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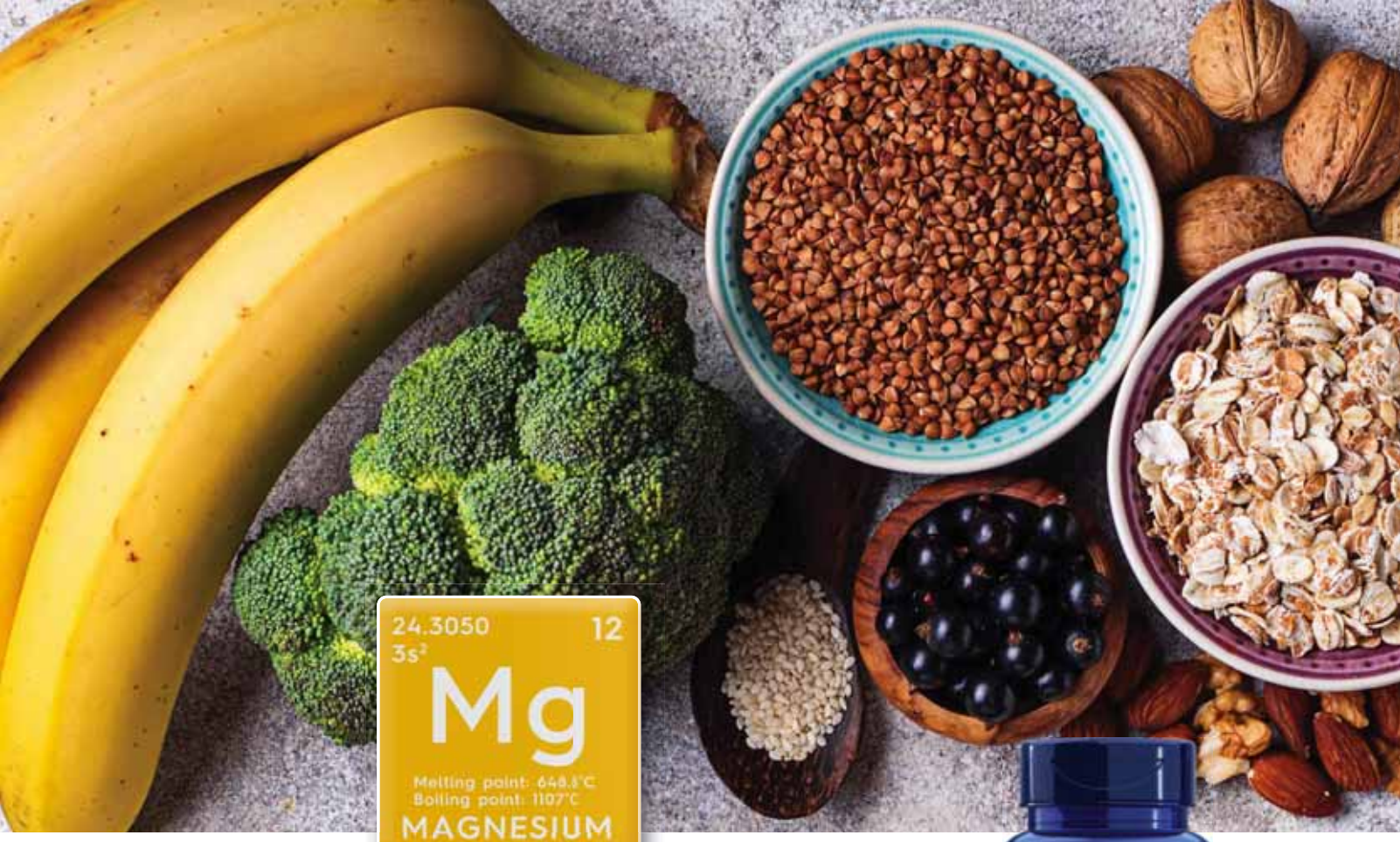

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Optimal Diet = 8 More Life Years

WILLIAM FALOON

Healthy **eating** patterns have long been associated with increased human **life expectancy**.

A higher degree of adherence with the **Mediterranean diet** is associated with a **10%-42%** lower risk of death, according to several studies.[1-7]

An observational study showed that an **Omega-3 Index** blood test score over **6.8%** is correlated with a **34%** lower overall mortality risk compared to people with **Omega-3 Index** scores under **4.2%.**[8]

A separate study found that *higher* **Omega-3 Index** scores are associated with **4.7 years** of *increased* life expectancy.[9]

Based on accumulating data about the effect of **diet** on human longevity, researchers developed *a model* to estimate **life expectancy** of people who followed an "**optimal diet**."

This model predicts that **women** who switch to an "optimal diet" at age 60 live an additional **8 years**, whereas **men** garner an additional **8.8 years**.[10]

The estimate was based on switching from a typical **Western diet** to mostly **plant-based** foods and fish, with lower consumption of red meat, processed meat, and sugary drinks.

These projected *increases* in **life expectancy** further corroborate the benefits of switching to healthier dietary patterns.

This editorial discusses these remarkable findings,[10] and how to incorporate more longevity-enhancing foods into your diet.

The **Global Health Data Exchange** is described as one of the most comprehensive efforts to measure health-related data including **dietary intake** and **mortality trends** worldwide.[11,12]

Records compiled from the **Global Health Data Exchange** enabled a meticulous study of dietary behaviors and the impact on human life expectancy.

While not a controlled clinical or observational study, estimates were made for what constitutes an "optimized diet" and what dietary changes health-conscious people should follow.[10]

The longevity projections generated by this modeling received widespread favorable media coverage.[10,13]

What is an "Optimal Diet"

The **Global Burden of Disease** study showed significant longevity benefits in response to substantially ***higher*** intake of:[11]

- **Whole grains**
- **Fruits**
- **Legumes**
- **Vegetables**
- **Fish**
- **Nuts**

And reduced ingestion of:

- Red meat
- Sugar-sweetened drinks
- Processed meat
- Refined grains

These dietary recommendations are well known to legacy readers of ***Life Extension Magazine®***. They help corroborate what has long been espoused about healthy dietary choices.

Huge Potential Increases in Human Longevity

The beginning of this article describes the **8-year** life expectancy ***increase*** that has been projected to occur when a 60-year-old switches to an **optimal diet**.[10]

Optimal diet is described as having a:

"Substantially higher intake than a typical diet of whole grains, legumes, fish, fruits, vegetables, and including a handful of nuts, while reducing red and processed meats, sugar-sweetened beverages, and refined grains."[10]

The projected *increase* in life expectancy for **60**-year-old people who make these changes is a substantial **8.0 years** (female) to **8.8 years** (male).[10]

One reason men gain more life years with an "**optimized diet**" is that men tend to have more unhealthy eating/drinking habits. Men may thus benefit with more years by switching from an unhealthy diet to an **optimized** one.

If a **20**-year-old makes the recommended sustained change from a typical **Western diet** to an **optimal diet**, the modeled lifespan *increase* would be:[10]

10.7 years for Women and 13.0 years for Men

Conversely, if an **80**-year-old changes to a sustained **optimized diet**, the projected ranges for life expectancy increase are about:[10]

3.4 years for Men and Women

The modeling data sets show that the ***younger*** one is when initiating healthier dietary habits, the greater the potential **longevity** benefit.

This is not surprising since reversing the accumulated damage that occurs with aging is more challenging than preventing it. This is one reason why I am funding **regenerative medicine** research projects so that people of all ages can derive meaningful longevity enhancements.

Food Groups in an "Optimized Diet"

The **Global Burden of Disease** data identified specific food groups that impact human longevity.[10]

In this modeling study it was projected that, consuming more **legumes** beginning at age 20 adds **2.2 years** to female life expectancy and **2.5 years** to males.[10]

It is estimated that merely eating less **red meat** and **processed meat** beginning at age 20 would add **1.6 years** to female lifespan and **1.9 years** to male lifespan.[10]

Switching from deleterious foods (like red and processed meat) to heathier foods (legumes and whole grains) yields substantial increases in **life expectancy** using this model.

Some **legume choices** include:

- Chickpeas (garbanzo beans)
- Peanuts
- Black beans
- Green peas
- Lima beans
- Kidney beans
- Black-eyed peas
- Navy beans
- Pinto beans
- Lentils
- Green beans

Some common **whole grain** choices include:

- Barley
- Brown rice
- Bulgur (cracked wheat)
- Sorghum
- Millet
- Oats
- Popcorn
- Whole-wheat bread, pasta or crackers

Life Expectancy in order of significance:

- ↑↑↑ Legumes
- ↑↑↑ Whole Grains
- ↑↑↑ Nuts
- ↓↓↓ Red Meat
- ↓↓↓ Processed Meat
- ↓↓ Sweetened Drinks
- ↓↓ Refined Grains
- ↓↓ Eggs
- ↑ Fish
- ↑ Fruit
- ↑ Vegetables

Source: Estimating impact of food choices on life expectancy: A modeling study.[10] Available at: https://doi.org/10.1371/journal.pmed.1003889.g003

The **green arrows** pointing up show what foods confer the greatest gains in longevity, with triple green arrows indicating the most beneficial. The **red arrows** pointing down show the foods that reduce human longevity, with triple red indicating the most detrimental.

Examples of nuts include a wide variety in their raw (not roasted) form such as:[14]

- Brazil nuts
- Cashews
- Macadamia nuts
- Pistachios
- Walnuts
- Almonds

Walnuts alone, when eaten five times a week, are associated with a **human** lifespan increase of **1.3 years** according to a **2021** study released by Harvard researchers.[15]

Mushrooms Reduce Mortality Risk

A landmark study published in April 2021 followed the dietary patterns of 15,000 Americans for nearly 20 years.[16]

Compared to no consumption, those who consumed mushrooms in their diet had a **16%** lower overall mortality risk.

When one serving a day of mushrooms was ingested instead of processed or red meats, there was a **35%** reduction in all-cause mortality.

A trend toward even lower mortality was found in people who consumed *higher* amounts of mushrooms.

Scientists have long wondered what's in mushrooms that enables people to live longer.

They found that mushrooms are a rich source of an **amino acid** called **L-ergothioneine**.[17]

Among other benefits, L-ergothioneine appears to protect DNA and reduce the **shortening** of **telomeres**.[17,18]

Low Mushroom Consumption in the United States

A correlation has been found between blood levels of **L-ergothioneine** and overall **life expectancy.**

One study compared the average daily intake of **L-ergothioneine** among several developed countries.[19]

The countries with the ***lowest*** intake, such as the United States,[19] had a lower average life expectancy.

Countries with the ***highest*** intake of ergothioneine have ***longer*** average **lifespans**.

Italians, on average, ingest more than **four times *greater*** amounts of **L-ergothioneine** daily compared to people in the **United States**.[19]

Studies are finding that ***higher*** blood levels of **L-ergothioneine** are associated with lower incidence of common age-related disorders.

For example, people with **cataracts** have ***lower*** levels of **L-ergothioneine** than those with healthy eye lenses. The degree of the compound's depletion correlates with the severity of **cataract formation**.[20]

L-ergothioneine levels tend to decline with advancing age.[21-23] Oral intake can effectively raise blood levels.[24]

This can be accomplished by adding more mushrooms to your diet or ingesting a standardized **L-ergothioneine** supplement in a dose of about **5 mg** each day.

I encourage readers to follow as many of the **healthy dietary patterns** described in this article as they can.

Data about an **"optimized diet"** provided further motivation for me to ingest foods that confer longevity.

For longer life,

William Faloon, Co-Founder
Life Extension®

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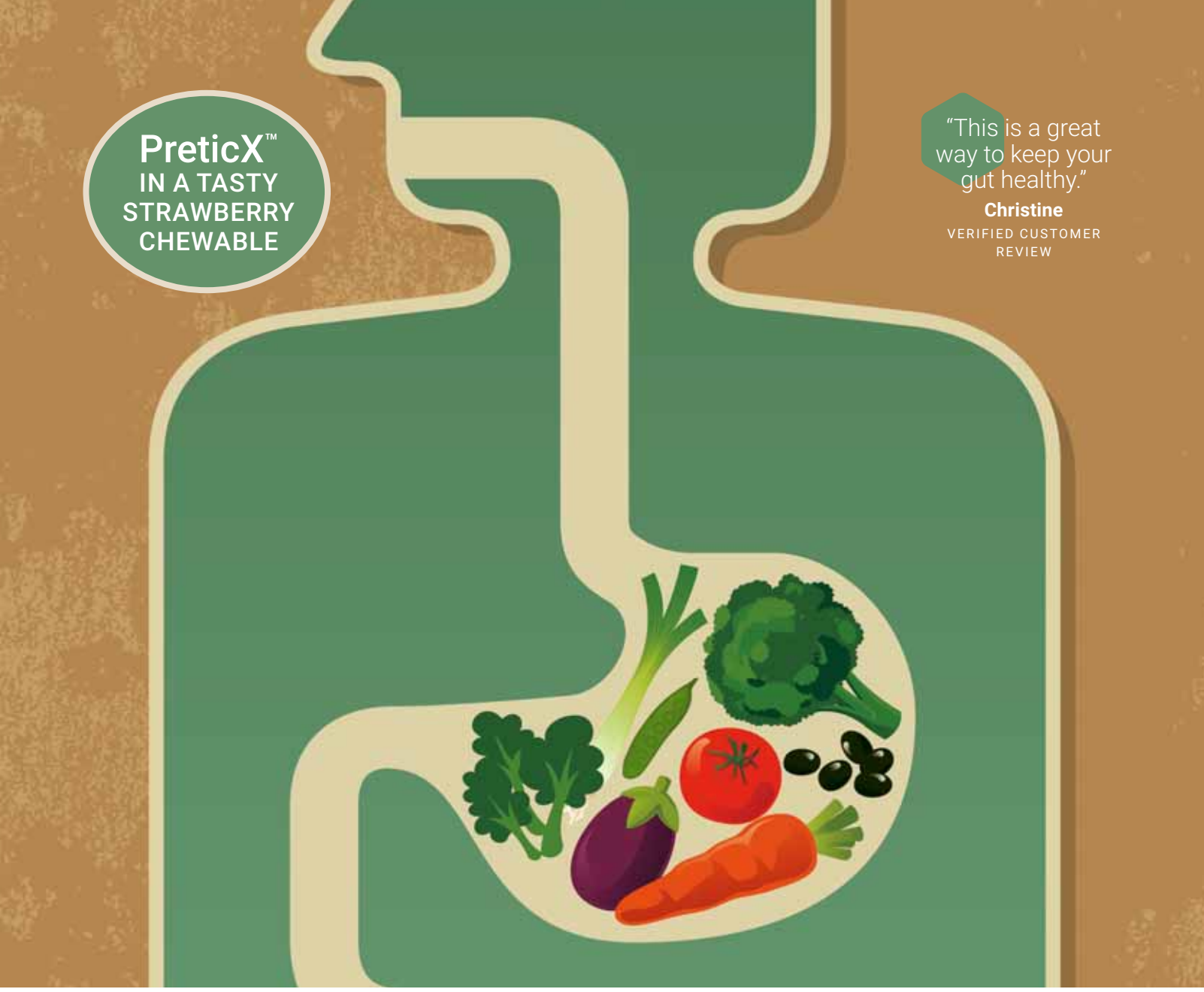

RESTORE YOUTHFUL GUT BALANCE

With Strawberry Flavored FLORASSIST® Prebiotic Chewable

- With age, our **bifidobacteria** levels decline to as little as **5%**, creating gut imbalance.[1]
- *Increasing* **bifidobacteria** levels *enhances* digestion and carbohydrate metabolism.
- *Strawberry flavored* **FLORASSIST® Prebiotic Chewable** helps restore healthy **bifidobacteria** levels in as little as 14 days using **XOS** prebiotic.[2]
- **1,000 mg** of **XOS** (xylooligosaccharides) per prebiotic chewable.

Item #02203 • 60 vegetarian chewable tablets
1 bottle **$15.75** • 4 bottles $14 each

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References
1. *Front Microbiol.* 2016;7:1204.
2. *Korean J Nutr.* 2007;40(2):154-61.

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

Selenium promotes the body's production of **glutathione**, a potent cellular antioxidant. It also encourages healthy cell division, thyroid health, and immune function.

Super Selenium Complex combines three complementary forms of selenium with vitamin E for additional antioxidant protection.

Item #01778 • 100 vegetarian capsules

1 bottle **$10.50** • 4 bottles $9 each

Each bottle provides a supply that lasts more than three months.

For full product description and to order **Super Selenium Complex**, call 1-800-544-4440 or visit www.LifeExtension.com

Essential Youth with L-Ergothioneine

The 'Longevity' Amino Acid

L-ergothioneine is an amino acid found in **mushrooms**.

Cell-based studies suggest that **L-ergothioneine** may support healthy longevity by:

- Protecting against ***mitochondrial*** **DNA** damage[1]
- Delaying ***telomere*** shortening[2]
- Supporting **DNA function** in cells subjected to UV exposure[3]

One daily capsule of **Essential Youth** provides **5 mg** of **L-ergothioneine**.

This **5 mg** potency exceeds the ***L-ergothioneine*** contained in 2 cups of white button mushrooms, depending on growing conditions.[4,5]

Item #02431 • 30 vegetarian capsules

1 bottle **$19.50**

4 bottles $17.50 each

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For full product description and to order **Essential Youth L-Ergothioneine**, call **1-800-544-4440** or visit **www.LifeExtension.com**

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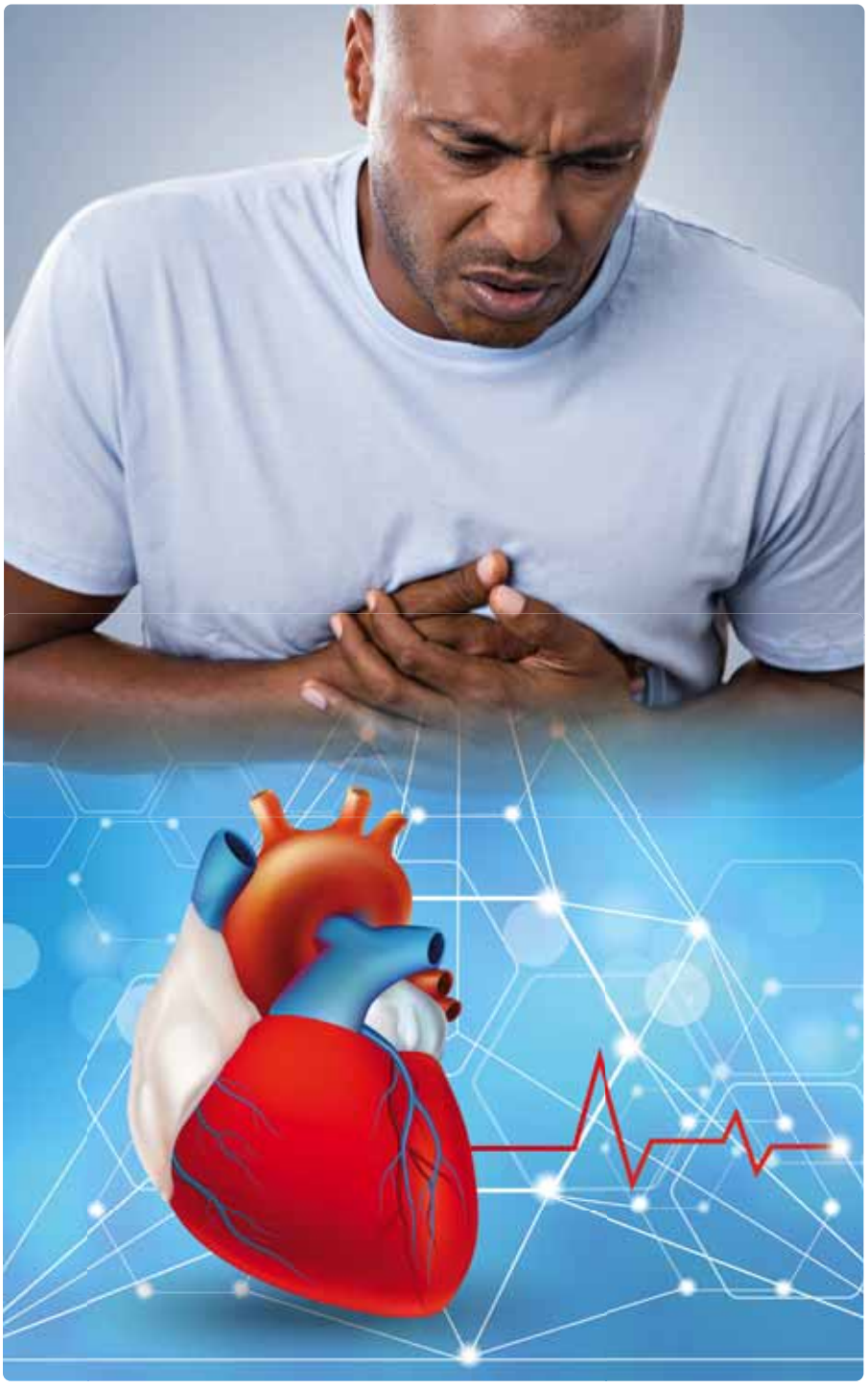
In the News



Magnesium Intake Linked to Longer Life After Heart Attack

People with a history of heart attack who reported a high intake of **magnesium** had a lower risk of death from cardiovascular disease or any cause during a median follow-up of **12.4 years**, according to a study published in *Frontiers in Cardiovascular Medicine*.*

The study included **4,365** men and women, **60-80 years** old, in the Alpha Omega Cohort, an ongoing follow-up of participants in the **40-month** Alpha Omega Trial.

A high magnesium intake, defined as greater than **320 mg** per day, was associated with a **28%** lower risk of dying from cardiovascular disease and a **22%** lower risk of death from any cause compared to a low intake, defined as less than **283 mg**.

The protective effect of magnesium was even stronger in patients who were being treated with diuretic drugs. In this group, the risk of mortality from cardiovascular disease was **45%** lower among those with high magnesium compared to those with low magnesium.

Editor's Note: An adequate intake of magnesium may be important for lowering long-term mortality risk after myocardial infarction, especially in patients treated with diuretics.

* *Front Cardiovasc Med*. 2022 Aug 12;9:936772.

Fish Oil Supplementation Associated with Reduced Risk of COPD

Taking fish oil supplements on a regular basis is associated with a reduced risk of chronic obstructive pulmonary disease, according to a study published in *Clinical Nutrition*.*

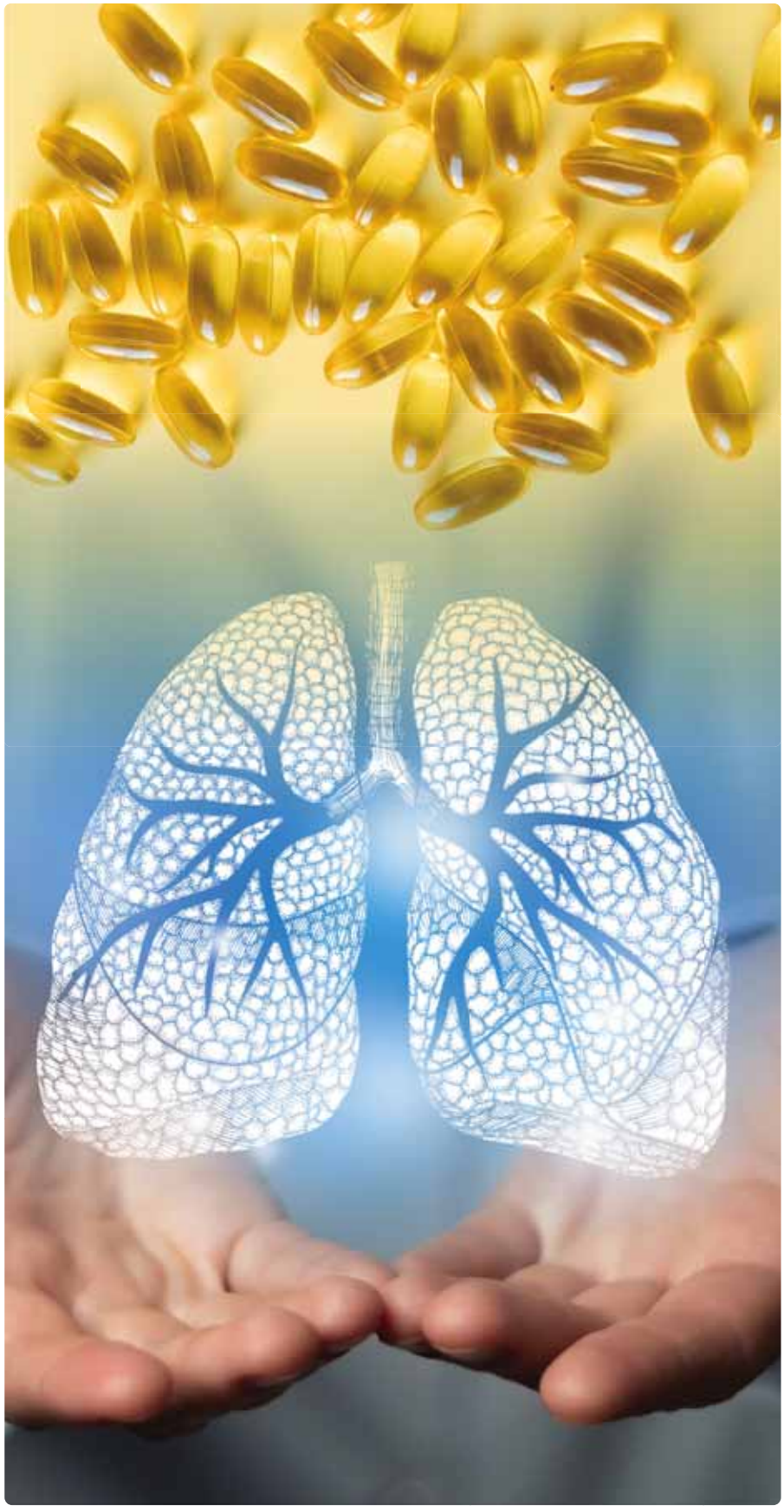
COPD, a chronic airway obstruction that leads to irreversible decline in lung function, is accelerated by inflammation. Researchers collected data from **484,414** participants in the UK Biobank, aged **40 – 69 years**.

The individuals answered questionnaires on fish oil supplements used between **2006** and **2010** and were then followed up for an average of **nine** years.

Results showed that habitual fish oil supplementation was associated with a **12%** reduced risk of **COPD**, regardless of a person's genetic predisposition for the condition.

Editor's Note: Several studies have suggested that omega-3 fatty acids may have anti-inflammatory properties. Future studies should further evaluate the mechanisms underlying this relationship to aid efforts to prevent incident **COPD**.

**Clinical Nutrition,* December 2022. https://doi.org/10.1016/j.clnu.2022.10.002



Quercetin Phytosome® Reduces Allergy Symptoms

A clinical trial revealed a decrease in seasonal allergy symptoms among men and women who received **quercetin**, the *European Review of Medical Pharmacology* reported.*

The trial included **66** participants **22–78** years old, with allergic eye and nasal symptoms related to pollen or dust exposure. Half of the participants received **200 mg** of quercetin and the others received a placebo daily for **four weeks**. Quality-of-life questionnaires and other tests evaluating eye and nasal symptoms were administered before and after the treatment period to grade and compare severity of the symptoms.

Among participants who received quercetin, allergy symptoms at the conclusion of the trial, including eye itching, sneezing, nasal discharge, and sleep disorder, were significantly improved compared to the placebo group.

Editor's Note: Quercetin is a flavonoid found in fruits, tea, onions, and herbs. The quercetin phytosome® used in the study is a food-grade bioavailable quercetin formulation.

* *Eur Rev Med Pharmacol Sci*. 2022 Jun;26(12):4331-4345.

Chlorophyllin May Help Improve Inflammatory Bowel Disease, Animal Study Shows

In an animal study published in the *American Journal of Physiology Gastrointestinal and Liver Physiology*, chlorophyllin was shown to improve inflammatory bowel disease, a disease class that encompasses Crohn's disease and ulcerative colitis.*

Chlorophyllin is a derivative of chlorophyll, the green pigment in plants. Researchers induced chronic colitis in a group of mice and supplemented some of the animals' diets with chlorophyllin in an amount reflective of consuming **200 grams** to **400 grams** per day of spinach in humans.

Supplementation with chlorophyllin prevented weight loss and colon shortening, improved stool consistency, decreased blood in the stool, and decreased premature mortality. Treated animals had less intestinal mucosal damage and inflammation.

Editor's Note: These results demonstrate that oral administration of chlorophyllin can significantly impede the biogenesis of experimental colitis.

* *Am J Physiol Gastrointest Liver Physiol*. 2022 Aug 1;323(2):G102-G113.

DEFEND YOUR HEALTH

VITAMIN D3

Systemic support for immune function, bone health, and normal blood-sugar levels.

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James

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Item #01713

125 mcg (5000 IU) • 60 softgels

1 bottle **$7.50** • 4 bottles $6.50 each

CAUTION: Individuals consuming more than 50 mcg (2000 IU)/day of vitamin D (from diet and supplements) should periodically obtain a serum 25-hydroxy vitamin D measurement. Do not exceed 10000 IU per day unless recommended by your doctor. Vitamin D supplementation is not recommended for individuals with high blood calcium levels.

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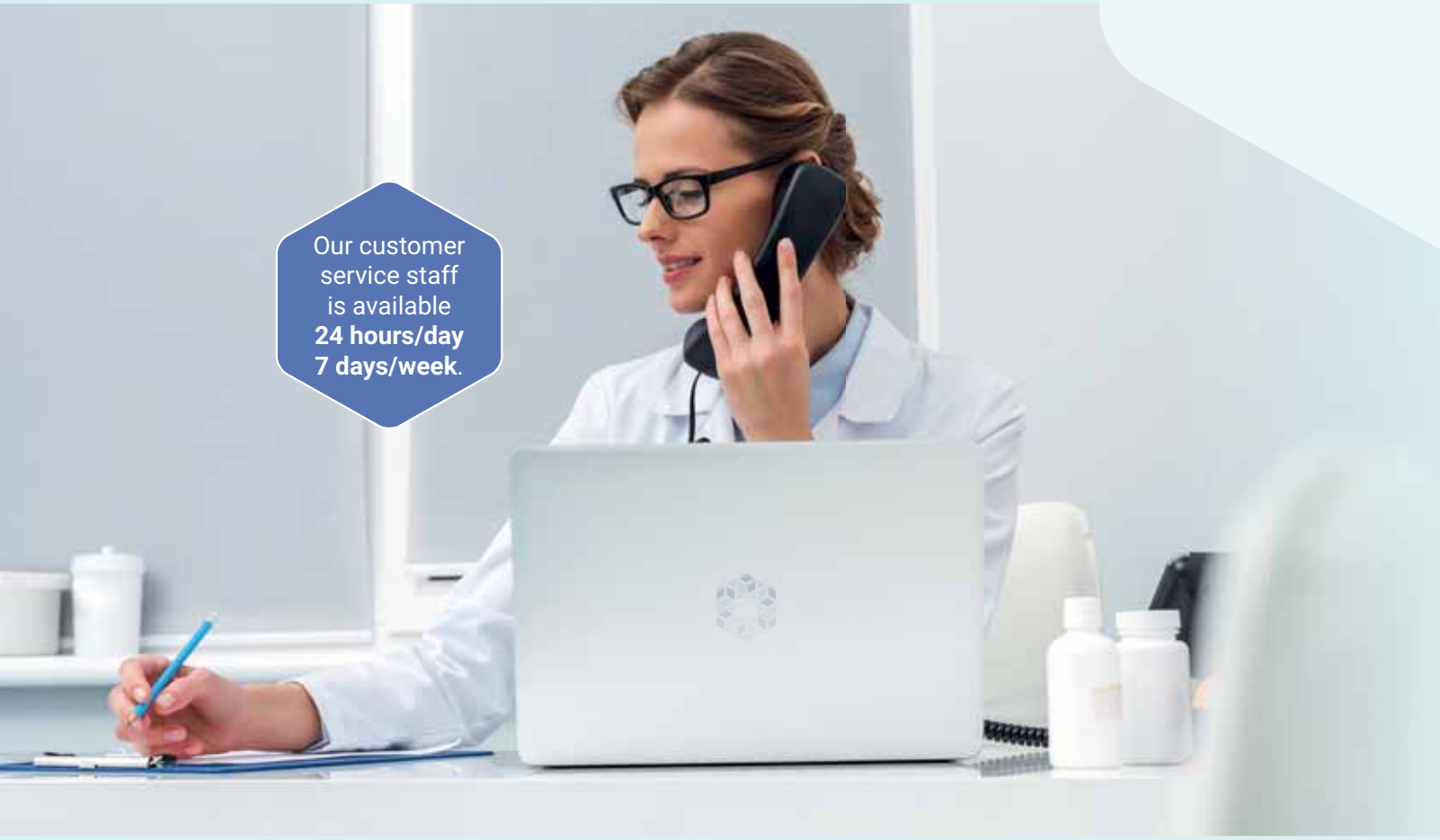

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Kathy
VERIFIED CUSTOMER REVIEW

- Hundreds of published studies describe **resveratrol's** health and longevity potential.[1]
- The challenge has been achieving sustained **blood levels** of **resveratrol**.
- In a **human** trial, a patented *plant-based* coating increased **bioavailability** up to **10 times**.[2]

Optimized Resveratrol Elite provides **bioavailable resveratrol** plus highly *absorbable* **quercetin** to provide complementary biological functions.

References
1. *Med Res Rev.* 2019;39(5):1851-1891.
2. *ACS Omega.* 2022 Apr 19;7(15):12835-45.

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Remarkable Life-Expectancy Impact of **Fish Oil**

BY MICHAEL DOWNEY

Readers of ***Life Extension Magazine***® seek **validated** methods to extend their healthy lifespans.

Some experiment with approaches shown in **animal** models to confer benefits…but lack conclusive **human** data.

Most know about the **heart health** benefits of **fish oil**.

Overlooked is compelling evidence showing that *higher* levels of ***omega-3s*** in humans correlate with ***longer life***.

This article summarizes research demonstrating multi-year **overall longevity** outcomes based on **omega-3** blood levels.

Beyond Heart Health

Fish oil is a rich source of **omega-3 fatty acids** that primarily include **EPA** (**eicosapentaenoic acid**) and **DHA** (**docosahexaenoic acid**).

Studies support *higher* intake of omega-3s for the prevention and management of **cardiovascular conditions**.[1-8]

Regular omega-3 intake can lower risk of heart attack and stroke and reduce ***mortality from heart disease***.[5,7-10]

The **pharmaceutical** industry has even created fish oil-derived **drugs** for reducing cardiovascular risks. These drugs, such as Lovaza®, and Vascepa®, are approved by the U.S. Food and Drug Administration (FDA) to reduce risk of cardiovascular events.[11,12]

Fish Consumption and Lifespan

A decade ago, a **16-year** study concluded that a **fish-rich diet** significantly *predicts* **longevity**.

Data on **2,692** senior adults showed that subjects with **high** blood levels of **omega-3 fatty acids** had:[13]

- **2.2 years** of ***longer*** **lifespan**,
- **27%** decrease in **overall mortality** risk, and
- **35%** decrease in **heart disease** mortality risk.

The omega-3 **DHA** was associated with a **40% reduction** in the risk of coronary heart disease death and substantially reduced mortality risk from arrhythmia (irregular heartbeat).[13]

In **2021**, a massive study evaluated **191,558** individuals' data and concluded that weekly intake of **175 grams** (two servings) of **oily fish** was associated with:[14]

- **Lower** risk of **death** among patients with previous **cardiovascular disease**,
- **Lower** risk of **death** from major cardiovascular disease, and
- **Lower** risk of **sudden cardiac death**.

Longevity Benefits for High-Risk Patients

These and other findings prompted studies on intake of **fish oil**.

A prospective study assessed **fish oil** intake and mortality among people with **cardiometabolic multimorbidity**.[15] This refers to having at least two of the chronic diseases, diabetes, stroke, or heart disease, which translates to exponentially *higher* mortality risk.[16]

Fish oil use by these patients was associated with a **17% lower** risk of **all-cause mortality**. Cardiovascular disease mortality risk was also reduced.

Taking fish oil at **age 45** was associated with ***adding 1.66 years to life expectancy.***[15]

Longevity Benefits in the General Population

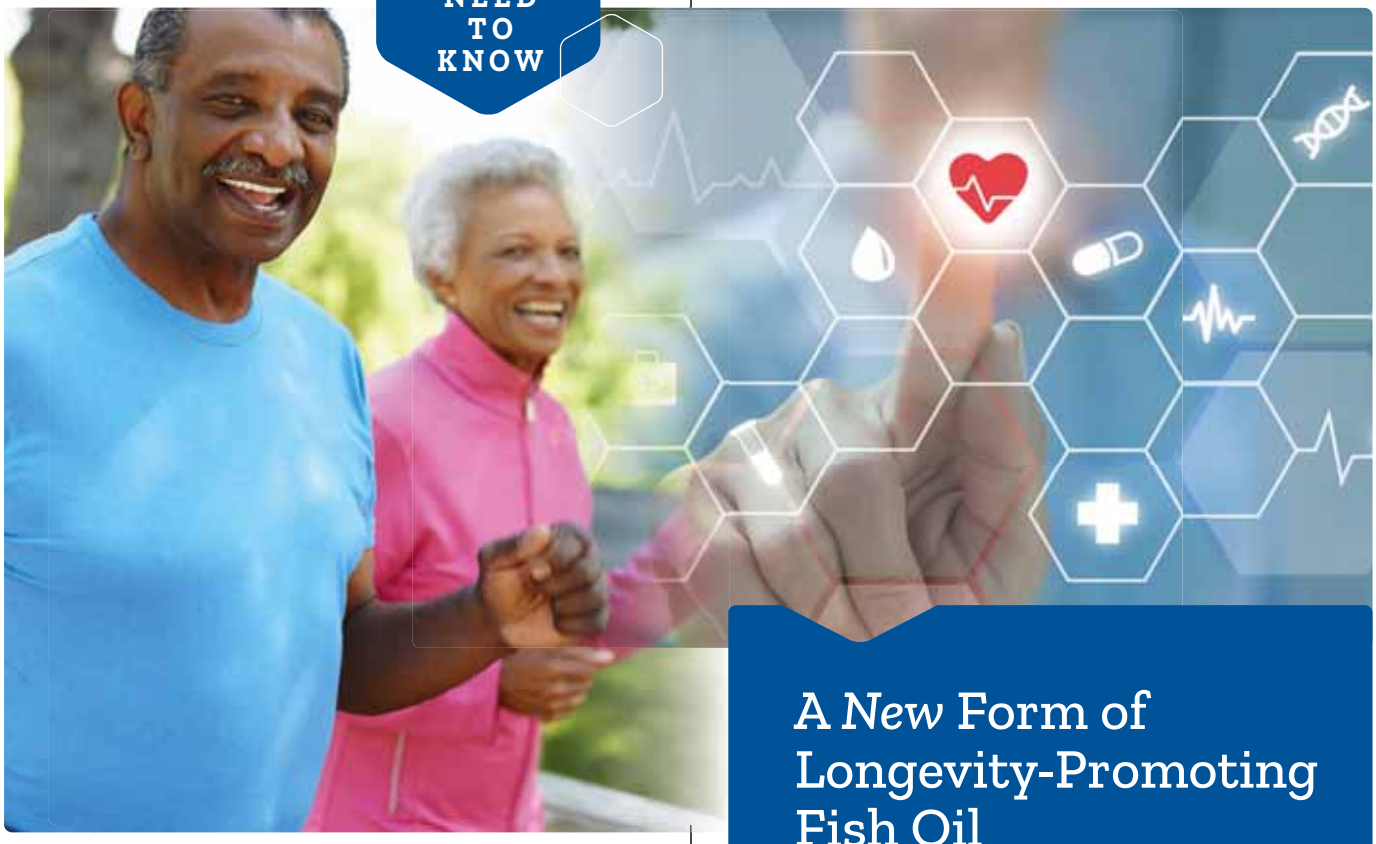
A *second* study using the UK Biobank cohort examined a whopping **502,536** volunteers aged 40-69 who live in the United Kingdom.[10]

Analysis showed that regular **fish oil** intake was associated with significantly **reduced**:

- **All-cause mortality**,
- **Cardiovascular disease mortality**,
- **Heart attack incidence**, and
- **Cardiovascular events**.

These associations were *independent* of numerous risk factors, including sex, age, ethnicity, body mass index, produce consumption, smoking, alcohol use, exercise, and various comorbidities.

WHAT YOU NEED TO KNOW



Amazingly, even *cold-water fish consumption* didn't change the benefits found for *fish oil supplements* to these outcomes.[10]

Another, earlier study looked at associations between *higher* blood levels of **omega-3 fatty acids** and **mortality,** using data from the **Framingham Heart Study**, one of the world's longest-running human studies.[17]

Those with the *highest* omega-3 blood levels, compared to the lowest, had an astonishing ***34% lower risk of death from any cause***.[17]

Lifespan Increase in Laboratory Model

Beyond the **human** lifespan studies discussed so far, laboratory researchers are discovering even greater longevity effects of omega-3s.

For over a century, researchers have used the fruit fly to study aging biology.[18] This fly has a short lifespan, so that effects can be observed in a fairly short amount of time, plus its **genome** is **60%** identical to **humans**.[19]

Scientists used the fruit fly in a study of the lifespan effects of omega-3 intake. Adding **EPA** and **DHA** to the flies' diets increased their median **lifespan** by **14.6%**.[20]

A *New* Form of Longevity-Promoting Fish Oil

- The heart benefits of **fish oil** are well-established, and recent studies provide compelling evidence of fish oil's potent **longevity** effects.
- Human data reveal that higher intake of fish or fish oil may add **years** to lifespan.
- An animal model showed that **EPA** and **DHA** supplementation increased lifespan by **14.6%**. That same percentage applied to humans would mean **11.5 years additional survival**.
- One recent study estimates that a dietary **lack** of **omega-3** oil may *shorten lifespan as much as smoking*.
- Innovative technology has allowed scientists to pack high amounts of fish oil into sugar-free, **chewable** forms for an alternative way to promote **longer life**.

If the average human lifespan were extended by a similar percentage, that would be an additional ***11.5 years of life***.[21]

This study shows that in a widely studied model organism, ***fish oil supplementation*** resulted in a marked **longevity increase**. This type of controlled intervention data in a time-tested biological model adds weight to the case, based on population data, for an enhancement of longevity from **fish oil** supplements.

Broad Benefits of Fish Oil

Recent data offer strong indications that the benefits of higher **fish oil** and **omega-3** fatty acid intake go beyond improving longevity and heart health.

Brain

- High omega-3 intake in midlife was found to maintain **brain** white matter integrity in old age.[26]
- Omega-3 lowered postpartum symptoms of **depression** compared to placebo.[27]
- Omega-3 significantly improved depression symptoms in pregnant and postpartum women.[28]

Insulin Resistance

- Omega-3 supplementation decreased fasting blood glucose as well as insulin resistance, compared to placebo.[29]
- Fish oil or oily fish intake was associated with a lower risk of **type II diabetes**.[30]

Sarcopenia

- Omega-3 intake promoted **muscle mass**[31] and **strength**[32] in older adults.
- There is emerging evidence for beneficial effects of omega-3 fats in this muscle-wasting disease.[33]

A Fish Oil-Longevity Explanation

One researcher has investigated possible explanations for this fish oil-longevity association by examining the role of **bioactive lipids**—a group that includes **EPA** and **DHA**—in age-related disease.[22]

This review noted that the body derives several healthy fats, including **EPA** and **DHA**, from dietary intake of **alpha-linolenic** acid found most abundantly in plant foods.

Alpha-linolenic acid is converted to **EPA/DHA** in the body by the action of enzymes known as ***desaturases***.[22]

Desaturase activity *declines* with age. As a result, aging cells can become deficient in various bioactive lipids, including **EPA** and **DHA**, potentially contributing to aging and metabolic abnormalities.

This scientist concluded that direct oral intake of bioactive lipids such as **EPA** and **DHA** may aid "***in the prevention, postponing, or even reversing of some of the aspects of aging***."[22,23]

Low Fish Oil Intake Shortens Life Similar to Smoking

How much impact might **fish oil** have on lifespan?

A recent study analyzed **Framingham Heart Study** data for individuals in their mid-sixties and concluded that:[24]

- **Smoking** was associated with a life expectancy **reduction** of ***4.73 years***, while
- The lowest body levels of **omega 3**, compared to the highest, were associated with a life expectancy **reduction** of ***4.74 years***.

In other words, for people in their 60s, low levels of **omega-3**s are as much of a risk for early mortality as smoking, based on these data.

Alternative to Softgels

Seeking ways to improve compliance with **fish oil** intake recommendations, Norwegian scientists spent **10 years** developing a *new* option for those who don't like softgels or capsules.

They created a water and protein matrix containing *tiny* droplets of fish oil, allowing for a higher nutrient load in a smaller space.[25] The result is a "gummy bite" that is small, tasty and sugar-free.

The smaller droplets also provide more surface area, enhancing breakdown by digestive **enzymes** in the body.[25]

For those who don't like to swallow **capsules**, this innovative technology packs **high-dose fish oil** into gummy bites.

Summary

Higher **fish oil** intake has long been shown to prevent and manage **cardiovascular conditions**.

Recent evidence links *higher* fish or fish oil intake, and higher blood levels of omega-3 fatty acids from fish, with **increased longevity** as well.

The highest **omega-3** blood levels were linked to a **34% lower** risk of ***death from any cause***.

Innovative technology has been used to produce a tasty, sugar-free, tropical fruit-flavored, gummy-bite form of fish oil for those who don't like swallowing softgels. •

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

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What's Behind the Fish Oil-Longevity Link

Scientists are still exploring *how* higher **fish oil** intake may lead to greater longevity. Emerging research provides a glimpse into at least some of the possible connections:

- A healthy level of omega-3 fatty acids can reduce and help resolve **chronic inflammation**.[34-37] This helps lower the risk for most age-related—***and potentially life-shortening***—chronic diseases, including cancer, obesity, diabetes, and dementia.
- A study of patients with chronic kidney disease found that omega-3 intake resulted in **longer telomeres** within white blood cells. Telomeres are the longevity-associated chromosomal "clocks" that shorten as we age.[38]
- Omega-3 fatty acids are precursors of signaling compounds known as **endocannabinoids**.[39] The endocannabinoid system is involved in regulation of appetite, pain sensation, mood, and memory.[40]
- Blood levels of DHA and total omega-3 fatty acids have been found to be significantly correlated, in middle-aged and elderly women, with diversity in the **gut microbiome**, the intestinal community of microbes.[41] Greater diversity is nearly always associated with greater disease resistance and better health.

How Can You Test Omega-3 Levels?

The best way to know if you are getting enough **omega-3 fatty acids** is to test your blood levels. The **Omega-3 Index** is a finger-stick blood test that can measure the *percentage* of omega-3 fatty acids in your red blood cells.

Ideally, your **Omega-3 Index score** should be greater than **6.8%**. The typical Japanese Omega-3 Index score is above **8.0%**, which may help account in part for the **five-year longer life expectancy** in Japan compared to the United States.[24]

To order the at-home Omega-3 Index test, call **1-800-544-4440** or visit www.LifeExtension.com.

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Reference: * *Gerontology.* 1996;42(3):170-80.

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References

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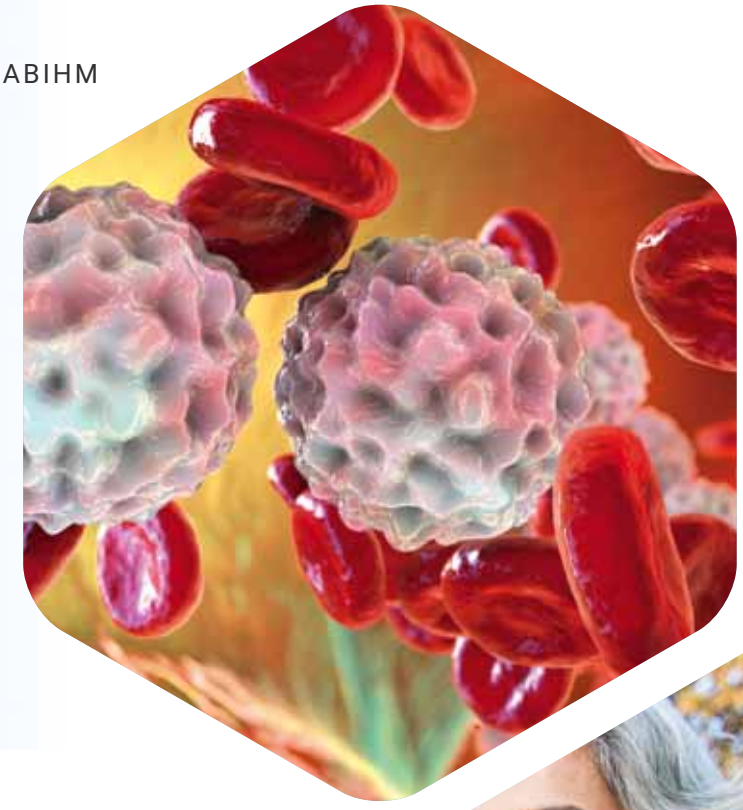
For full product description and to order **Omega-3 Fish Oil Gummy Bites**, call 1-800-544-4440 or visit www.LifeExtension.com

Protect Your Cells from SUGAR DAMAGE

BY EDWARD R. ROSICK, DO, MPH, DABIHM



When **glucose** binds to proteins, fats, or nucleic acids in our body, **toxic compounds** are formed.[1]

These cellular poisons are called **advanced glycation end products** or **AGEs**.[2,3]

Diabetics suffer accelerated **glycation**, but destructive glycation processes happen in people with **normal** blood glucose levels as well.[3]

Glycation is linked to faster aging,[1] cardiovascular disorders,[2,4-6] diabetic complications,[3,6-8] and other chronic conditions.[2,6,9-11]

Fortunately, there are ways to reduce damage inflicted by **advanced glycation end products** (AGEs).

Hidden Side Effect of Glucose

Maintaining sufficient blood **glucose** is essential to life.

But glucose itself has a deadly side effect.

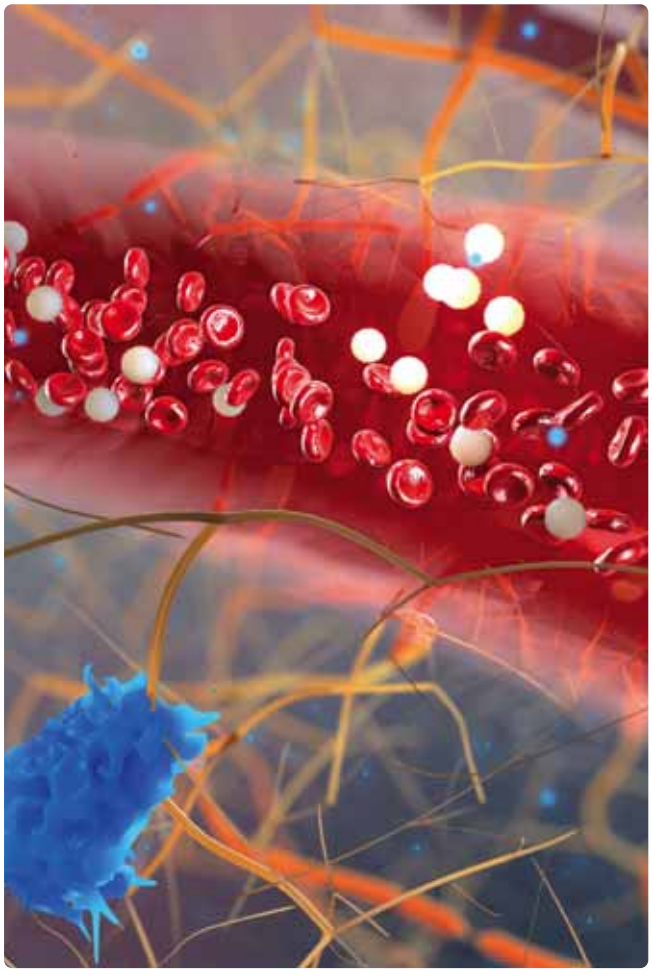
With age, even normal **glucose** levels bind to the body' s proteins and fats to accumulate **non-functional** structures called **advanced glycation end products**.

Those with higher **glycation** levels suffer more damage to cells and blood vessels.[5,8,14-16] This pertains to diabetic and non-diabetic individuals.

Glycation end products are partly responsible for many **diabetic** complications,[16,17] including kidney[6,16] and nerve damage,[16,18] blindness,[16,19] and heart disease.[16,20]

Rates of **diabetes** have more than **doubled** in the last 20 years.[21] Almost **100 million** Americans have **pre-diabetes**, meaning blood sugar levels between **100 mg/ml** and **125 mg/ml**.[22,23]

Controlling blood sugar is essential to reduce diabetic morbidities. Guarding against excess **glycation** is equally important.



Human studies have demonstrated a relationship between advanced glycation products contributing to muscle weakness in older healthy individuals.[24]

A recent review of studies has shown that glycation products reduce skin elasticity, produce wrinkles, accumulate pigments, and destroy the skin barrier by stimulating inflammation.[13]

Cardiovascular Damage

Those with the *highest* **glycation** levels have been shown to be at greater risk of suffering nonfatal and fatal **cardiovascular diseases**.[20,25,26]

A report in the journal *Molecular Basis of Disease*[27] detailed the ways in which **glycation** contributes to heart disease, including:

- Decreased blood vessel **flexibility**,
- Increased heart muscle **stiffness**,
- Decreased production of **nitric oxide**, a vital biochemical needed for optimal blood vessel dilation, and
- Increased **oxidative stress** and **inflammation**.

Research from Japan confirmed that high **glycation** levels are associated with the progression of dangerous **cardiac plaque** in patients with and without diabetes.[28]

Another study of patients with **acute coronary syndrome** (a range of conditions marked by reduced blood flow to the heart) showed high levels of advanced glycation end products as a **predictor of death** and further heart disease.[29]

How Benfotiamine Helps

Vitamin B1 (also known as **thiamine**) is essential for energy production and brain health. Deficiencies of thiamine can lead to serious problems, including cardiovascular, immune system, and visual impairments, neurological disorders, and neuropathy.[30]

Benfotiamine is a fat-soluble form of thiamine with increased **absorbability** and **bioavailability**.[31-34]

It has been shown in studies to protect against **diabetic complications** and **vascular damage** by acting as an anti-inflammatory agent and by combating the damaging effects of **advanced glycation end products** (AGEs).[17,35-44]

In one study, diabetic patients with **polyneuropathy** (painful damage to nerves throughout the body) who took **400 mg** daily of benfotiamine had significantly fewer complaints of pain.[40] A study in rats showed that benfotiamine prevented diabetes-induced damage in the animals' eyes, hearts, and kidneys.[45]

A randomized controlled trial published in **2020** examined the effects of benfotiamine in patients with diabetic **sensorimotor polyneuropathy**, nerve damage that causes difficulty moving and feeling sensation.[41] In an earlier randomized controlled trial, patients taking **600 mg** of **benfotiamine** a day for six weeks, had improved neuropathy symptoms as compared to patients receiving **300 mg** or placebo.[46]

And, **300 mg** of thiamine supplementation improved **renal function** in diabetic patients over a three-month period.[47]

Protecting the Heart and Blood Vessels

One of the hallmarks of both diabetes and heart disease is damage to **blood vessels** brought about by oxidative stress, inflammation, and glycation.

Benfotiamine can help prevent these types of damage.

In a pilot study, 13 adults with **type II diabetes** were given a meal that had high amounts of **advanced glycation end products** in it. Taking **1,050 mg** of benfotiamine daily for three days before the meal decreased markers of oxidative stress and damaging changes to large and small blood vessels.[35]

In another human study, taking **1,050 mg** of benfotiamine daily improved blood flow in volunteer smokers. Short-term treatment with benfotiamine was shown to reduce effects of smoking as a result of its protective vascular qualities.[44] Benfotiamine does not make smoking safer, but this study indicates protective effects for anyone exposed to inhaled environmental toxins.

Studies also show that **benfotiamine** can effectively combat oxidative stress and vascular dysfunction, drivers of **heart disease**. In an animal study, benfotiamine use acted as an effective **antioxidant** for the heart.[42]

A significant body of evidence demonstrates that benfotiamine interferes with glycation pathways.[48] It was used in **Europe** as a neuropathy medication long before Americans gained access to it as a low-cost supplement.

WHAT YOU NEED TO KNOW

Stop Damage Done by Glycation

- When sugar binds to proteins and other compounds in the body in a process called **glycation**, toxic compounds are formed called **advanced glycation end products (AGEs)**.
- AGEs are linked to diabetic complications, accelerated aging, heart disease, and other chronic illnesses.
- AGEs are also detrimental to nondiabetics causing skin aging, loss of muscle strength and chronic inflammation.
- Benfotiamine is a bioavailable form of vitamin B1. It has been shown to prevent the damaging effects of AGEs. Benfotiamine also reduces inflammation and oxidative stress associated with diabetes and heart disease.
- Human studies show that benfotiamine is effective in decreasing debilitating symptoms of type II diabetes including **nerve damage** and can help protect the heart and blood vessels against damage from AGEs.

Life Extension suggests supplementing with benfotiamine in daily doses of **250-1,000 mg** to help reduce glycation damage. Those with *higher* blood sugar levels or unhealthy dietary practices should consider the *higher* benfotiamine dose range.

Meals that contain damaging glycation products include foods cooked at high temperature such as frying, grilling, broiling, and roasting. Safer ways of food preparation to reduce ingestion of **advanced glycation end products** include boiling, stewing, steaming, and poaching.

Summary

Advanced glycation end products or **AGEs** are harmful compounds formed when blood sugar interacts with proteins and other compounds in the body. They contribute to diabetic complications, heart disease, and accelerated aging.

Benfotiamine is a safe, fat-soluble form of vitamin B1 that can help reduce the production of AGEs.

Multiple studies have shown that **benfotiamine** can help protect against oxidative stress, vascular dysfunction, and other hallmarks of conditions like **diabetes** and **heart disease**.

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

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Optimal Blood Sugar Levels

Life Extension considers these to be the ideal glycemic marker blood levels:

- Fasting Glucose: **80-86 mg/dL**
- HbA1c (Hemoglobin A1C): **5.0%-5.4%**
- Fasting insulin <**5.0 uIU/ml**

Thiamine Deficiency [30]

- Thiamine, vitamin B1 is essential for metabolism, energy production, and for normal nervous and cardiovascular function.
- Deficiency can cause fatigue, poor memory, loss of appetite, sleep disturbances, abdominal discomfort, and weight loss.
- A diet high in processed carbohydrates and sugars can cause its deficiency. Consumption of excess alcohol is also associated with thiamine deficiency.
- Severe thiamine deficiency may cause nerve, heart, and brain abnormalities.
- Health disorders that warrant an increase in thiamine intake include overactive thyroid and liver disorders.
- **Benfotiamine** is a fat-soluble form of thiamine with increased **absorbability** and **bioavailability**.[31-34]

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* *Int Angiol.* 2014 Feb;33(1):20-6.

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Lactoferrin's Cell Regenerative Effects

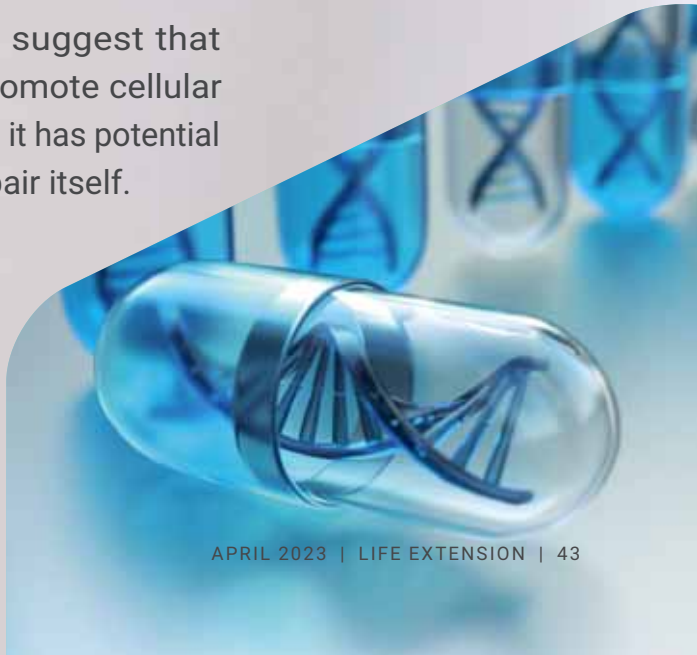
BY GREGORY E. BIGFORD, PHD, MSBA

Lactoferrin is a multi-functional protein known for its ability to support **immunity**.

Research in preclinical[1-5] and clinical settings[6,7] reveals how **lactoferrin** helps prevent growth of **microbes**, including bacteria and viruses, in healthy cells.

A recent clinical trial in **Japan** found that this protein has properties that can help mitigate **infectious diseases** including summer colds.[8]

Emerging preclinical data suggest that **lactoferrin** can also help promote cellular **regeneration**.[3] In other words, it has potential to help the body heal and repair itself.



What is Lactoferrin?

Lactoferrin is a protein primarily found in milk, tears, nasal fluids, saliva, and secretions from gastro-intestinal, and reproductive tissues.[1,9]

It is also found in blood plasma,[9] immune cells such as neutrophils,[10] and macrophages.[1] It helps facilitate **immune responses** against pathogens such as bacteria, parasites, fungi, and viruses.[1]

Lactoferrin Against Viral Illnesses

Lactoferrin is present in our body and is a factor in the body's defense against infections.

It strengthens the immune system by blocking the direct viral invasion of cells.[11]

One unusual feature of **lactoferrin** is the diversity of viruses it can shield against. It possesses robust **antiviral** activity against viruses that cause the **common cold** and **flu**, gastroenteritis, hepatitis B and C, herpes simplex, Epstein-Barr virus, and more.[4,11]

Lactoferrin also has *indirect* antiviral effects. It helps the body fight against a virus by **activating immune** defenses. It boosts the activity and number of **natural killer** cells.[1,12,13] Viruses replicate inside cells. Natural killer cells can recognize abnormal cells, including those infected by viruses, and destroy them. This can help prevent the spread of a virus in the body.

Lactoferrin also stimulates the production of other antiviral compounds, including the signaling proteins known as **interferons**.[2,8,11]

Lactoferrin may also help block the ability of viruses to **reproduce** even if they're already inside cells.[11] This helps limit the spread of the virus, potentially reducing the severity of the resulting illness.

While some lactoferrin is produced in the body, oral intake can boost its levels.

In more recent years, scientists have conducted research into its potential ability to help the body repair damaged tissues and cells.

Regenerative Properties

Inflammation and **oxidative stress** can severely harm cells, leading to deterioration of body systems and chronic disease.

Preclinical studies have shown lactoferrin's **anti-inflammatory** and **antioxidant** properties help protect against that damage.[14] It works by stimulating anti-inflammatory molecules,[2,13] inhibiting pro-inflammatory molecules,[2,15,16] and scavenging free radicals[14,17-19] to reduce oxidative stress.[20-23]

Lactoferrin also has *direct* properties of **regeneration** and **repair**. It can:

- Bind and interact with **DNA** to protect genetic material against damage,[14]
- Promote healthy cell division,[24] and
- Spur **differentiation** of stem cells (when stem cells mature and develop into specialized cell types).[25,26]

Together, these actions may help the body repair itself and even ***reverse*** some of the damage that comes with aging.

Bone Benefits

Much of the research on lactoferrin's regenerative qualities has focused on **bone health**.

Studies have found that lactoferrin can promote proliferation of *bone-forming* cells known as **osteoblasts** and the differentiation of stem cells into **bone cells**.[3,27] Preclinical studies have shown it can also activate bone-building signals that normally halt with age.[28-30]

This could be important for people with **osteoporosis**, in which bones become brittle and prone to fractures.[31] Osteoporosis is alarmingly common, affecting **30%** of women aged 50 or older, **77%** of women over 80, **16%** of men 50 or older, and **46%** of men over 80.[32]

In a randomized placebo-controlled human trial, women aged 45 to 60 years, who were at high risk for osteoporosis, were given **125 mg** per day of **lactoferrin** (enriched with an enzyme from milk called ribonuclease) for **180** days. In those who received the lactoferrin, there was a significant reduction in bone resorption and an increase in bone formation.[33]

One of the side effects of bisphosphonates (drugs to prevent bone loss) is osteonecrosis (in which bone dies due to low blood flow).

In a study of people with bisphosphonate-induced **osteonecrosis**, a lactoferrin-saturated dressing was applied directly to wounds after surgical removal of dead bone. **Bone healing** and **wound closure** were complete in just ***one to two weeks***, compared with ***two to three months*** under usual treatment.[34]

Other studies have shown that lactoferrin inhibits the process of bone *breakdown*.[3,35] Lactoferrin may also be able to offset bone degeneration and promote regenerative processes, preserving **bone mass** and improving bone architecture.[36]

Another human study shows lactoferrin supplementation to be beneficial in people with periodontal disease [37]

WHAT YOU NEED TO KNOW

The Regenerative Power of Lactoferrin

- **Lactoferrin** is a milk protein often consumed as a dietary supplement to support immune health.
- Research shows that lactoferrin is active against a wide assortment of pathogens.
- It works by helping to block viral invasion of cells and by amplifying the immune system's power to eliminate viral infection from the body.
- Early research has shown that lactoferrin can promote cellular and tissue **regeneration** and repair, processes that help the body reverse damage.
- Preclinical research shows that lactoferrin has **anti-cancer** effects.
- Research suggests that lactoferrin may spur the formation of new blood vessels, helping restore blood flow to damaged tissue.

Repairing Cartilage and Tendons

Like bone, **cartilage** tends to wear down with age, leading to pain and stiffness at the joints. **Osteoarthritis**, the most common type of arthritis,[38] and **disc degenerative disease** both involve the progressive deterioration and degradation of vertebral discs and cartilage.[39]

A **lactoferrin-derived peptide** has shown promise in addressing these degenerative processes. In preclinical studies, it was found to inhibit inflammatory mediators and break down processes in joint cartilage[40-42] and discs.[42,43]

Tendons are fibrous tissues that attach muscle to bone. In an animal model, a **lactoferrin-derived peptide** was effective in enhancing tendon repair after injuries that result in loss of functional mobility.[44]

A human trial in patients undergoing tendon repair surgery found that injection of the same peptide into the surgical site led to a significant improvement in **function** and **mobility**.[45]

Wound Healing

Lactoferrin has also shown great potential as a wound-healing agent.

In a clinical trial in diabetic patients, a population prone to chronic skin ulcers, application of a gel that incorporated a synthetic form of lactoferrin resulted in **reduced neuropathic ulcer size**.[46]

In cell and animal models of **burn wounds,** a plant-derived lactoferrin that is identical to human lactoferrin stimulated skin cell function and wound healing.[47]

In preclinical studies, direct application of lactoferrin also accelerates the wound-healing process in the **cornea** of the eye,[48,49] and the mucous lining of airways.[50]

Emerging Applications

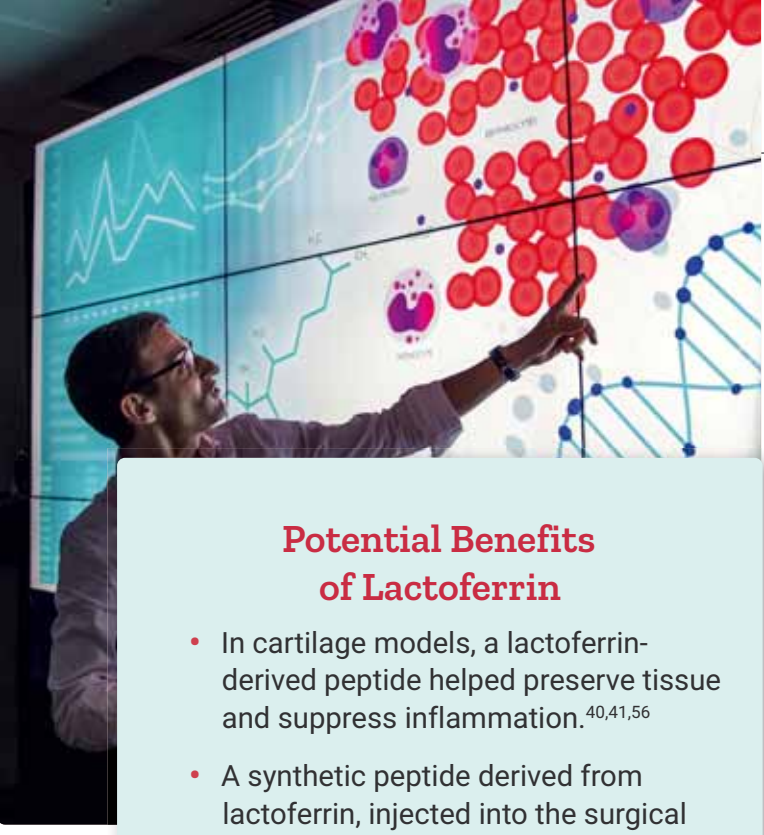
A review published in **2021** noted lactoferrin's ability to modulate growth, proliferation, and differentiation of **stem cells** into **osteoblasts**.

The review also indicated the potential of lactoferrin in supporting **angiogenesis** (formation of new blood vessels).[3] Blood vessel development is a vital step in regenerative medicine as it enables the restoration of blood flow to damaged tissues.[51]

"Talactoferrin" is a recombinant protein, a synthetic drug form of human lactoferrin. Preclinical studies of **skin wounds** show that talactoferrin can increase the **healing rate** and decrease the healing time of the wound.[52]

Lactoferrin has also shown **anti-cancer** effects, contributing to cell-cycle arrest and cell death in cancerous cells.[53,54] In an animal study, lactoferrin in conjunction with other factors substantially suppressed **prostate tumor** growth in mice.[55]

More clinical research remains to be done, but lactoferrin holds great promise in helping the body repair itself and in promoting overall health.



Potential Benefits of Lactoferrin

- In cartilage models, a lactoferrin-derived peptide helped preserve tissue and suppress inflammation.[40,41,56]
- A synthetic peptide derived from lactoferrin, injected into the surgical site in human tendon repair surgery, resulted in improved sensory and mobility recovery.[45]
- In a rodent, as well as a bone cell model, it promoted healthy bone metabolism and structure.[29,57]
- The same lactoferrin-derived peptide promoted preservation of intervertebral disc cells.[43]
- In a clinical trial, a topically applied gel made with a synthetic lactoferrin drug promoted significantly greater healing of diabetic neuropathic ulcers.[46]
- In laboratory and animal models, direct application of lactoferrin aided in healing the corneal tissue that forms the surface of the eye.[48,49]
- In a preclinical study, a plant-derived lactoferrin that is identical to human lactoferrin stimulated skin cell function and wound healing.[47]
- Evidence from preclinical studies indicates it may possess various anti-cancer effects.[1,12,54]

Supplementing with Lactoferrin

Lactoferrin has a wide range of benefits. A typical dose of lactoferrin is **300 mg** once or twice daily.

Taken orally, lactoferrin is readily absorbed and can play an important role in bolstering defenses against viral illnesses.

Summary

Many people consume **lactoferrin** for immune support. A significant amount of preclinical research has shown that various forms of this protein, or its derivatives, may also aid the body's **regenerative processes**, helping to repair damage to bone, cartilage, and tendons, speed the healing of wounds, and more.

These and other effects hold great promise for our approach to osteoporosis, arthritis, and other degenerative disorders. •

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

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Protect Peripheral Nerves with Lipoic Acid

BY JACK ROSS

Over 20 million Americans are estimated to have some form of **peripheral neuropathy,** a nerve disease that can lead to pain, numbness, and weakness, most often in the hands, feet, and legs.

Peripheral neuropathy has different causes, with **diabetes** and blood vessel problems notable among them.[1]

As it worsens, **diabetic peripheral neuropathy** may lead to the development of foot ulcers and the need for foot or leg amputations.[2] People with peripheral neuropathy also have higher rates of **overall mortality**.[3]

But there's good news. A nutrient called **lipoic acid** has been successfully used for the treatment of diabetic neuropathy in Germany for decades.[4,5]

Clinical trials in people suffering from **diabetic neuropathy** show that **lipoic acid** can reduce **pain** and other symptoms,[6-9] and may help prevent progression of nerve damage.[9]

What Is Peripheral Neuropathy?

Peripheral neuropathy is a general term for disease of the nerves outside the brain and spinal cord.[10]

Peripheral neuropathies, diabetic[2,11] or non-diabetic, often begin in the feet, and often progress up the leg over time.[1,12]

Among other conditions that affect nerves, the most common culprit is **high blood sugar**, which is why people with type II diabetes have the *highest* rates of neuropathy.[2,13]

Estimates of the prevalence of peripheral neuropathy in diabetics range as high as **70%**.[1]

In adults *without* diabetes, peripheral neuropathy occurs much less frequently than in those with diabetes.[13] Alcohol abuse,[13] some chemotherapy drugs,[13] hereditary diseases, vitamin B12 deficiency, and other health conditions can contribute to or cause its development.[1,14]

Peripheral neuropathy often results in loss of function, numbness, tingling, and extreme pain.[12]

Eventually, it may result in loss of balance.[10] Diabetic neuropathy may result in difficulty walking and increased risk of falls.[5]

Diabetic neuropathy is the major cause of diabetic **foot ulcers** and **infections**, which can lead to leg **amputations**.[2,13] A large, clinical study showed lower-limb amputation rates in those with **diabetes** were **15 times** higher than in non-diabetics.[15]

Neuropathy in diabetics can also affect nerves that control heart and blood vessels, causing abnormalities of heart rate and blood vessel function. **Cardiac autonomic neuropathy** can be associated with a high risk of arrhythmias, and sudden cardiac death.[16,17]

One large study found that peripheral neuropathy is an independent predictor of *higher* **overall mortality**.[3]

Lipoic Acid Defends Nerves

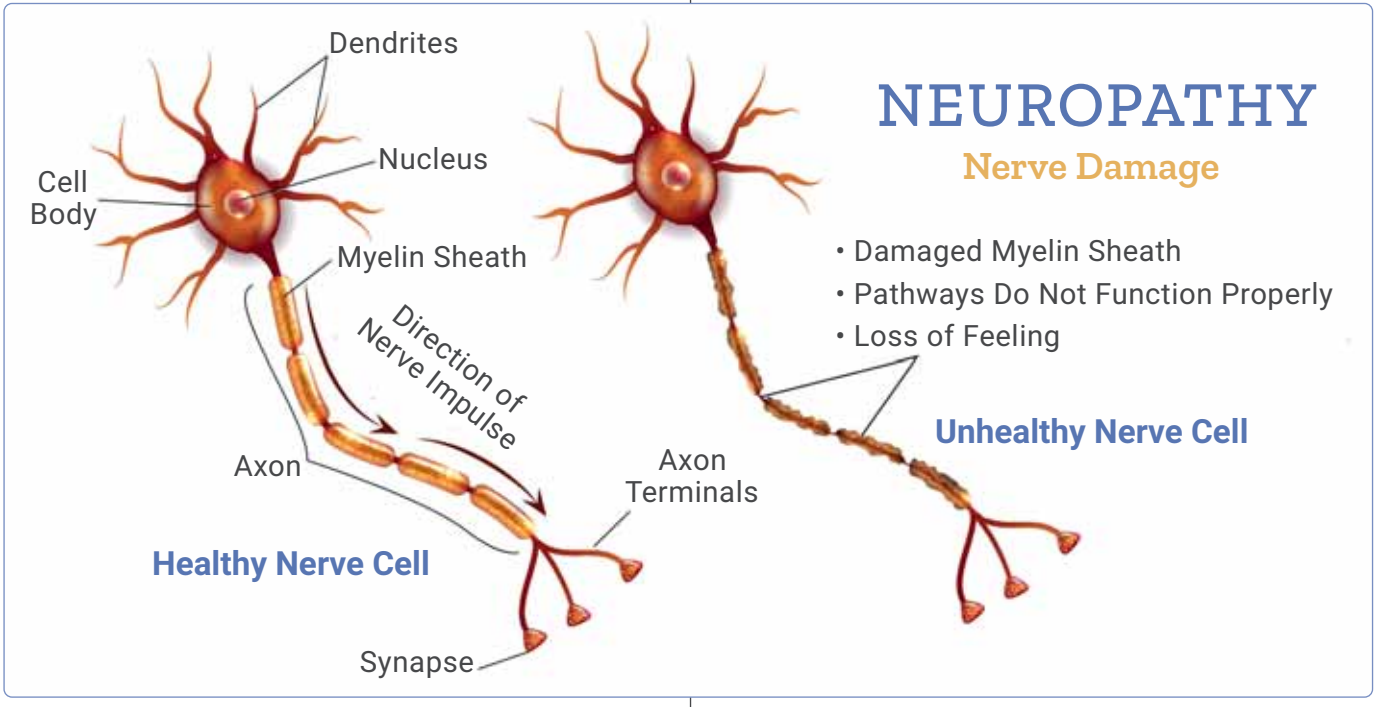
Lipoic acid is a compound produced in the body and also found in small amounts in some vegetables and animal products, particularly organ meats.[18]

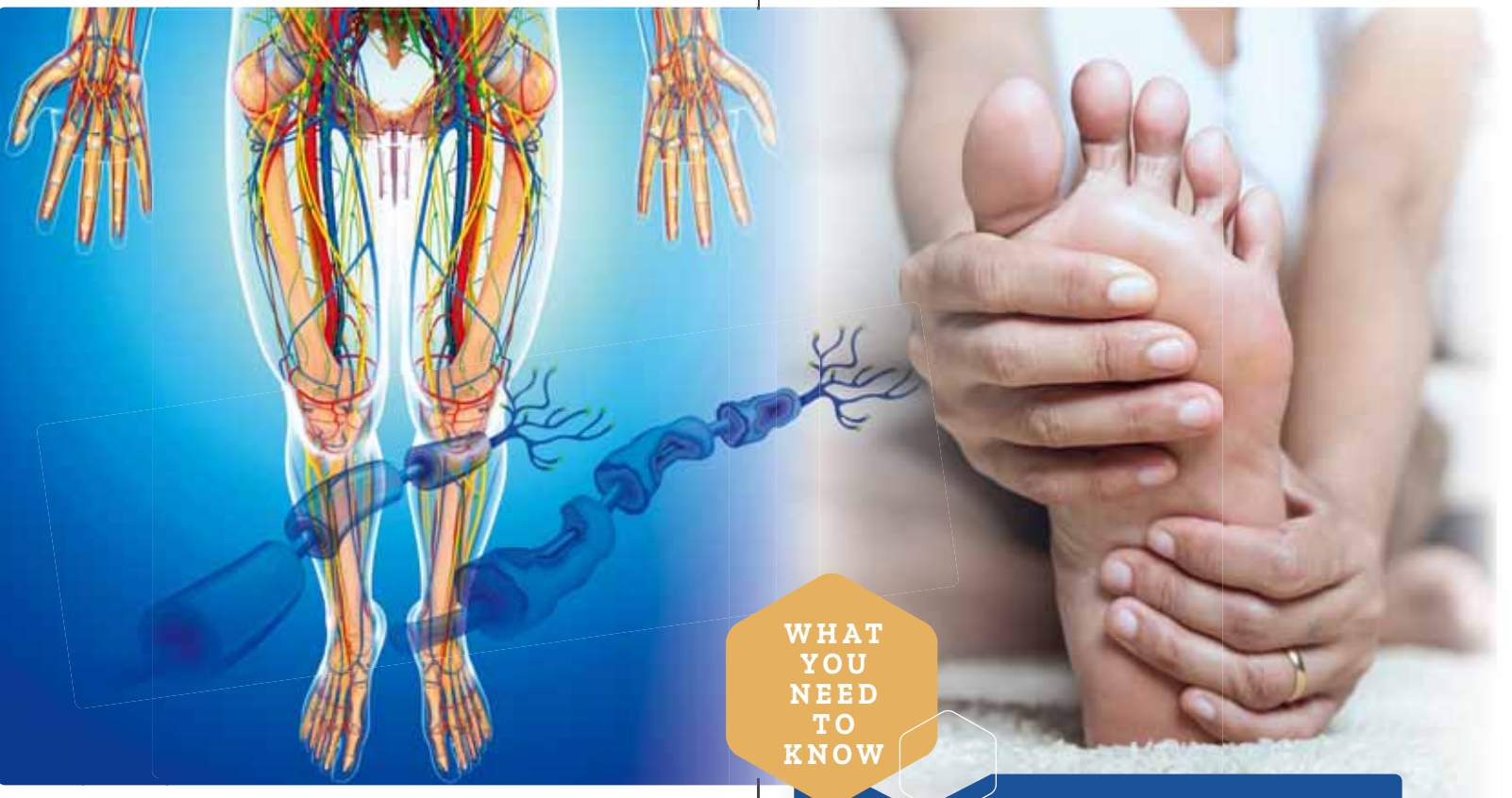
It plays an essential role in turning glucose and other nutrients into energy.[19] It enhances glucose uptake,[20] and plays a role in modulating **insulin sensitivity**.[21]

It is also a potent **antioxidant** that helps fight oxidative stress. It even helps regenerate several *other* antioxidants.[12,22]

One review reported that lipoic acid can help decrease pain signals by blocking channels on pain-sensing nerve cells.[5]

Lipoic acid has been licensed and used in the management of **diabetic peripheral neuropathy** for decades in Germany.[5]





WHAT YOU NEED TO KNOW

Easing Pain and Improving Function

Scientists have conducted many clinical trials of **lipoic acid** for diabetic peripheral neuropathy.[6-9,18]

Nerve conduction studies, which measure how efficiently electrical signals move through a nerve, have shown that lipoic acid can **improve nerve function**. Nerve conduction velocities that were previously slowed were boosted with lipoic acid use.[8]

Additional benefits have been identified in other trials.

For example, a clinical study in diabetics found that lipoic acid not only improved peripheral neuropathy scores, it also significantly decreased feelings of **depression**.[9] Diabetics are two to three times more likely than non-diabetics to have depression.[23]

Another clinical study found that **50%** of subjects felt their **quality of life** and **overall health** condition was "very much better" or "much better" following 40 days of lipoic acid supplementation.[6]

Studies have shown that lipoic acid led to improvements in potentially deadly **cardiac autonomic neuropathy** as well.[8,24]

Lipoic acid use has also been associated with improvements in body mass index,[5,8,25] cholesterol levels,[6] and markers of blood glucose control.[8,24]

Get Relief from Peripheral Nerve Pain

- **Peripheral neuropathy** is a common condition marked by loss of sensation, tingling, numbness, and pain in the peripheral nerves.
- The most common cause is high blood sugar, seen in **type II diabetes**, but people without diabetes can also suffer from peripheral neuropathy.
- Peripheral neuropathy is associated with an increased risk of overall mortality.
- The nutrient **lipoic acid** can help relieve peripheral neuropathy symptoms, including pain and numbness, and may also improve nerve function.

Summary

Peripheral neuropathy is a common condition that causes numbness, tingling, pain, and loss of function in the peripheral nerves. In diabetics, it is associated with an increased risk of amputations, falls, and death.

Lipoic acid has been used to treat diabetic peripheral neuropathy in Germany for decades.

Clinical studies show that it can lead to significant reductions in pain, numbness, and other symptoms. ●

Two Forms of Lipoic Acid

Lipoic acid occurs in two different forms: R-lipoic acid and S-lipoic acid.

Most production methods result in a mixture of these forms.[18,26]

The "**S**" form is not very biologically active. The "**R**" form is the biologically active component (and the kind produced by the body) that is responsible for lipoic acid's phenomenal antioxidant effect.[18,26]

A lipoic acid formula that provides **100%** R-lipoic acid can be readily used by the body, maximizing its health benefits.

Animal and human studies demonstrate that R-lipoic acid provides clinical benefits with ***much greater biological activity***.[18,26,27]

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

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Reduce ANXIETY to Improve Health

BY STEVE PAGE, OT/L, PHD, MS, MOT

Anxiety affects **6.8 million** adults or **3.1%** of the U.S. population.[1]

It's estimated that **hundreds of millions** of people worldwide experience **anxiety**.[2]

The situation has become so bad that the U.S. Preventive Services Task Force recently recommended that all adults under age 64 be screened for **anxiety**.[3]

Anxiety is a reaction to stress.[4]

Stress and **anxiety** don't just make us *feel* miserable, persistent stress can have a drastic impact on an individual's health.

One way the body responds to stressful situations is by producing the hormone **cortisol**, which allows the body to stay on high alert.[5]

Poor regulation of cortisol, however, is associated with disorders that decrease **quality of life** and increase mortality risks.

Fortunately, researchers have identified safe ways to *modulate* cortisol levels and anxiety.

When Excess Cortisol Makes You Sick

Stress is often caused by events—environmental, emotional, or physical.[6]

One of the normal ways for the body to respond to stress and **anxiety** is by releasing the hormone **cortisol** from the adrenal glands.[5]

Cortisol is one of the main hormones responsible for keeping the stress response activated. This is why cortisol is thought of as a *chronic stress* hormone.[7]

In people with **anxiety** disorders, cortisol levels may be higher than in the rest of the population.

Chronic stress that results in improper cortisol balance can lead to a wide range of serious health problems.[8,9]

In a study of hip-fracture patients, cortisol elevation was associated with low function of natural killer cells in the **immune system**.[10] Elevated cortisol has also been associated with susceptibility to infections.[11] Dysregulation of cortisol has also been associated with poor inflammatory response[12,13] and with *increased* rates of major cardiovascular,[14] and metabolic diseases.[12] They even suffer from higher rates of overall **mortality**.[11,14]

Plant-Based Solutions

People with anxiety disorders are routinely prescribed antidepressants or other medications. In 2020 alone, prescriptions for **anti-anxiety medications** jumped by **34%**.[15] While medications may help, not all patients tolerate them, they don't work for everyone, and some can even be addictive.[16]

Researchers have identified specific **plant extracts** that have been **shown clinically** to safely reduce elevated cortisol *and* feelings of anxiety and stress.

Lychee-Green Tea Blend

Lychee is a fruit commonly consumed throughout Eastern Asia,[17,18] as a fruit and for medicinal purposes.[19]

Lychee fruit is rich in **polyphenols**,[20] compounds recognized for their role in biological activities, most notably for the ability to reduce inflammation, fight oxidative stress and prevent cell damage.[21-23]

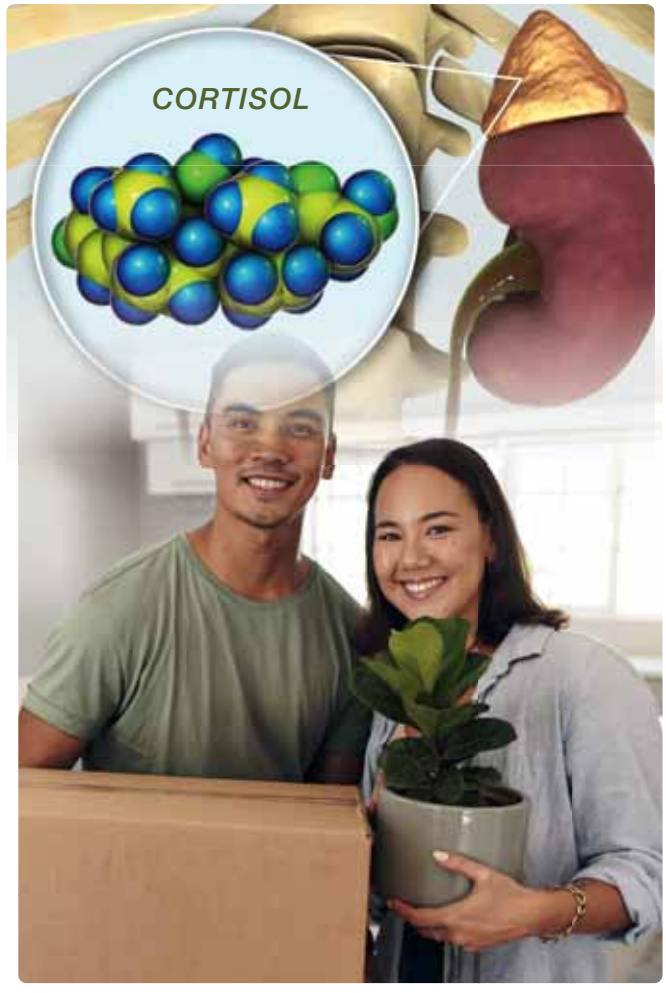
Most **lychee** products sold today contain **long-chain polyphenols**, which are not easily absorbed in the intestinal tract. When combined with green tea, the **lychee-green tea blend** was shown to provide a low molecular size extract that is far more **bioavailable** than ordinary lychee extract alone.

The polyphenol content measured in the blood after using this blend was ***three times higher*** than the amount after using **lychee** extract alone.[24]

In one controlled study, this **lychee-green tea** blend significantly reduced **cortisol** levels compared to baseline. Healthy young men were assigned to take either **100 mg** of the **lychee-green tea** blend or a **placebo** daily. After four weeks, those who received the extract blend had significant reductions in blood **cortisol** levels, as well as in the inflammatory cytokines **IL-1beta** and **IL-6**.[25]

In a human trial, **100 mg** of **lychee-green tea** blend was given twice daily to 10 healthy individuals, for 10 days, followed by exercise under low oxygen conditions, to induce stress. They found that the rate at which cortisol and the inflammatory markers increased was significantly slower among subjects given the extracts compared to placebo.[26]

By reducing cortisol and inflammation, this blend may help prevent much of the damage stress and anxiety can do.



WHAT YOU NEED TO KNOW

Plant Extracts Combat Chronic Stress

- One way our body responds to anxiety and stress is by producing the hormone **cortisol**.
- Chronically elevated cortisol levels weaken the immune system and increase risk of chronic disease and death.
- **Lychee-green tea** blend has been clinically shown to significantly reduce cortisol and markers of inflammation.
- A mix of extracts of two tree barks, ***Magnolia officinalis*** and ***Phellodendron amurense***, safely and effectively reduced cortisol levels in clinical trials. It also reduced feelings of stress, anger, depression, and fatigue.
- Combining a **lychee-green tea** blend with ***Magnolia-Phellodendron*** bark extracts may optimize their power to ease anxiety, reduce cortisol levels, and prevent the **long-term damage** caused by stress.

Magnolia and Phellodendron Bark

Two **tree bark extracts** have also been shown to reduce cortisol levels.

For centuries, the bark of the ***Magnolia officinalis*** tree (it grows in high altitudes in Eastern Asia) has been used to combat a variety of conditions,[27] including anxiety, depression, and stress.[28,29]

An extract from the bark of another tree, ***Phellodendron amurense***, has been used in traditional Chinese medicine and has been shown to reduce biological markers of stress in animals.[30]

To test whether a **combination** of **Magnolia** and **Phellodendron** extracts would reduce cortisol levels, researchers gave either **250 mg** of a **bark extract** mixture or a **placebo** two times daily to people with moderate to high stress levels. After four weeks, *only* those taking the bark extracts had significantly lower **cortisol** levels *and* significant reductions in **stress**, **anger**, **depression**, and **fatigue**.[31]

In two other studies, researchers gave participants either a placebo or **250 mg** of **magnolia** and **phellodendron** bark extracts three times daily.

- Overweight premenopausal women aged 20-50 who reported consistently high anxiety levels, reported significantly decreased anxiety symptoms after six weeks.[30]
- In a similar group of women with above-average anxiety associated with eating, prevention of weight gain was observed after six weeks in the treatment group as compared to placebo recipients, who gained weight during the trial.[32]

The anti-anxiety benefits of **Magnolia bark** extract extend beyond cortisol. In cell and animal studies, compounds found in *Magnolia officinalis* have been shown to interact with receptors in the brain in ways that would be expected to benefit **mood** and psychological well-being.[33]

For example, **serotonin**—sometimes nicknamed the "happy hormone"—is key in regulating stress, depression, and mood. *Magnolia* may help to *increase* **serotonin** levels as seen in animal models and lab studies.[34,35]

Combining these **bark extracts** with the **lychee-green tea** blend may maximize their cortisol-lowering effects, helping to reduce the harm done by anxiety and stress.

Summary

Chronic anxiety undermines physical, mental, and emotional health. The excessive **cortisol** secretion that accompanies unremitting stress can weaken immunity and increase risk of infections, chronic disease, and death.

Lychee-green tea blend is highly absorbable and has been shown in two clinical studies to lower the stress hormone cortisol.

Extracts of ***Magnolia officinalis*** and ***Phellodendron amurense*** bark have shown the ability to reduce cortisol levels and anxiety, helping to protect against the damage chronic stress can do.

A blend of these compounds offers one approach to reduce excess cortisol levels, which may counteract some of the harmful effects inflicted by chronic stress. •

What is Cortisol?

- Cortisol is a hormone produced by the adrenal glands located at the top of the kidneys.[5]
- It helps regulate numerous bodily functions, including the stress response, metabolism, immune function, and inflammatory response.[5]
- It peaks in the early morning, then gradually declines to its lowest level around midnight.[36]
- Chronic stress disrupts this daily rhythm.[36]
- Many studies show the average cortisol levels gradually increase in older adults as they age.[37]
- *Chronically elevated cortisol* levels are associated with higher blood glucose, high blood pressure, weakened immunity, muscle loss, and low bone mass[11,14] that can impact quality of life.

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

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How to Measure Your Stress and Cortisol Levels

Sometimes stress is so constant that we learn to live with it.

A cortisol blood test allows you to find out whether your levels are elevated and by how much. If they're high, that's often a sign of ongoing stress.

Lifestyle changes like meditation, exercise, and eating a healthy diet can bring this level down. Regular use of safe plant compounds may lower elevated cortisol and can prevent the immune-weakening effects of stress.

Periodic testing can give you a picture of your stress, and your progress, over time.

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Chili Peppers

BY LAURIE MATHENA

People who enjoy the burning sensation that comes from biting into a hot chili pepper also enjoy a surprising array of health benefits—*including a longer life*.

An association between chili pepper consumption and lower risk of all-cause, cardiovascular, and cancer-related deaths was found, and presented at the American Heart Association's Scientific Sessions 2020.

The systematic review and meta-analysis published in the *Annals of Medicine and Surgery* included more than 570,000 people and found that compared to people who rarely or never ate chili peppers, those who ate the most had a:[1]

- **26%** reduced risk of dying from **cardiovascular disease**,
- **23%** reduced risk of dying from **cancer**, and
- **25%** reduced risk of dying from **any cause**.

Previous studies have demonstrated various health benefits of chili peppers that could help elucidate some of the reasons behind the reduced risk of death—and specifically cardiac death.

For example, an animal study found that the same compound that gives chili peppers their heat—called *capsaicin*—reduced total cholesterol, triglycerides, and non-HDL cholesterol levels in animals fed a high-cholesterol diet.[2] Capsaicin was also associated with improved aortic function.

In a human study, consuming about one ounce of a chopped chili blend every day for four weeks significantly reduced the rate of free radical damage (oxidation) to cholesterol and triglycerides.[3] This could confer significant cardiovascular protection, since oxidized cholesterol is the kind of cholesterol that builds up on artery walls and contributes to atherosclerosis.

To incorporate more chili peppers in your diet, add them to sauteed vegetables, soups, or vegetable dips. Or, if you enjoy the burn, you can eat them whole.

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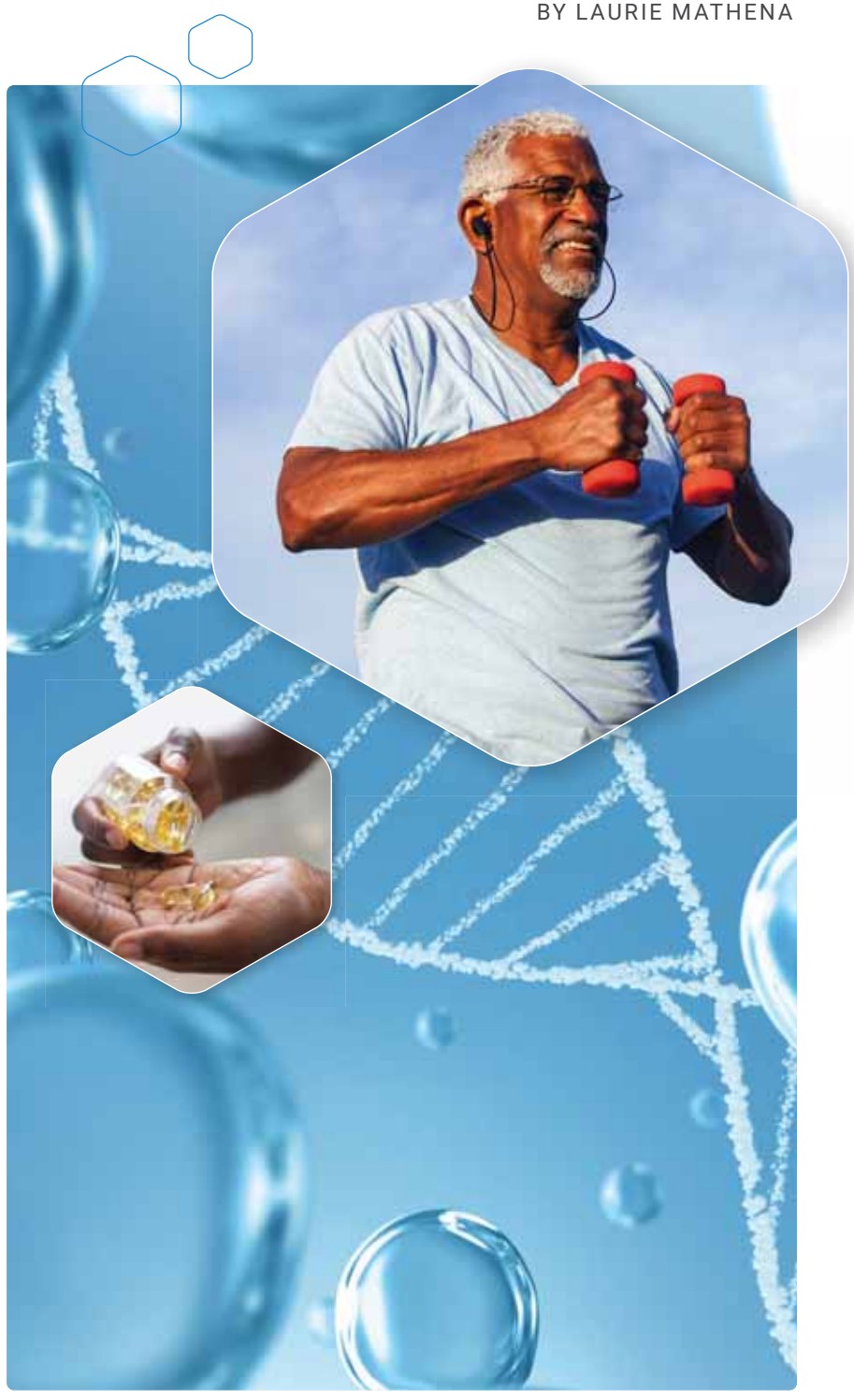
Nutrients for Preventing Frailty

BY LAURIE MATHENA



Starting around age 40, we lose roughly **8%** of muscle mass **per decade**. After age 70, muscle mass decreases by about **15%** per decade.[1]

This drastic decline in muscle mass is called **sarcopenia**. It increases the risk for falls and fractures, hospitalization,[2] and **disability**.[3,4]

Eventually, ***frailty*** can set in, which speeds up passage on the road to lost independence and early death.[5]

Two nutrients have been shown to head off sarcopenia and frailty by ***rebuilding lost muscle mass*** in aging adults.

These can be added to a protein-sufficient diet or protein supplements that contain body-mass-building amino acids.

Maintained Muscle Mass

Beta-hydroxy beta-methylbutyrate, or **HMB**, is a compound created during metabolism of the amino acid **leucine**.[6]

HMB helps decrease muscle breakdown (called **catabolism**) and increase muscle buildup (**anabolism**).[7-11]

HMB levels decline with age, a drop that correlates with diminished muscle mass and strength.[12]

A 2015 meta-analysis found that oral intake of HMB ***preserved muscle mass*** in older adults and may help prevent muscle atrophy.[13]

One study showed that HMB intake could even preserve lean body mass in the face of sustained **bed rest**, a powerful stimulus for sarcopenia.[14]

Improved Exercise Results

HMB has also been shown to help boost **lean body mass** when used with **resistance training**.[15,16]

In one study, a group of 70-year-olds participated in a resistance training exercise program five days a week. During that time, they took **one gram** of **HMB** or a **placebo** three times a day.[15]

After eight weeks, those taking HMB had an **increase** in lean body mass of **1.76 pounds**, while placebo recipients lost **0.44 pounds**—despite exercising five days a week.

This study showed that HMB can augment strength training in older adults.

Vitamin D3 can complement that action by further enhancing muscle strength.

Vitamin D3 Boosts Strength

Sarcopenia, associated with problems with balance and gait, adds to the risk of falling and fractures in older individuals.[17]

Vitamin D3 intake improves **muscle strength** and **performance**.[18,19]

Studies show that it's possible to increase **muscle strength** simply by boosting vitamin D levels.

A controlled trial of 160 postmenopausal women, aged 50-65, found that supplemental vitamin D3 provided significant protection against sarcopenia, as evidenced by an increase in muscle strength and control of progressive loss of muscle mass in the treatment group.[20] Falls can happen because of **inadequate muscle mass** and **poor coordination** or balance.[21]

Vitamin D3 shows promise for combatting *both* factors.

Researchers assigned women to receive either **1,000 IU/day** of vitamin D3 or a placebo. After nine months, those who took vitamin D had a **25.3%** increase in leg muscle strength, while women in the **placebo** group lost **6.8%** of their lean mass.[20]

A meta-analysis of clinical studies suggests that adequate intake of vitamin D not only preserves but also ***improves*** muscle strength.[18] That's an important finding, since loss of overall muscle strength can increase the risk of **mortality.**[22]

The greatest benefits were seen in those who had the lowest vitamin D levels at the beginning of the study (less than **12 ng/mL**) and in older subjects.

Other studies have found that increased vitamin D intake in deficient elderly adults led to improved **balance** and a *decreased* risk of **falls**.[23]

Summary

HMB and vitamin D have been shown to combat **sarcopenia** and help prevent **frailty** by maintaining and boosting muscle mass and performance.

HMB contributes to improvements in strength and lean muscle mass, while **vitamin D3** helps boost muscle strength and improve balance.

Combat Four Underlying Factors of Sarcopenia

There are four primary factors that contribute to sarcopenia. HMB or vitamin D3 mitigates each of these underlying factors:

Factor #1: Skeletal muscle protein imbalance causes muscle to break down faster than it is rebuilt.

HMB exerts pro-anabolic (muscle build-up) and anti-catabolic (anti-breakdown) properties.[9]

Factor #2: Declining sex hormone levels due to aging reduce muscle mass.

Vitamin D supports sex hormone synthesis[24] and muscle contractile strength.[25]

Factor #3: Falling numbers and activity of mitochondria greatly contribute to sarcopenia.[26]

Vitamin D3 signaling improves mitochondrial function and dynamics, which can increase muscle strength.[27]

Factor #4: As muscles break down, levels of pro-inflammatory markers rise.[28]

Vitamin D3 acts as an immune modulating hormone that can suppress inflammation associated with sarcopenia.[29]

A combination of HMB and vitamin D3, along with adequate protein intake, may help maintain optimal muscle mass, strength, and function well 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.

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01535 Vitamin B6
00361 Vitamin B12 Methylcobalamin
01536 Vitamin B12 Methylcobalamin • 1 mg, 60 veg lozenges
01537 Vitamin B12 Methylcobalamin • 5 mg, 60 veg lozenges
02228 Vitamin C and Bio-Quercetin Phytosome • 60 veg tablets
02227 Vitamin C and Bio-Quercetin Phytosome • 250 veg tablets
01753 Vitamin D3 • 25 mcg (1000 IU), 90 softgels
01751 Vitamin D3 • 25 mcg (1000 IU), 250 softgels
01713 Vitamin D3 • 125 mcg (5000 IU), 60 softgels
01718 Vitamin D3 • 175 mcg (7000 IU), 60 softgels
01758 Vitamin D3 with Sea-Iodine™
02040 Vitamins D and K with Sea-Iodine™

WEIGHT MANAGEMENT & BODY COMPOSITION

02479 7-Keto® DHEA Metabolite • 100 mg, 60 veg capsules
02207 AMPK Metabolic Activator
02504 Body Trim and Appetite Control
02478 DHEA Complete
01738 Garcinia HCA
02506 Mediterranean Weight Management
01432 Optimized Saffron
00818 Super CLA Blend with Sesame Lignans
02511 Thermo Weight Control
02509 Waistline Control™

WOMEN'S HEALTH

01942 Breast Health Formula
01626 Enhanced Sex for Women 50+
01894 Estrogen for Women
02204 Menopause 731™
02319 Prenatal Advantage
01649 Super-Absorbable Soy Isoflavones
02507 Youthful Woman 40+ with B-Complex

THE VERSATILE BENEFITS OF PYCNOGENOL®

Pycnogenol® is a plant extract derived from French maritime pine bark.
Its benefits are available in these three formulations:

*ARTERIAL PROTECT

Item #02004 • 30 vegetarian capsules
1 bottle **$33**
4 bottles $29 each
1 DAILY

†**VENOFLOW™

Item #02102 • 30 vegetarian capsules
1 bottle **$39**
4 bottles $36 each
1 DAILY

†PYCNOGENOL®

French Maritime Pine Bark Extract
Item #01637 • 60 vegetarian capsules
1 bottle **$48**
4 bottles $45 each

ARTERIAL PROTECT

Provides Pycnogenol® and standardized gotu kola leaf extract to help stabilize endothelial plaque and promote healthy blood flow throughout the body.

VENOFLOW™

For those who sit for long periods while traveling or in the office, this proprietary blend of Pycnogenol® and nattokinase promotes healthy venous blood flow.

PYCNOGENOL®

Numerous published studies describe how concentrated extracts in Pycnogenol® help protect against multiple factors related to normal aging.

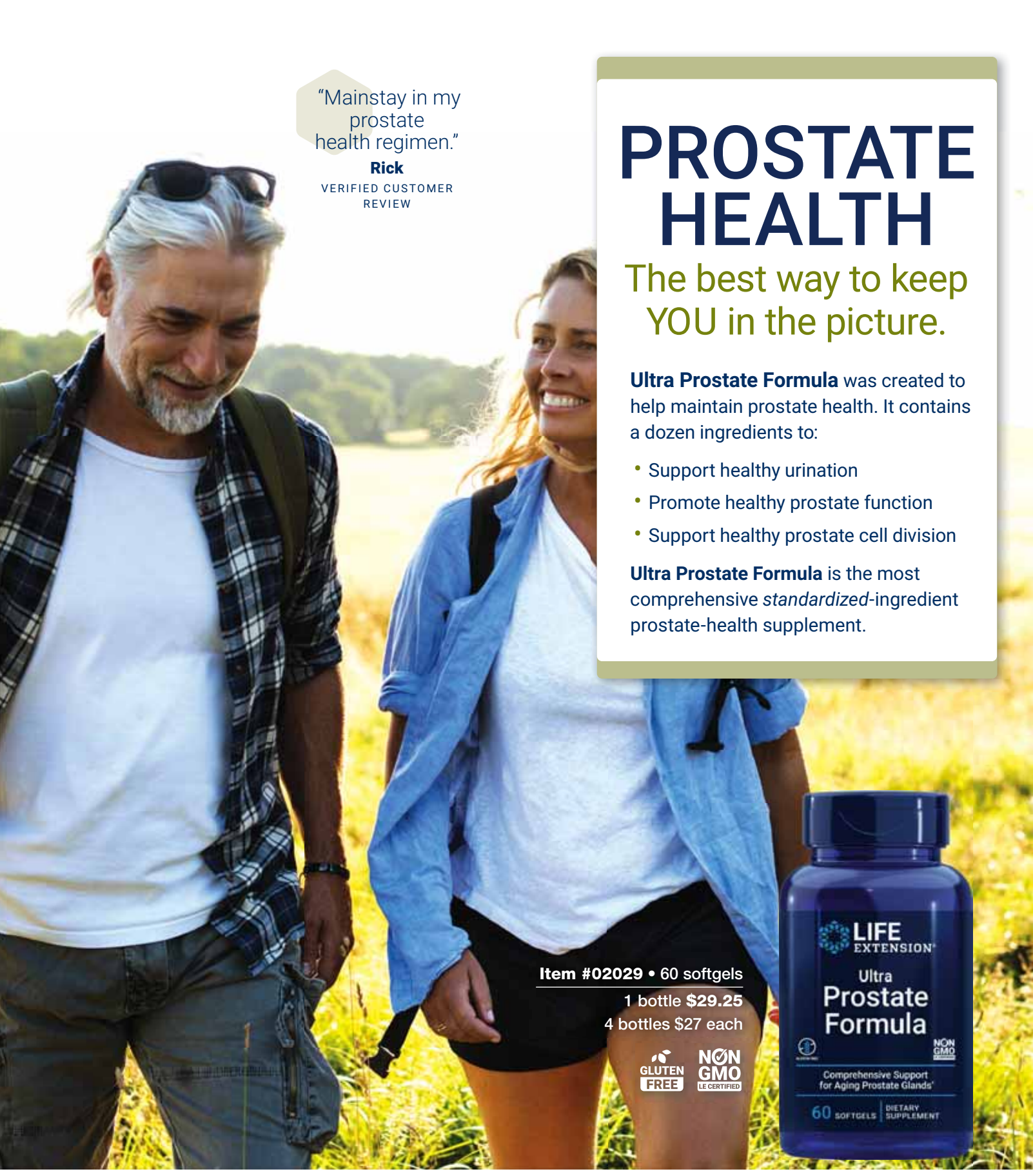
For full product descriptions and to order **PYCNOGENOL®**, **ARTERIAL PROTECT**, or **VENOFLOW™**, call **1-800-544-4440** or visit **www.LifeExtension.com**

GLUTEN FREE
NON GMO LE CERTIFIED

*Pycnogenol® and Centellicum® are registered trademarks of Horphag Research.
Use of this product may be protected by one or more U.S. patents and other international patents.

†Pycnogenol® is a registered trademark of Horphag Research, Ltd.

****CAUTION:** Consult your healthcare provider before use of VenoFlow™ if taking medication (especially those affecting blood coagulation or blood pressure), being treated for a medical condition (especially bleeding disorders), under the age of 18, pregnant, or lactating.



"Mainstay in my prostate health regimen."

Rick

VERIFIED CUSTOMER REVIEW

PROSTATE HEALTH

The best way to keep YOU in the picture.

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

- Support healthy urination
- Promote healthy prostate function
- Support healthy prostate cell division

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

Item #02029 • 60 softgels

1 bottle **$29.25**

4 bottles $27 each

GLUTEN FREE

NON GMO LE CERTIFIED

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

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The Science of a Healthier Life®

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