estimates that its broader portfolio of compounds based on same technology as eteplirsen can help about 80% of these kids. That’s 12,000 to 16,000 kids in the United States alone—and tens of thousands more across the globe. Jenn says there [were] only 12 children in the world receiving the medicine. The rest are wasting away and dying.

**LE:** After 39 months of fighting, Jenn finally succeeded in getting Austin into a clinical trial. Of course, the drug cannot reverse the debilitating declines Austin suffered while fighting for access. But how is he doing now?

**DO:** [According to Jenn], it’s not going to make him walk again, but it could stabilize his progression so he doesn’t get worse. For 170 weeks, Austin watched his brother get better while he got worse. He lost the ability to transfer himself from chair to bed, from chair to toilet, to wash his hair, dress himself, cut his food... The most frustrating part of the FDA is that they already have the tools they need to approve a drug like this. We weren’t asking them to go against the rules, against the law, or make an exception.

**LE:** What is happening in the approval process now?

**DO:** In April 2015, the CEO of Sarepta resigned—a casualty of the company’s struggles with the FDA. A few weeks later, the FDA invited Sarepta to submit a new drug application. If all goes well, and the drug is approved, it will be because an innovative CEO and a group of moms joined forces to fight for faster approval.

**LE:** Why do you think the Right to Try has taken the country by storm?

**DO:** It’s simple. Almost everywhere it has passed, courageous Americans fighting terminal illnesses have stepped forward to fight for it. These patients and their families have testified before state legislatures, lobbied their elected leaders, and shared their stories with the media—asking their fellow citizens to stand with them in the fight to save their lives. Their stories captured the imaginations of legislators of both parties and inspired millions to rally around the terminally ill. These Americans moved hearts—and votes—in support of the principal that every American has a fundamental right to try to save his or her own life.

**LE:** Thank you for sharing your experience and the work you’re doing.

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

Darcy Olsen is the president of the Goldwater Institute, a national research and legal organization that has changed over 200 laws throughout the US. An authority on education reform, economic policy, and government reform, Olsen is a regular guest on national media programs. Her opinions have been widely published in outlets such as the *Wall Street Journal*, *USA Today*, and *National Review*.

Olsen has received numerous awards and recognitions including a 2014 Bradley Prize, which recognizes individuals of extraordinary talent and dedication who seek to preserve and defend the institutions of free government and private enterprise, and the national Roe Award for achievement in public policy.

To contact the Goldwater Institute, please visit www.goldwaterinstitute.org or call 1-602-462-5000.

To order a copy of *The Right to Try*, call 1-800-544-4440 or visit LifeExtension.com

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Retail price: $26.99
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Optimal heart health depends on many factors including proper functioning of the **endothelium**—the thin layer of cells lining the interior of the entire circulatory system.\(^1\)

Even with cholesterol/glucose levels in the healthy range, it is important to maintain the youthful integrity of the endothelium.

**TRIPLE-ACTION PROTECTION**

*Endothelial Defense™ with Pomegranate Complete and CORDIART™* contains three unique ingredients shown to improve endothelial health.

1. **Pomegranate Complete** provides potent polyphenols clinically shown to support healthy blood flow.\(^2,^3\)

2. **CORDIART™** (extract from sweet orange peels) activates endothelial production of **nitric oxide**, which supports healthy circulation.\(^4\)

3. **Superoxide dismutase** (SOD) supports healthy arterial function and boosts the body’s protective enzymes.\(^5,^6\)

To order *Endothelial Defense™ with Pomegranate Complete and CORDIART™*, call **1-800-544-4440** or visit [www.LifeExtension.com](http://www.LifeExtension.com)

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Contains wheat

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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%
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*C 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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Enhanced Support for Healthy Inflammation Response

SUPER Bio-Curcumin®

Super Bio-Curcumin® features BCM-95®, a patented curcumin that absorbs up to 7 times better than standard curcumin,¹ making this product ideal for those seeking to:

- Inhibit the pro-inflammatory effects of NF-kappaB activation,²
- Inhibit the pro-inflammatory activities of cyclooxygenase, lipooxygenase, and cytokines,³
- Support normal cell-cycle growth,⁴
- Maintain immune system health,⁵
- Promote healthy brain function,⁶
- Help maintain normal, healthy platelet function,⁷
- Support natural defenses against estrogen-mimicking chemicals,⁸ and
- Benefit joint health and bowel function.⁹

Life Extension® also provides Advanced Bio-Curcumin® with Ginger & Turmerones for those seeking the additional benefits of added ginger:¹⁰,¹¹

- Nearly twice the support for a healthy inflammatory response,
- Nearly twice the immune health support, and
- About twice the free radical fighting support.

To order Super Bio-Curcumin® or Advanced Bio-Curcumin® with Ginger & Turmerones, call 1-800-544-4440 or visit www.LifeExtension.com

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MEGA GREEN TEA EXTRACT
Powerful DNA Protection

Your body is under constant attack from toxins that cause cellular DNA damage and accelerate normal aging processes.

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

- Protect against DNA damage and oxidative stress¹
- Support healthy blood sugar levels²
- Enhance heart health³
- Boost brain function⁴
- Support strong bones⁵
- Maintain healthy cholesterol levels already within normal range⁶

Each cost-effective bottle lasts over three months!

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

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Mega Green Tea Extract
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Item #00953 • 100 vegetarian capsules

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References

Note: EGCG is the acronym for epigallocatechin gallate, which is the polyphenol in green tea that has demonstrated the most robust health benefits.
Researchers now recognize that regular, strenuous exercise is a powerful anti-aging tool. If that’s the case, then Mackie Shilstone may live forever. He’s an exercise machine.

Shilstone is arguably America’s most influential fitness and performance expert, having played a pivotal role in the success and career extension of more than 3,000 professional athletes and teams.

His clients have included baseball greats Ozzie Smith and Brian Dozier, boxers Michael Spinks, Riddick Bowe, Roy Jones Jr., and Bernard Hopkins, tennis ace Serena Williams, and two-time Superbowl-winning quarterback Peyton Manning. Shilstone is among the top 50 most influential people in boxing history, says KO Magazine. He helped his friend, actor John Goodman, drop 125 pounds—so far—and former Playboy Model of the Year Breann McGregor credits him for her striking figure.

Shilstone offers recommendations for Life Extension® readers that cover exercise routines, dietary choices, and supplements.
Do As I Do—Well, At Least, Try

Stretching the twilight era of the careers of many professional athletes well past their expected retirement age has brought Mackie Shilstone his greatest fame. Ozzie Smith devoted part of his Hall-of-Fame induction speech to Shilstone, acknowledging that his training with the premier sports performance manager enabled him to extend his career by an additional 11 years.

Two factors in Shilstone’s workouts are particularly impressive—almost unbelievable.

To understand the first factor, it’s critical to know that he is not the kind of trainer who stands next to his pro-athlete clients, urging them to work harder. He says that the best way to train top athletes is to analyze the physical skills of their sport, break them down into their essential elements, design a tailored program accordingly, and then perform those specialized exercises right alongside them. The truly impressive part? None of his star-athlete clients can keep up with him!

The second, and most compelling, factor is that he has just received his Medicare card. Yes, the trainer that none of his pro-athlete clients can keep up with just turned age 65 in March.

Shilstone calls tennis great Serena Williams—one of his clients—Lois. Why? Because she calls him Superman.

“Mackie is not human,” says Williams. “No one has ever been able to beat him—champion or not. I’m still working on it.”

Another client who credits Shilstone’s extreme workouts with his career longevity—and who also couldn’t keep up with the famous trainer—is former New Orleans Saints kicker Morten Andersen, who retired in 2008 at age 48.

“I would be going full speed,” says Anderson, “and he would be jogging backwards, saying to me, ‘Let’s go—that the best you’ve got?’”

Shilstone seems not be aging. At 65, he looks much younger, weighs 147 pounds, and has 10% body fat, blood pressure of 105/65, and a resting pulse rate between 42 and 48. The enthusiasm in his eyes when he talks simply beams energy.

Sure, he’s incredibly fit. But how is it possible for him to keep up with—and outperform—professional athletes less than half his age?

The answer is a highly nutritious diet that includes supplements, a punishing daily exercise regimen, keeping mentally active—he has written seven books, co-owns eight GNC franchises, and spent seven years as the Director of Health and Fitness for the John Ochsner Heart and Vascular Institute—and above all, a capacity for suffering that is as much motivational as physical.

When clients ask his secret, he has a stock answer. “I’m trying to kill myself,” he tells them. “But you’re just trying to survive.”

And now, he can taunt his 20-something clients who are unable to keep up with him by waving his Medicare card in their faces.

Shilstone has read Life Extension Magazine® for five years and offers advice to fellow readers.

“For a longer, healthier life—aiming for compressed morbidity at a much later part of your life—follow a Mediterranean-style eating plan, do regular cardiovascular and resistance exercise and take appropriate nutritional supplementation,” he says, adding, “and a positive outlook on life, prayer, and good family associations.”

Diet and Supplements

Shilstone hasn’t eaten red meat in 35 years.

A typical breakfast includes a blended drink containing water, fruits, 5,000 mg of vitamin C, a teaspoon of green vegetable powder, two tablespoons of Bulgarian yogurt, 20 grams of whey protein isolate, and a teaspoon of cod liver oil with vitamin D. After that, he
may have a slice of rye toast with omega-3 peanut butter.

Lunch is often salmon or turkey, with salad and water.

Dinner, following a 20-minute bike ride, is frequently grilled chicken, fish, or a turkey burger, with green vegetables and a glass of white wine.

He takes an array of nutritional supplements daily, including:

- An omega-3 (1,280 mg) with added vitamin D3 (1,000 IU), twice daily with breakfast and dinner
- Cod liver oil with vitamin D3 (with his morning blender drink)
- Life Extension®’s Super Bio-Curcumin (400 mg), at breakfast
- Life Extension®’s Optimized Resveratrol (250 mg), with breakfast
- Glucosamine/chondroitin formula (1,500/1,200 mg), with breakfast
- DHA fatty acid (830 mg)
- Probiotics (12 billion live colony-forming units), before breakfast
- Magnesium citrate (150 mg and another 300 mg at bedtime)
- Zinc citrate (50 mg), twice daily after meals
- BioSil™ hair, skin, and nails formula
- Life Extension®’s CoffeeGenic® Green Coffee Extract (400 mg), before dinner
- Life Extension®’s TMG (Trimethylglycine, 1,000 mg), at dinner, and
- A premium multivitamin formula with dinner

For youthful skin, he uses RejuveneX® Factor Firming Serum, morning and night.

“After three decades of working with star athletes, I know that what you put in your mouth can make the difference between winning, losing, or just competing,” Shilstone says. “And after three decades of conducting hospital-based weight management and wellness programs, I’ve seen the end results of poor eating habits and a lack of exercise—susceptibility to cancer, metabolic syndrome, visceral fat gain, diabetes, and heart disease.”

**Power Workouts**

Shilstone’s day starts at 4:48 am. He spends an hour catching up on Life Extension® and various technical journals. “I don’t feel I’ve started my day unless I’ve expanded my mind,” he says.

Then he cycles 12 minutes from his New Orleans home to Newman High School, where he prepared Peyton Manning for the 2015 Super Bowl season. There, he follows his grueling, six-days-a-week regimen. Packed into 12- to 15-minute blocks—for a tight total of 90 minutes of actual movement, excluding resting and walking times—are running, jumping, stability-ball exercises, traditional weight routines, static and dynamic stretching, medicine-ball throws, kettle-bell exercises, chin-ups, lunges and rotations with resistance cords, squats and squat jumps, and jumping crossovers.

He then stretches for 12 minutes before riding his bicycle back home—taking 15 minutes this time, instead of 12. “I take it a little easier after my workout,” he says.

Medicare card or not, he has no plans to cut back on his workouts. And his passion for promoting healthy life extension goes well beyond helping professional athletes and celebrities to seniors who have never followed a nutritious diet or regularly exercised. He has helped hundreds of non-athletes, both through his books and personally, and says that there are no barriers between professional athletes and the average person—“only different target goals and differing training times to reach those goals.”

**Advice for Aging Readers**

For Life Extension® readers with limited time who still want to optimize their health and prevent the age-related muscle loss known as sarcopenia, Shilstone recommends high-intensity interval (HIT) training—an exercise strategy that alternates brief periods of highly intense exercise at the limit of one’s ability with longer less-intense recovery periods, greatly shortening the overall time.
required for high-value workouts. He says high-intensity training has, in some ways, provided the same cardiovascular benefits of extended, continuous, cardiovascular exercise.

“Exercise using interval cardiovascular training four times a week and work out with resistance-type exercise three or four times a week,” he suggests, “and increase your protein intake [with] diet and whey isolate protein during the day, along with casein protein before bed.” He also suggests a muscle-building amino acid product once or twice daily, as well as 3 grams of a compound known as HMB or (beta-hydroxy-beta-methylbutyrate), which may enhance strength gains, especially on untrained athletes just starting a strength-training program.

Aging individuals who feel that bad knees, stiff joints, chronic fatigue, or other movement issues may prevent them from exercising, let alone using high-intensity training, might take a lesson from Shilstone’s experience. Rather than preventing exercise, he suggests, these problems may result from a lack of it. After a lifetime of staying extremely active, Shilstone has only experienced minimal knee discomfort—and he doesn’t attribute this to great luck or good genes.

“I attribute it to my resistance-exercise routine with emphasis on eccentric quadriceps and hamstrings and my comprehensive hip-strengthening (glutes) routine, along with a daily core exercise routine.”

Fatigue is often a result of poor sleep quality, but daily exercise can enhance restorative sleep.

But Shilstone stresses that rigorous daily exercise isn’t a goal in itself. “I don’t live for my workout,” he says. “I workout to live.” In his down time, he enjoys reading books about great leaders, present and past.

As examples of how much living he has experienced outside of the gym, Shilstone has served as a Clinical Instructor of Public Health and Preventative Medicine at Louisiana State Health Sciences Center, Adjunct Instructor in the School of Allied Health at Nicholls State University, and Adjunct Professor at the A. B. Freeman School of Business at Tulane University. He has also served as a special advisor to the US Olympic Committee on Sports Nutrition and an advisor to the Louisiana Governor’s Council on Physical Fitness and Sports.

Of his seven books on fitness and healthy lifestyles, the one best-suited to aging individuals might be Stop Renting Your Health—Own It: A Three Step Approach. This 165-page guide covers the metabolism changes that accompany aging and how to promote wellness and prevent the muscle loss of sarcopenia. Critically, it outlines the same unique, science-based approach that Shilstone uses with celebrities and sports professionals—and it is available as a free download from his website.

As for the not-insignificant challenge of finding the motivation to just get started and keep going, Shilstone says, “Some people dream of success, while others wake up and work hard to try and make it happen. It takes a commitment for a person to get his or her health-and-performance age below that of their chronological age—and commitment means that you are either all-in or you’re out.”

“It’s never too late to get healthy,” he adds, “but you need to start with a vision and ask yourself how you want to die. The answer will show you how to live.”

So how does he want to die? “I’m not going to go out broken,” he stresses. “I’m going out standing up.”

He muses on what science may be able to contribute to human longevity.

“I think science is on the brink of extending life with the human genome project, blood testing for genetic markers, caloric restriction to attack cancer cells and achieve apoptosis, along with breakthroughs in exercise science such as the use of high-intensity interval training.”

Mackie Shilstone’s book, Stop Renting Your Health—Own It: A Three Step Approach, is available as a free download at http://www.mackieshilstone.com/stop-renting-your-health-own-it/

Readers can learn about, and buy, any of his other books by visiting http://www.mackieshilstone.com/category/publications/ or by visiting amazon.com

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Most commercial vitamin E supplements contain little, if any, gamma tocopherol. They instead rely on alpha tocopherol as the primary ingredient. However, it is gamma tocopherol (not the alpha form) that quenches peroxynitrite, the free radical that plays a major role in the development of age-related decline.\(^1,2\)

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The new book, *The Menopause Cure: Hormonal Health*, provides an in-depth guide to restoring health, vitality, youth, brainpower, ideal weight, and sex drive to women facing perimenopause and menopause. Author Jill D. Davey, who collaborated with Sergey Dzugan, MD, PhD, shares how the use of bioidentical hormone restorative therapy can help women have a happy, healthy, strong, and sexually vibrant life in their 40s, 50s, and beyond. In this interview with *Life Extension Magazine*, Jill discusses some important highlights from *The Menopause Cure*. 
LE: Is suffering through the symptoms of menopause simply a fact of life for women?

JD: We have become used to accepting aging and menopause as a normal process—accepting getting fat, a diminished sex drive, suffering hot flashes and night sweats, being unable to sleep peacefully anymore, sudden brain fog and senior moments. Accepting becoming ill, feeble, weak, and depressed. Accepting heart disease, high blood pressure, diabetes, osteoporosis, dementia, and more. We do not have to accept this anymore. There is an alternative, a safe method to redress all menopausal symptoms, and the disease they now call aging, along with all of its age-related diseases.

LE: You believe that an alternative can be found in restorative medicine. Can you explain what that is?

JD: Restorative medicine views our body and health in a complete sense; a whole body approach. Being of optimal health is what we are looking at. Being emotionally, mentally, and spiritually connected—the hormonal network along with internal organs and systems functioning at maximum efficiency. Restorative medicine looks at prevention, not only cure, by keeping things in balance.

At a basic level what I am saying is that restorative medicine corrects and balances instead of suppressing and hiding those niggling symptoms, which will, at a later date, become something not so very nice.

The overall goal of restorative medicine is to prevent these symptoms ever occurring by keeping hormones balanced, synchronized, or, let’s say, in harmony with the use of bioidentical hormones, vitamins, supplements, and minerals, all of which are important for a long and healthy life. Restorative medicine approaches the body with true health and prevention in mind.

LE: There has been a lot of controversy about hormone replacement therapy over the years. What distinguishes bioidentical hormones from synthetic hormones?

JD: Bioidentical hormones are not pharmaceutical drugs. They are biologically identical to the hormones that are produced in our body, identical in molecular structure, hormone replicas. They come from plant extracts that are bioengineered in a lab to become an exact copy of the human hormone.

Synthetic hormones are completely different from bioidentical hormones. A synthetic hormone is a substance that is not found in nature, rather, it is reinvented from nature so as to be patented.

The drug Premarin® is a horse estrogen. It is derived from the urine of pregnant mares. Some people may, mistakenly, believe that because of this, it can be classified as being natural and is safe. This is not the case. Although Premarin® does contain estrogens natural to humans (e.g. estrone), it also contains estrogens natural to a horse (equilin, equilenin). What is our body going to do with these horse estrogens? We are not horses. Premarin® is not bioidentical to human requirements.

Unlike natural or bioidentical hormones, synthetic, alien, or pseudohormones cannot be metabolized safely and efficiently without producing toxic byproducts in the body. The fact is that the body has an inbuilt system that metabolizes bioidentical hormones easily.

Synthetic hormones are foreign compounds that are never actually produced inside the body. Bioidentical hormones are natural to the human body and provide many health benefits.

LE: How can balancing hormone levels through the use of bioidentical hormones help some of the key complaints of women going through menopause?

JD: We’ll start with the most superficial of things, the skin. Quite suddenly and drastically after menopause our skin seems to shrivel up and become paper-thin, wrinkles deepen and become more apparent. There’s no stretch anymore. The skin becomes drier and we bruise more easily and heal less quickly. These changes in the skin are partly due to a decline in estrogen levels. Balanced estrogen levels help keep skin from aging so drastically. By simply replacing with bioidentical estrogens when there is a decline we can maintain and even erase some of the years of aging skin.
Another common symptom of menopause is “leaky bladder” and pain or difficulty in urinating. This syndrome is due to a weakened muscle in the bladder and urethra. The overall health and strength of these muscles is largely dependent on balanced estrogen levels and when there is a low estrogen level, we get the leak! Estrogens help restore normal blood flow to the tissue and muscles that sustain and regulate the urinary tract. Restoring our body with bioidenti cal hormones can very easily treat, and even prevent, this common problem.

Unexpected weight gain is very common in perimenopause. One of the reasons we gain weight in perimenopause is because there is an imbalance of hormones. That hormonal environment is usually one of high insulin, along with low estrogens and thyroid function. We cannot lose weight if we have high insulin or if our thyroid is dysfunctional. When we have low thyroid it doesn't matter how much we diet or exercise, the weight will NOT come off. Our body cannot metabolize the food we eat effectively, turning calories into fat instead of using them for energy. Women with balanced hormones are less likely to gain weight than those without.

**LE:** One question we hear from a lot of readers relates to sex after menopause. Can bioidentical hormones help women maintain a healthy sex life during and after menopause?

**JD:** The majority of women at this stage of their lives will be disinterested in sex. This is because our sex hormones are declining. We are entering perimenopause, and menopause and postmenopause don’t get any better. Both estrogens and progesterone are needed to maintain women’s sexual organs in a normal and healthy condition. Testosterone is needed for sexual desire, arousal, and fantasy.

Ovarian estrogens have many functions, one of which is to aid our sexual happiness. It supports the blood flow to the vaginal lining but with a decline of this hormone, the blood flow to the genital area becomes lesser, which causes genital tissue to lose its sensitivity, leading to reduced arousal and greater difficulty in achieving orgasm. Also, vaginal tissue tends to become dryer and thinner, leaving the vaginal walls more susceptible to infection and irritation, making sexual intercourse painful and uncomfortable.

It is important to restore your body if you want to enjoy sex again. Vaginal dryness and atrophy are commonplace in menopausal women. Balance your body and you will avoid these problems and at the same time protect yourself from illness and age-related diseases.

**LE:** Do women need to be concerned about their hormone levels even beyond menopause?

**JD:** Women are so used to being told, “It’s only menopause, it’ll pass.” Totally untrue. Yes, your hot flashes and night sweats will pass, but internally the body is experiencing total breakdown due to hormonal loss. It doesn’t pass, it gets worse. This is why we become weak, frail, have bent-up bodies, and get sick as we age. The major part of it has to do with hormonal loss.

Hot flashes are transitory, they are a symptom telling our body that something is not functioning correctly; something has gone awry. Transitory because they apparently pass, they last only as long as it takes for the body to adapt to this new situation. This new situation is dangerous and will eventually lead to chronic disease and aging, so it needs to be corrected. Declining hormones need to be restored for the body to function optimally, and to slow that “body
“breakdown” process. Hormones have incredible influence on the body—they control us, they make or break us, build us up or tear us down. With declining hormone levels we age at a greater rate, and die at a greater speed.

LE: Can you discuss the connection between hormones and aging?

JD: Declining hormone levels are almost always associated with chronic illness and all age-related diseases. This is what I call the common denominator to aging: hormonal loss. The fact is, we begin our descent into aging and its related illnesses because our hormones decline, not the other way around. In other words, our hormones do not decline because we age or become ill. We become ill because our hormones decline. When you restore them, you will protect yourself.

Dr. Dzugan believes that, by corresponding physiology and therefore restoring the body to optimal levels with the use of bioidentical hormones, vitamins, supplements, and minerals, which are all interrelated, we can slow the aging process and use restorative medicine to treat age-related diseases.

LE: What are some practical steps readers can take to begin their restorative medicine journey?

JD: Restorative medicine is a very precise medicine that requires specific blood tests. We are all different and therefore require different supplements in different amounts. Once your blood samples are analyzed, you can acquire bioidentical hormones, supplements, vitamins, and minerals based on where your optimal levels should be.

If your blood tests show that you are low on magnesium, calcium, or iron, you will need to bring [yourself] within optimal ranges. Another example is that if you are low on the two female sex hormones, progesterone and estrogen, they will need to be brought into their optimal ranges. Bioidentical hormones, vitamins, supplements and minerals work together in the body…they are all interrelated.

As Dr. Dzugan said to me, “Your blood doesn’t lie, it is not guesswork, this is precise medicine. Your bloodwork shows what is missing and what is needed at that time. This medicine tells you want your body needs and what it doesn’t need.”

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 Menopause Cure: Hormonal Health, call 1-800-544-4440 or visit LifeExtension.com

Jill D. Davey was born in England, but for the past 27 years she has lived in Italy. She began researching restorative medicine/bioidentical hormones after entering menopause. Sergey A. Dzugan, MD, PhD, is co-founder and Chief Scientific Officer of the Dzugan Institute of Restorative Medicine. He is the author of 151 publications in medical journals, and these publications include surgical, oncological, academic, and anti-aging topics. He was the former President of Life Extension® Scientific Information Inc.

Previous publications include The Migraine Cure: How to Forever Banish the Curse of Migraines, The Magic of Cholesterol Numbers: A Step Away from the Cholesterol-Lowering Drugs, and Your Blood Doesn’t Lie! Aging, Disease and Illnesses Are Linked to One Cause... and One Solution!

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References

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  - **$141.75**

**Weight Loss Panel - Comprehensive** (LC100022)
- CBC/Chemistry profile (see description), Free, Total and Total Testosterone, Estradiol, Progesterone, Cortisol, TSH, Free T3, Free T4, Reverse T3, Insulin, Hemoglobin A1c, Vitamin D 25-hydroxy, C-Reactive Protein (high sensitivity), and Ferritin.
- **$275**

**Male Elite Panel** (LC100016)
- CBC/Chemistry Profile (See description), Free, Total and Total Testosterone, Total Estrogens, Estradiol, DHEA-S, Progesterone, Pregnenolone, DHT, FSF, LH, TSH, Free T3, Free T4, Reverse T3, Free and Total PSA, IGF-1, SHBG, Vitamin D 25-OH, hs-CRP, Ferritin, Homocysteine
- **$575**

**Female Elite Panel** (LC100017)
- CBC/Chemistry Profile (See description), Free, Total and Total Testosterone, Total Estrogens, Estradiol, DHEA-S, Progesterone, Pregnenolone, DHT, FSF, LH, TSH, Free T3, Free T4, Reverse T3, IGF-1, SHBG, Vitamin D 25-OH, hs-CRP, Ferritin, Homocysteine
- **$575**

**Female Hormone Add-On Panel** (LCADDM)*
- Pregnenolone and Dihydrotestosterone (DHT)
  - To provide an even more in-depth analysis of a woman’s hormone status, Life Extension has created this panel as an addition to the Female Life Extension Panel.
  - **$120**

**Male Hormone Add-On Panel** (LCADDF)*
- Pregnenolone and Total Testosterone
  - To provide an even more in-depth analysis of a man’s hormone status, Life Extension has created this panel as an addition to the Male Life Extension Panel.
  - **$125**

**Comprehensive Thyroid Panel** (LC100017)
- TSH, T4, Free T4, Free T3, Reverse T3, Total Estrogens, Progesterone, Pregnenolone, DHT, FSF, LH, TSH, Free T3, Free T4, Reverse T3, IGF-1, SHBG, Vitamin D 25-OH, hs-CRP, Ferritin, Homocysteine
- **$198**

**Life Extension Thyroid Panel** (LC304131)
- TSH, T4, Free T3, Free T4
- **$75**

**Thyroid Panel with Reverse T3** (LC100044)
- TSH, T4, Free T3, Free T4, Reverse T3
- **$120**

**The CBC/Chemistry Profile** (LC381822)
- **$35**
  - Note: This CBC/Chemistry Profile is included in many Life Extension panels. Please check panel descriptions.

- **Cardiovascular Risk Profile**
  - Total Cholesterol, Cholesterol/HDL Ratio
  - LDL Cholesterol, Estimated ChD Risk
  - Triglycerides, Iron

- **Liver Function Panel**
  - AST (SGOT), Total Bilirubin
  - ALT (SGPT), Alkaline Phosphatase
  - LDH

- **Kidney Function Panel**
  - BUN, Creatinine Ratio
  - Creatinine, Uric Acid

- **Blood Protein Levels**
  - Total Protein, Albumin/Globulin Ratio

- **Blood Count/Red and White Blood Cell Profile**
  - Red Blood Cell Count (Monocytes), White Blood Cell Count (Lymphocytes)
  - Eosinophils, Basophils, Total White Blood Cell Count (Platelet Count)
  - Hemoglobin, Hematocrit, White Blood Cell Count (Hemoglobin)
  - Total Leukocytes, Neutrophils, Total Leukocytes (Hematocrit)
  - Monocytes (Absolute), Lymphocytes (Absolute), Total Leukocytes (MCV)
  - Eosinophils (Absolute), WBC (MCH)
  - Baso (Absolute), MCHC
  - RyWBC (Absolute), Polynucleated Cells
  - RDW

- **Blood Mineral Panel**
  - Calcium, Sodium, Potassium, Chloride, Phosphorus, Iron

- **Male Comprehensive Hormone Panel** (LC100010)
  - CBC/Chemistry Profile, DHEA-S, Estradiol, DHT, PSA, Pregnenolone, Total and Free Testosterone, SHBG, TSH, Free T3, Free T4, Cortisol.
  - **$299**

- **Female Comprehensive Hormone Panel** (LC100011)
  - CBC/Chemistry Profile, DHEA-S, Estradiol, Total Estrogens, Progesterone, Pregnenolone, Total and Free Testosterone, SHBG, TSH, Free T3, Free T4, Cortisol.
  - **$299**

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

- **Stress Management Profile** (LC100043)
  - Cortisol AM/PM, DHEA-S, Glucose, Insulin, Progesterone, Free T3, Lipid Panel.
  - **$125**

- **Adrenal Stress Profile - Saliva** (LC100046)
  - Cortisol X4, DHEA-S, Cortisol AM/DM, DHEA-S, Cortisol AM/DHEA-S ratio, Secretory IgA.
  - **$175**

- **Basic Cortisol Profile - Saliva** (LC100047)
  - Cortisol X4 to measure cortisol rhythm over time.
  - **$129**

- **Sleep Hormones Profile - Saliva** (LC100048)
  - Cortisol and Melatonin plus ratio.
  - **$175**

- **MTHFR/COMT Genetic Methylation Profile** (LC100045)
  - Tests for genetic mutations in MTHFR and COMT.
  - **$149**
This test is packaged as a kit.

The Omega Check™ also includes your AA:EPA ration. This panel looks at vascular inflammatory biomarkers, allowing you to determine and track a major factor in heart disease, sudden heart attack and cardiac death. The Omega Check™ also includes your AA:EPA ration, allowing you to determine and track a major factor in total body inflammation.

Other Popular Tests and Panels

- **HEALTHY AGING PANEL-COMPREHENSIVE**
  - **LC100026**
  - $249

- **HEALTHY AGING PANEL-BASIC**
  - CBC/Chemistry profile, C-Reactive Protein (high sensitivity), Vitamin B12, Folate, Vitamin D 25-hydroxy, Hemoglobin A1C, TSH, Ferritin, and Insulin.
  - **LC100025**
  - $149

- **NMR LIPROPROFILE**
  - The NMR LipoProfile® 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.
  - **LC123810**
  - $99

- **ANEMIA PANEL**
  - CBC/Chemistry Profile, Ferritin, Total Iron Binding Capacity (TIBC), Vitamin B12, Folate, and Vitamin B12 (high sensitivity).
  - **LC100006**
  - $79

- **AUTOIMMUNE DISEASE SCREEN**
  - ANA screen, hs-CRP, TNF-alpha, Immunoglobulins, IgA, IgG, IgM.
  - **L100041**
  - $189

- **DIABETES MANAGEMENT PROFILE – COMPREHENSIVE**
  - **LC100040**
  - $129

- **DIABETES MANAGEMENT PROFILE – BASIC**
  - **LC100039**
  - $39

- **ADVANCED CARDIAC BIOMARKERS**
  - ADVANCED OXIDIZED LDL PANEL
  - This panel looks at vascular inflammatory biomarkers, beginning with lifestyle choices to the development of metabolic as well as cardiovascular disease and the formation of vulnerable plaque. The panel contains the following tests: F2-Isoprostanes, Myeloperoxidase, and Oxidized LDL.
  - **LC100035**
  - $285

- **OXIDIZED LDL PANEL**
  - This panel looks at vascular inflammatory biomarkers, beginning with the development of metabolic as well as cardiovascular disease and the formation of vulnerable plaque. The panel contains the following tests: Myeloperoxidase and Oxidized LDL.
  - **LC100034**
  - $175

- **OMEGA CHECK**
  - Provides valuable information on your risk of developing heart disease, sudden heart attack and cardiac death. The Omega Check™ also includes your AA:EPA ration allowing you to determine and track a major factor in total body inflammation.
  - **LC0MEGA**
  - $131.50

- **HORMONES**
  - DHEA SULFATE (LC004020)
  - This test shows if you are taking the proper amount of DHEA.
  - $61

- **MALE BASIC HORMONE PANEL**
  - DHEA-S, Estradiol, Free and Total Testosterone, PSA
  - **LC100012**
  - $75

- **FEMALE BASIC HORMONE PANEL**
  - DHEA-S, Estradiol, Free and Total Testosterone, Progesterone
  - **LC100013**
  - $75

- **DIHYDROTESTOSTERONE (DHT)**
  - Measures serum concentrations of DHT.
  - **LC500142**
  - $50

- **ESTRADIOL**
  - For men and women. Determines the proper amount in the body.
  - **LC004515**
  - $33

- **INSULIN FASTING**
  - Can predict those at risk of diabetes, obesity, heart and other diseases.
  - **LC004333**
  - $29.90

- **PREGNENOLONE**
  - Used to determine ovarian failure, hirsutism, adrenal carcinoma, and Cushing’s syndrome.
  - **LC140707**
  - $116

- **PROGESTERONE**
  - Primarily for women. Determines the proper amount in the body.
  - **LC004317**
  - $55

- **SEX HORMONE BINDING GLOBULIN (SHBG)**
  - This test is used to monitor SHBG levels which are under the positive control of estrogens and thyroid hormones, and suppressed by androgens.
  - **LC082016**
  - $33

- **GENERAL HEALTH**
  - VITAMIN D (250H)
  - This test is used to rule out vitamin D deficiency.
  - **LC081950**
  - $47

- **FERRITIN**
  - Ferritin levels reflect your body’s iron stores and is also a biomarker for insulin resistance.
  - **LC004598**
  - $28

- **PSA (PROSTATE SPECIFIC ANTIGEN)**
  - Screening test for prostate disorders and possible cancer.
  - **LC010322**
  - $31

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.

TERMS AND CONDITIONS

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

Mail your order form to:

Life Extension
National Diagnostics, Inc.
3600 West Commercial Boulevard
Fort Lauderdale, FL 33309
Phone your order to: 1-800-208-3444
Fax your order to: 1-866-728-1050

With Your Healthy Rewards, you earn LE Dollars back on every purchase you make — including blood tests! See www.LifeExtension.com/Rewards for details.
**Amino Acids**
- Arginine/L-Ornithine Capsules
- Arginine Omithine 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
- Endothelial Defense™ with Pomegranate
- Complete and CORDIART™
- Endothelial Defense™ with GliSODin®
- Natural BP Management
- NitroVasc with CORDIART™
- Pomegranate Complete
- Pomegranate Fruit Extract

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

**Brain Health**
- Acetyl-L-Carnitine
- Acetyl-L-Carnitine Arginate
- Blast
- Brain Shield® Gastrodin
- Cognitex® Basics
- Cognitex® with Brain Shield®
- Cognitex® with Pregnenolone & Brain Shield®
- Cognizin® CDP-Choline Caps
- DMAE Bitartrate (dimethylaminoethanol)
- Dopamine
- Ginkgo Biloba Certified Extract™
- Huperzine A
- Lecithin Granules
- Migra-Eez®
- Neuro-Mag® Magnesium L-Threonate
- Neuro-Mag® Magnesium L-Threonate with Calcium and Vitamin D3
- Optimized Ashwagandha Extract
- Prevagen®
- PS (Phosphatidylerine) 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
- Carnosoothe with PicroProtect™
- Digest RC™
- Effervescent Vitamin C - Magnesium Crystals
- Enhanced Super Digestive Enzymes
- Enhanced Super Digestive Enzymes w/Probiotics
- Esophageal Guardian
- Extraordinary Enzymes
- Fen Dophilus
- Fiber-Immune Support

**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™
- Peak ATP® with GlycoCam®
- PQO Caps with BioPQQ®
- Rhodiola Extract
- RiboGen® French Oak Wood Extract
- Triple Action Thyroid

**Eye Health**
- Astaxanthin with Phospholipids
- Brite Eyes III
- Certified European Bilberry Extract
- Eye Pressure Support with Mirtogenol®
- MacuGuard® Ocular Support
- MacuGuard® Ocular Support with Astaxanthin
- Tear Support with MacuBright®

**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
- Organic Golden Flax Seed
- OMEGA FOUNDATIONS® Provalin®
- Purified Omega-7
- OMEGA FOUNDATIONS® Vegetarian DHA

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

**Glucose Management**
- CinSulin® with InSea® and Crominex® 3+
- Mega Benfototamine
- Natural Glucose Absorption Control
- Tri Sugar Shield®

**Heart Health**
- Aspirin (Enteric Coated)
- BioActive Folate & Vitamin B12 Caps
- Cardio Peak™ with Standardized Hawthorn and Arjuna
- Fibrinogen Resist™ with Nattokinase
- Optimized Carnitine with GlycoCam®
- 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
- Triple Action Cruciferous Vegetable Extract

**Immune Support**
- AHCC®
- Echinacea Extract
- Enhanced Zinc Lozenges
- 26 Hyperimmune Egg
- Immune Modulator with Tinofend®
- Immune Protect with PARACTIN®
- Immune Senescence Protection Formula™
- Knoko® Gold AHCC
- Kyolic® Garlic Formula 102
- Kyolic® Garlic Formula 105
- 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 AprésFlex®
- Advanced Bio-Curcumin® with Ginger & Turmerones
- Black Cumin Seed Oil with Bio-Curcumin®
- Black Cumin Seed Oil
- Boswellia
- Cytokine Suppressor™ with EGCG
- Nerva®
- Serrafflazyme
- Specially-Coated Bromelain
- Super Bio-Curcumin®
- Zylflamend® Whole Body

**Joint Support**
- Artho-Immune Joint Support
- ArthroMax® Advanced with UC-II® & AprésFlex®
- 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 Antioxidants 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**
- AMPK Activator
- AppleWise Polyphenol Extract
- Berry Complete
- Blueberry Extract
- Blueberry Extract with Pomegranate
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<th>PRODUCT Description</th>
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**SUBTOTAL OF COLUMN 1**
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**COSMESIS**

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<tr>
<td>0158</td>
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<td>ANTI-AGING &amp; ADULT BLEMISH LOTION • 1 oz</td>
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<td>BROCCOLI SPROUT CREAM • 1 oz</td>
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**SUBTOTAL OF COLUMN 3**

**D**

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<th>4 Unit Each</th>
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<td>ANTI-AGING &amp; ADULT BLEMISH LOTION • 1 oz</td>
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**SUBTOTAL OF COLUMN 4**

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

**JULY 2016**
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<th>ITEM No.</th>
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<td>DIGESTIVE ENZYMES w/PROBIOTICS (Enhanced Super) • 60 veg. caps</td>
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<td>FLORASSIST® HEART HEALTH PROBIOTIC • 60 veg. caps</td>
<td>32.00</td>
<td>24.00</td>
<td>21.00</td>
<td></td>
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</tr>
<tr>
<td>02019</td>
<td>FLORASSIST® ORAL HYGIENE • 30 lozenges</td>
<td>18.00</td>
<td>13.50</td>
<td>12.75</td>
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</tr>
<tr>
<td>01825</td>
<td>FLORASSIST® BALANCE • 30 liquid veg. caps</td>
<td>32.00</td>
<td>24.00</td>
<td>21.00</td>
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<tr>
<td>02000</td>
<td>FLORASSIST® MOOD • 60 caps</td>
<td>33.00</td>
<td>24.75</td>
<td>22.50</td>
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</tr>
<tr>
<td>01920</td>
<td>FLORASSIST® THROAT HEALTH • 30 lozenges</td>
<td>20.00</td>
<td>15.00</td>
<td>13.50</td>
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</tr>
<tr>
<td>01913</td>
<td>FOLATE HIGH POTENCY (Optimized) • 5,000 mcg, 30 veg. tablets</td>
<td>25.00</td>
<td>18.75</td>
<td>16.50</td>
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</tr>
<tr>
<td>01939</td>
<td>FOLATE (Optimized) • 1,000 mcg, 100 veg. tablets</td>
<td>19.00</td>
<td>14.25</td>
<td>12.75</td>
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<tr>
<td>01842</td>
<td>FOLATE + VITAMIN B12 (BioActive) • 90 veg. caps</td>
<td>12.00</td>
<td>9.00</td>
<td>8.00</td>
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<tr>
<td>01544</td>
<td>FORSKOLIN • 10 mg, 60 veg. caps</td>
<td>16.00</td>
<td>12.00</td>
<td>10.50</td>
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<td></td>
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</tr>
<tr>
<td>01513</td>
<td>FUCOIDAN W/MARITECH® 926 (Optimized) • 60 veg. caps</td>
<td>36.00</td>
<td>27.00</td>
<td>24.75</td>
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</tr>
</tbody>
</table>

**SUBTOTAL OF COLUMN 5**

<table>
<thead>
<tr>
<th>ITEM No.</th>
<th>PRODUCT</th>
<th>Retail Each</th>
<th>1 Unit Each</th>
<th>4 Unit Each</th>
<th>10 Unit Each</th>
<th>GTY Total</th>
<th>YOUR PRICE</th>
</tr>
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<tbody>
<tr>
<td>00559</td>
<td>GAMMA E TOCopherol/Tcopheriends® • 60 softgts</td>
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<tr>
<td>00759</td>
<td>GAMMA E TOCopherol W/Sesame Lignans • 60 softgts</td>
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<td>01394</td>
<td>GARLIC (Optimized) • 200 veg. caps</td>
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<td><strong>01122</strong></td>
<td>GINGER FORCE® • 60 liquid caps</td>
<td>34.95</td>
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**SUBTOTAL OF COLUMN 6**

RECEIVE 25% OFF THE RETAIL PRICE OF ALL PRODUCTS
<table>
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<tr>
<th>ITEM No.</th>
<th>PRODUCT</th>
<th>YOUR PRICE</th>
</tr>
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<tbody>
<tr>
<td>02065</td>
<td>LIFE EXTENSION MIX™ + 315 tablets w/o copper</td>
<td>60.00</td>
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<tr>
<td>02064</td>
<td>LIFE EXTENSION MIX™ + 490 caps w/o copper</td>
<td>90.00</td>
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<tr>
<td>02066</td>
<td>LIFE EXTENSION MIX™ POWDER + 14.81 oz w/o copper</td>
<td>80.00</td>
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<tr>
<td>01608</td>
<td>LIVER EFFICIENCY FORMULA + 30 veg. caps</td>
<td>18.00</td>
</tr>
<tr>
<td>01638</td>
<td>5-LOX INHIBITOR W/PRÉSÉLFLEX™ + 100 mg, 60 veg. caps</td>
<td>22.00</td>
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<tr>
<td>01678</td>
<td>L-LYSINE + 620 mg, 100 veg. caps</td>
<td>9.00</td>
</tr>
<tr>
<td>00455</td>
<td>LYCOPENE (Meg) + 15 mg, 90 softgels</td>
<td>35.00</td>
</tr>
<tr>
<td>01992</td>
<td>MACUGUARD® OCULAR SUPPORT + 60 softgels</td>
<td>25.00</td>
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<tr>
<td>01993</td>
<td>MACUGUARD® OCULAR SUPPORT w/ASTAXANTHIN 60 softgels</td>
<td>44.00</td>
</tr>
<tr>
<td>01459</td>
<td>MAGNESIUM CAPS + 500 mg, 100 veg. caps</td>
<td>12.00</td>
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<tr>
<td>01682</td>
<td>MAGNESIUM (CITRATE) + 160 mg, 100 veg. caps</td>
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<tr>
<td>01908</td>
<td>MEDITERRANEAN TRIM WITH SINETROL™-XPUR 60 veg. caps</td>
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<tr>
<td>01688</td>
<td>MELATONIN + 300 mcg, 100 veg. caps</td>
<td>5.75</td>
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<tr>
<td>01883</td>
<td>MELATONIN + 500 mcg, 200 veg. caps</td>
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<tr>
<td>00329</td>
<td>MELATONIN + 1 mg, 60 caps</td>
<td>5.00</td>
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<tr>
<td>00330</td>
<td>MELATONIN + 3 mg, 60 veg. caps</td>
<td>8.00</td>
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<tr>
<td>00331</td>
<td>MELATONIN + 10 mg, 60 softgels</td>
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<tr>
<td>00332</td>
<td>MELATONIN + 3 mg, 60 veg. lozenges</td>
<td>8.00</td>
</tr>
<tr>
<td>01734</td>
<td>MELATONIN (Fast-Acting Liquid) + 2 fl. oz (Citrus-Vanilla)</td>
<td>12.00</td>
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<tr>
<td>01787</td>
<td>MELATONIN TSTED RELEASE + 300 mcg, 100 veg. tabs</td>
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</tr>
<tr>
<td>01788</td>
<td>MELATONIN TSTED RELEASE + 750 mcg, 60 veg. tabs</td>
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<tr>
<td>01787</td>
<td>MELATONIN TSTED RELEASE + 3 mg, 60 veg. tabs</td>
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<tr>
<td>01536</td>
<td>METHYLCOBALAMIN + 1 mg, 60 veg. lozenges (vanilla)</td>
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</tr>
<tr>
<td>01537</td>
<td>METHYLCOBALAMIN + 5 mg, 60 veg. lozenges (vanilla)</td>
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<tr>
<td>00709</td>
<td>MIGRA-EEZE™ (Butterbur) + 60 softgels</td>
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</tr>
<tr>
<td>01522</td>
<td>MILK THICKLE (European) + 60 veg. caps</td>
<td>34.50</td>
</tr>
<tr>
<td>01822</td>
<td>MILK THICKLE (European) + 60 softgels</td>
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</tr>
<tr>
<td>01825</td>
<td>MILK THICKLE (European) + 120 softgels</td>
<td>44.00</td>
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<tr>
<td>01940</td>
<td>MIRAFORE w/STANDARDIZED LIGNANS (Super) + 120 veg caps</td>
<td>62.00</td>
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<tr>
<td>01669</td>
<td>MITOCONDRIAL BASICS W/BIPQ™ + 30 caps</td>
<td>44.00</td>
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<tr>
<td>01868</td>
<td>MITOCONDRIAL ENERGY OPTIMIZER W/BIPQ™ + 120 caps</td>
<td>72.00</td>
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<tr>
<td>00605</td>
<td>MK-7 • 90 mcg, 60 softgels</td>
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<tr>
<td>00451</td>
<td>MSM (Methylsulfonyl methane) + 1,000 mg, 100 caps</td>
<td>14.00</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>ITEM No.</th>
<th>PRODUCT</th>
<th>YOUR PRICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>01534</td>
<td>N-ACETYL-L-CYSTEINE + 600 mg, 60 veg. caps</td>
<td>14.00</td>
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<tr>
<td>01904</td>
<td>NAD+ CELL REGENERATOR™ + 100 mg, 30 veg. caps</td>
<td>34.00</td>
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<tr>
<td>00666</td>
<td>NATTOKINASE + 60 softgels</td>
<td>25.50</td>
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<tr>
<td>01807</td>
<td>NATURAL APPETITE SUPPRESS (Advanced) + 60 veg. caps</td>
<td>38.00</td>
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<tr>
<td>00984</td>
<td>NATURAL BP MANAGEMENT + 60 tablets</td>
<td>44.00</td>
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<tr>
<td>01892</td>
<td>NATURAL ESTROGEN + 60 veg. tabs</td>
<td>38.00</td>
</tr>
<tr>
<td>01626</td>
<td>NATURAL SEX FOR WOMEN® 50+ (Advanced)+90 veg. caps</td>
<td>59.00</td>
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<tr>
<td>01444</td>
<td>NATURAL SLEEP® + 60 veg. caps</td>
<td>13.00</td>
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<tr>
<td>01551</td>
<td>NATURAL SLEEP® w/ MELATONIN (Enhanced)+30 caps</td>
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<tr>
<td>01511</td>
<td>NATURAL SLEEP® W/O MELATONIN (Enhanced) + 30 caps</td>
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**SUBTOTAL OF COLUMN 7**

<table>
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<th>ITEM No.</th>
<th>PRODUCT</th>
<th>YOUR PRICE</th>
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<tbody>
<tr>
<td>01445</td>
<td>NATURAL SLEEP® MELATONIN + 5 mg, 60 veg. caps</td>
<td>18.00</td>
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<tr>
<td>00987</td>
<td>NATURAL STRESS RELIEF + 30 veg. caps</td>
<td>28.00</td>
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<tr>
<td>03741</td>
<td>NERVIA® + 90 softgels</td>
<td>53.95</td>
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<tr>
<td>01603</td>
<td>NEURO-MAG® MAGNESIUM L-THREONATE + 90 veg. caps</td>
<td>40.00</td>
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<tr>
<td>01602</td>
<td>NEURO-MAG® MAGNESIUM L-THREONATE w/CALCIUM &amp; VITAMIN D3 + 25 grams + Lemon flavor</td>
<td>40.00</td>
</tr>
<tr>
<td>01990</td>
<td>NIROVASC w/CORDIATM™ + 30 veg. caps</td>
<td>18.00</td>
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<tr>
<td>01903</td>
<td>NK CELL ACTIVATOR™ + 30 veg. tablets</td>
<td>45.00</td>
</tr>
<tr>
<td>00373</td>
<td>NO-FLUSH NIACIN + 800 mg, 100 caps</td>
<td>19.00</td>
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**SUBTOTAL OF COLUMN 8**

**RECEIVE 25% OFF THE RETAIL PRICE OF ALL PRODUCTS JULY 2016**
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<tr>
<th>ITEM No.</th>
<th>PRODUCT</th>
<th>Retail Each</th>
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<tbody>
<tr>
<td>01092</td>
<td>PROSTATE FORMULA (Ultra Nat) • 60 softgels</td>
<td>13.00</td>
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<tr>
<td>01099</td>
<td>PROSTAPOLM™ (Triple strength) • 30 softgels</td>
<td>36.00</td>
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<tr>
<td>01742</td>
<td>PROTEIN-ISOLATE (Whey) Vanilla • 403 grams</td>
<td>200.00</td>
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<tr>
<td>01743</td>
<td>PROTEIN-ISOLATE (Whey) Chocolate • 1 lb powder</td>
<td>200.00</td>
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<tr>
<td>01770</td>
<td>PROTEIN CONCENTRATE (New Zealand Whey) Vanilla 500 grams</td>
<td>200.00</td>
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<tr>
<td>01771</td>
<td>PROTEIN CONCENTRATE (New Zealand Whey) Chocolate 660 grams</td>
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<tr>
<td>01812</td>
<td>PROVINAL-• PURIFIED OMEGA-7 • 30 softgals</td>
<td>30.00</td>
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<tr>
<td>01508</td>
<td>PTEROPURE® Pterostilbene • 50 mg, 60 veg. caps</td>
<td>30.00</td>
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<tr>
<td>01209</td>
<td>PUMPKIN SEED EXTRACT (Water-soluble) • 60 veg. caps</td>
<td>20.00</td>
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<tr>
<td>01637</td>
<td>PYCNOGENOL® FRENCH MARITIME PINE BARK EXTRACT 100 mg, 60 veg. caps</td>
<td>64.00</td>
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<td>01217</td>
<td>PYRIDOXAL 5'-PHOSPHATE • 60 veg. caps</td>
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<tr>
<td>01309</td>
<td>QUERCETIN (Optimized) • 250 mg, 60 veg. caps</td>
<td>22.00</td>
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<tr>
<td>01030</td>
<td>RED YEAST RICE (Bluebonnet) • 600 mg, 60 veg. caps</td>
<td>16.95</td>
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<tr>
<td>00605</td>
<td>REGIMINT • 60 enteric-coated caps</td>
<td>19.95</td>
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<tr>
<td>01708</td>
<td>REISHI EXTRACT MUSHROOM COMPLEX • 60 veg. caps</td>
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<tr>
<td>01448</td>
<td>REJUVENEX® BODY LOTION • 6 oz</td>
<td>24.00</td>
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<tr>
<td>01621</td>
<td>REJUVENEX® FACTOR FIRMING SERUM • 1.7 oz</td>
<td>65.00</td>
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<tr>
<td>01220</td>
<td>REJUVENEX® (Ultra) • 2 oz</td>
<td>52.00</td>
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<td>00676</td>
<td>REJUVENIGHT® (Ultra) • 2 oz</td>
<td>39.95</td>
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<tr>
<td>01410</td>
<td>RESVERATROL W/PTEROSTILBENE • 100 mg, 60 veg. caps</td>
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<tr>
<td>02031</td>
<td>RESVERATROL W/NICOTINAMIDE RIBOSIDE (Optimized) • 30 veg. caps</td>
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<tr>
<td>02030</td>
<td>RESVERATROL (Optimized) • 60 veg. caps</td>
<td>46.00</td>
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<tr>
<td>00889</td>
<td>RHODIOLA EXTRACT • 250 mg, 60 veg. caps</td>
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<tr>
<td>01900</td>
<td>RIBOGEN® FRENCH OAK WOOD EXTRACT 200 mg, 60 veg. caps</td>
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<tr>
<td>00972</td>
<td>(D) RIBOSE POWDER • 150 grams</td>
<td>27.50</td>
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<tr>
<td>01473</td>
<td>(D) RIBOSE TABLETS • 100 veg. tabs</td>
<td>32.00</td>
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<tr>
<td>01609</td>
<td>RICH REWARDS® BREAKFAST GROUND COFFEE • 12 oz. bag</td>
<td>13.00</td>
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<tr>
<td>01730</td>
<td>RICH REWARDS® BREAKFAST BLEND GROUND COFFEE Natural Mocha • 12 oz. bag</td>
<td>15.00</td>
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<tr>
<td>01729</td>
<td>RICH REWARDS® BREAKFAST BLEND GROUND COFFEE Natural Vanilla • 12 oz. bag</td>
<td>15.00</td>
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<tr>
<td>01612</td>
<td>RICH REWARDS® BREAKFAST BLEND WHOLE BEAN COFFEE 12 oz. bag</td>
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<tr>
<td>01610</td>
<td>RICH REWARDS® DECAFENATED ROAST GROUND COFFEE 12 oz. bag</td>
<td>14.00</td>
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<tr>
<td>01208</td>
<td>R-LIPIC ACID (Super) • 240 mg, 60 veg. caps</td>
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<tr>
<td>00070</td>
<td>RNA CAPSULES • 500 mg, 100 caps</td>
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**SUBTOTAL OF COLUMN 9**

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<th>PRODUCT</th>
<th>Retail Each</th>
</tr>
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<tr>
<td>01432</td>
<td>SAFFRON W/SATIREAL® (Optimized) • 60 veg. caps</td>
<td>36.00</td>
</tr>
<tr>
<td>01935</td>
<td>SAMe (S-ADENOSYL-METHIONINE) 200 mg, 30 enteric coated tablets</td>
<td>25.00</td>
</tr>
<tr>
<td>01933</td>
<td>SAMe (S-ADENOSYL-METHIONINE) 400 mg, 30 enteric coated tablets</td>
<td>36.00</td>
</tr>
<tr>
<td>01934</td>
<td>SAMe (S-ADENOSYL-METHIONINE) 400 mg, 60 enteric coated tablets</td>
<td>66.00</td>
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**SUBTOTAL OF COLUMN 10**

**RECEIVE 25% OFF THE RETAIL PRICE OF ALL PRODUCTS**
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<th>Item No.</th>
<th>PRODUCT</th>
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<th>1 Unit Each</th>
<th>4 Unit Each</th>
<th>10 Unit Each</th>
<th>QTY</th>
<th>Total</th>
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<tbody>
<tr>
<td>01921</td>
<td>URIC ACID CONTROL • 60 veg. caps</td>
<td>24.00</td>
<td>18.00</td>
<td>16.50</td>
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<tr>
<td>00213</td>
<td>VANADYL SULFATE • 7.5 mg, 100 veg. tablets</td>
<td>15.00</td>
<td>11.25</td>
<td>9.38</td>
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<tr>
<td>00408</td>
<td>VENOTONE • 60 caps</td>
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<tr>
<td>01327</td>
<td>VINPOCETINE • 10 mg, 100 veg. tablets</td>
<td>18.00</td>
<td>13.50</td>
<td>10.50</td>
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<tr>
<td>00372</td>
<td>VITAMIN B3 Niacin • 500 mg, 100 caps</td>
<td>7.85</td>
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<td>4.99</td>
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<td>VITAMIN B5 • 500 mg, 100 caps (Panthenolic Acid)</td>
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<td>01535</td>
<td>VITAMIN B6 • 250 mg, 100 veg. caps</td>
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<tr>
<td>00361</td>
<td>VITAMIN B12 • 500 mcg, 100 lozenges</td>
<td>8.75</td>
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<tr>
<td>01634</td>
<td>VITAMIN C w/DIHYDROQUERCETIN • 1,000 mg, 60 veg. tablets</td>
<td>10.00</td>
<td>7.50</td>
<td>6.75</td>
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<td></td>
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</tr>
<tr>
<td>00927</td>
<td>VITAMIN C w/DIHYDROQUERCETIN • 1,000 mg, 250 veg. tablets</td>
<td>25.50</td>
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<tr>
<td>00884</td>
<td>VITAMIN C POWDER (BUFFERED) • 454 grams</td>
<td>23.95</td>
<td>17.96</td>
<td>16.50</td>
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<td>VITAMIN D3 LIQUID EMULSION • 2,000 IU, 1 fl. oz</td>
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<td>VITAMIN D AND K W/SEA-IODINE® • 60 caps</td>
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<td>VITAMIN K2 (Low dose) • 45 mcg, 90 softgels</td>
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<td><strong>01051</strong></td>
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**BOOKS**

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<td>by Jill D. Davie &amp; Sergey Dzugan, MD • 2016</td>
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<td>by Paul McGoothin and Meredith Averill • 2016</td>
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<td>by Dan Buettner • 2015</td>
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<td>OUTSTANDING HEALTH: THE 6 ESSENTIAL KEYS TO MAXIMIZE YOUR ENERGY AND WELL BEING</td>
<td>by Michael Gaitzer, MD &amp; Larry Trivieri Jr. • 2015</td>
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<td>TESTOSTERONE REPLACEMENT THERAPY</td>
<td>by Dr. John Crisler • 2015</td>
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**SUBTOTAL OF COLUMN 11**

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

Not sure exactly which supplements you need? Talk to a Wellness Specialist toll-free at 1-800-226-2370
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<th>POSTAGE &amp; HANDLING</th>
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| SHIPPING | UPS OVERNIGHT add $16, UPS 2nd DAY AIR add $7. For Puerto Rico, US Virgin Islands, add $7. CANADA UPS EXPRESS Flat rate $17.50, UK Flat rate $25 USD. ALL OTHER INTERNATIONAL AIR WILL BE ADDED. |

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

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**BILL TO ADDRESS**

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**SHIP TO ADDRESS**

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

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L-Theanine helps control overstimulation of brain cells—promoting relaxation without diminished daytime alertness or other side effects.¹

The L-Theanine in this product:

- Inhibits excitatory stimuli at glutamate receptors in the brain²,³
- Stimulates production of relaxing neurotransmitter GABA⁴
- Beneficially influences gene expression in brain areas related to memory and mood⁴
- Supports blood pressure control under stress for those within normal levels²

Non-GMO

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