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FEATURE ARTICLES

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ON THE COVER

Lithium and Healthy Aging

A **2024** published review concluded that trace levels of **lithium** in drinking water may reduce **dementia** risks. This corroborates previous findings showing how low-dose **lithium** can help promote whole-body **healthy aging**.

DEPARTMENTS

LIFE EXTENSION®

The Science of a Healthier Life®

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2. Akay Internal Study. Liposomal hydrogel vitamin C pharmacokinetics. Data on file. 2021.

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Sandra C. Kaufmann, MD, is a fellowship-trained and board-certified pediatric anesthesiologist as well as the Chief of Anesthesia at the Joe DiMaggio Children's Hospital in Hollywood, Florida. She is the founder of The Kaufmann Anti-Aging Institute and the author of the book The Kaufmann Protocol: Why we Age and How to Stop it (2018). Her expertise is in the practical application of anti-aging research.

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Aubrey de Grey, PhD, is a biomedical gerontologist and Editor-in-Chief of *Rejuvenation Research*, the world's highest-impact, peer-reviewed journal focused on intervention in aging. He received his BA and PhD from the University of Cambridge in 1985 and 2000 respectively. Dr. de Grey is a Fellow of both the Gerontological Society of America and the American Aging Association and sits on the editorial and scientific advisory boards of numerous journals and organizations.

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Dipnarine Maharaj MD, MB, ChB, FRCP (Glasgow), FRCP (Edinburgh), FRCPath., FACP, is the Medical Director of the Maharaj Institute of Immune Regenerative Medicine, and is regarded as one of the world's foremost experts on adult stem cells. He received his medical degree in 1978 from the University of Glasgow Medical School, Scotland. He completed his internship and residency in Internal Medicine and Hematology at the University's Royal Infirmary.

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Ralph W. Moss, PhD, is the author of books such as *Antioxidants Against Cancer*, *Cancer Therapy*, *Questioning Chemotherapy*, and *The Cancer Industry*, as well as the award-winning PBS documentary *The Cancer War*. Dr. Moss has independently evaluated the claims of various cancer treatments and currently directs The Moss Reports, an updated library of detailed reports on more than 200 varieties of cancer diagnoses.

Michael D. Ozner, MD, FACC, FAHA, is a board-certified cardiologist who specializes in cardiovascular disease prevention. He serves as medical director for the Cardiovascular Prevention Institute of South Florida and is a noted national speaker on heart disease prevention. Dr. Ozner is also author of *Heart Attacks Are Not Worth Dying For, The Great American Heart Hoax*, and *The Complete Mediterranean Diet*. For more information visit www.DrOzner.com.

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Xiaoxi Wei, PhD, is a chemist, expert in supramolecular assembly and development of synthetic transmembrane nanopores with distinguished selectivity via biomimetic nanoscience. She has expertise in ion channel function and characterization. She founded X-Therma Inc., a company developing a radical new highway towards non-toxic, hyper-effective antifreeze agents to fight unwanted ice formation in regenerative medicine and reduce mechanical icing.

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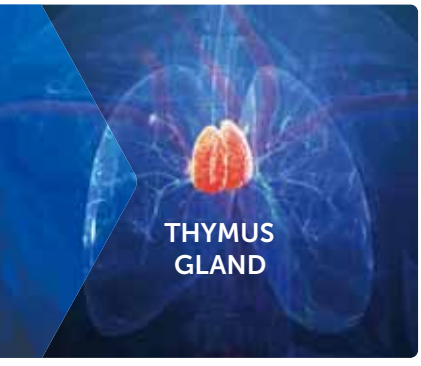
How Many Needless Deaths?

WILLIAM FALOON



With age, our **thymus gland** shrivels to the point that it no longer produces the same amount of the **thymic hormones** it did in youth.

Thymic hormones are important to regulate **immune function**.[1]

This decline in thymic hormones contributes to **immune senescence**, whereby our ability to fight **infections** and **cancers** is severely diminished, while our bodies are ravaged by **chronic inflammation**.[1,2]

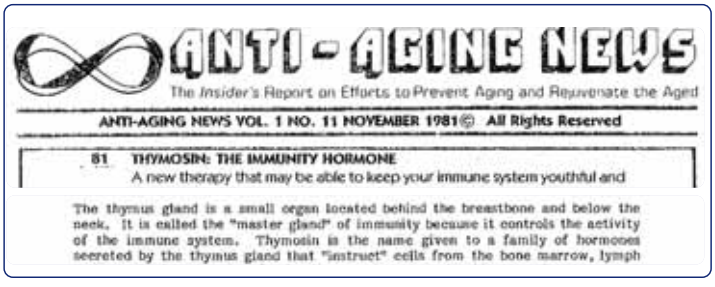
In **1981**, we dedicated an issue of our publication (*Anti-Aging News*) to the disease-fighting properties of **thymosin alpha 1**, an immune peptide secreted by young thymus glands.

We described how **thymosin alpha 1** might soon be approved as an adjuvant **cancer** therapy and how it could transition into a method to reverse the decline in **immune function** that occurs with normal aging.

Here we are **44 years** later, and despite favorable published studies and approvals in other countries,[3] Americans are denied access to **thymosin alpha 1**.

And unlike medications that come in pill form, that Americans obtain from other countries, **thymic hormones** are delicate **peptides** that must be injected and kept cool to maintain their potency.[4]

In recent years, new studies revealed robust therapeutic potential when **thymosin alpha 1** is combined with conventional treatments for certain **cancers**, **sepsis**, **viral infections**, and **autoimmune** disorders.[5]



ANTI-AGING NEWS

The Insider's Report on Efforts to Prevent Aging and Rejuvenate the Aged

ANTI-AGING NEWS VOL. 1 NO. 11 NOVEMBER 1981 © All Rights Reserved

81 THYMOSIN: THE IMMUNITY HORMONE

A new therapy that may be able to keep your immune system youthful and

The thymus gland is a small organ located behind the breastbone and below the neck. It is called the "master gland" of immunity because it controls the activity of the immune system. Thymosin is the name given to a family of hormones secreted by the thymus gland that "instruct" cells from the bone marrow, lymph

By modulating healthy immune functions, **thymosin alpha 1** boosts defenses against pathogens and malignancies while suppressing/dampening autoimmune reactions.[6]

This suggests that thymosin alpha 1 could potentially boost efficacy and reduce the side effects of **CAR T** and **checkpoint inhibitor** drugs that can cause inflammatory reactions in cancer patients.

With increasing evidence of safety + efficacy, **thymosin alpha 1** may eventually become part of standard medical practice. We may then learn how many Americans perished because of delayed access to this natural-to-the-human-body **thymic peptide**.

The media redundantly touts new drugs that "harness the body's immune system" to kill cancer cells.

Much of this media attention began in the **1980**s with drugs such as **interleukin-2** that have potent immune-boosting effects.[7]

While immune drugs shrink certain tumors and can improve tumor markers, many have not completely fulfilled their early promise.

In **2011**, the first checkpoint inhibitor, Yervoy® (Ipilimumab), was introduced that makes cancer cells more vulnerable to chemotherapy, radiation, and immune attack.[8]

Keytruda® soon followed, that benefited those few patients who achieved durable responses, but for most, bought only a few extra agonizing months of life.[9]

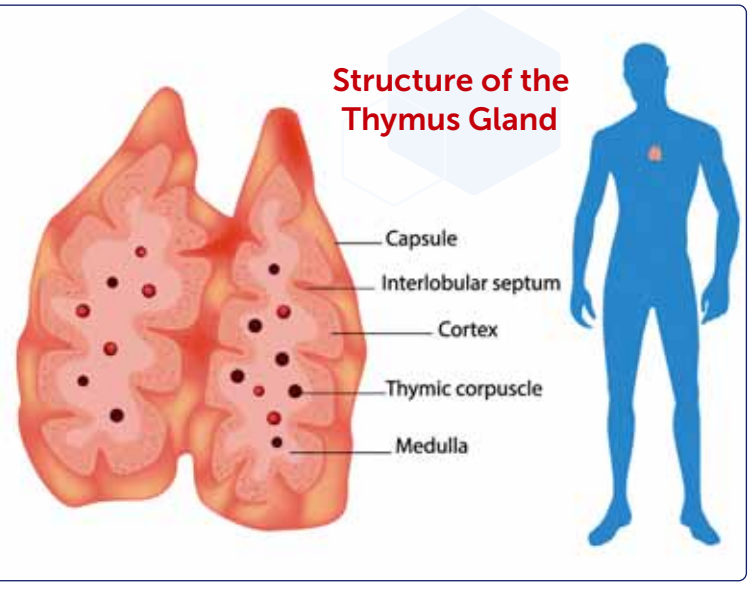
Checkpoint inhibitors are a class of drugs that block proteins used by certain kinds of cancer cells to avoid being attacked by the **immune** system.[10]

Thymosin Alpha 1 May Improve Safety-Efficacy

Starting at puberty the thymus gland begins to atrophy and output of immune regulatory peptides (like the **thymosin alpha 1**) plummets.

By the time cancer incidence spikes in Americans (average age 66 years),[11] there are severe declines of **immune functions**.[12]

While drug classes like **interferons**, certain **interleukins**, and **checkpoint inhibitors** have favorable immune properties, there is evidence they might work better in combination with **thymosin alpha 1.**



An abundance of published data reveals that combining standard therapies with **thymosin alpha 1** can significantly improve treatment efficacy and reduce toxicities.[4,13-16]

One retrospective study showed median overall survival in advanced-stage **melanoma** patients was **58** months when **thymosin alpha 1** was administered before the checkpoint inhibitor drug Yervoy®. When Yervoy® was administered alone to advanced-stage patients, median overall survival was only **seven months**.[17]

This study provided stark data demonstrating the potential benefits of bolstering immune functions with thymosin first, and then following with a **checkpoint inhibitor** to remove tumor cell barriers that preclude immune destruction.

An overview analysis published in **2019** titled "***A Reappraisal of Thymosin Alpha 1 in Cancer Therapy***" used the term "**combination**" 38 times to describe how adding **thymosin alpha 1** could improve clinical outcomes when combined with other therapies.[18]

These data likely motivated the **FDA** to consider approving **thymosin alpha 1** for stage 4 (advanced) melanoma patients, but we don't see FDA follow through for compassionate use.[19-22]

My question is: why not let ***early***-stage melanoma and other cancer patients try **thymosin alpha 1** when there may be a better opportunity to induce a complete response?

Discovery of Thymosins in 1966

The extraction of thymosins dates back to the year **1966** (59 years ago)![23]

By **1966-1968**, published research showed that thymosin was able to restore **immune** functions in mice whose thymus glands were surgically removed.[24]

In **1977**, a published review of clinical studies described the **immune**-potentiating effects of **thymosin alpha 1** in immune-deficient cancer patients.[25]

Early studies starting in **1978** were already showing benefits with thymosin alpha 1 in cancer patients undergoing conventional therapies.[26,27]

The November **1981** issue of our publication (*Anti-Aging News*) advocated for widespread study and clinical application of **thymosin alpha 1** to combat tumors and prevent opportunistic infections caused by the immune-suppressive effects of surgery, chemo, and radiation therapies.

"The FDA's restriction appears unfounded, as **thymosin a1** has shown safety and efficacy beyond the initially specified conditions."[38]

Decades of Research

Published studies elucidate in greater detail the many immune-modulating mechanisms of **thymosin alpha 1**,[5,6,14,28,29] a hormone that abundantly circulates in *younger* people, but virtually disappears with older age and the onset of **immune senescence**.

A number of clinical trials found that **thymosin alpha 1** increased survival and reduced progression of metastatic disease in patients with advanced cancer, when used with standard cancer treatment.[16,17,30,31]

Thymosin has multiple mechanisms that may account for the observed benefits, including preventing the tumor-induced reduction of natural killer (NK) cell activity and preserving the barrier integrity that keeps tumor cells from spreading.[18]

Additional lab data show that:

- When combined with alpha-beta **interferon**, administration of **thymosin alpha 1** can stimulate **NK activity** in chemotherapy-immune-suppressed mice.[32]
- Mice inoculated with **melanoma** or **lung cancer** cells had restored **NK cell activity** if treated with **thymosin alpha 1** and **alpha-beta interferon** 10 days after tumor inoculation.[33,34]
- The **anti-tumor effects** were improved in melanoma-bearing mice by the combined **chemo-immunotherapy** using high doses of **thymosin alpha 1** and low dose **alpha-beta interferons** in combination with the chemotherapeutic drug cyclophosphamide.[35]

In an animal model study, the combination of thymosin alpha 1 and alpha-beta interferon restored the function of NK cells in animals with suppressed NK function after chemotherapy treatment. This demonstrates the potential value of combination immune treatments, including for fighting cancer.[32]

We've long advocated that **thymosin alpha 1** be considered in *early*-stage cancers when there is a realistic opportunity for a durable complete response as opposed to mere improved survival.

Recent published reviews of scientific literature **(2018-2024)** increasingly recognize **thymosin alpha 1** as a potential adjuvant therapy for **sepsis**, **viral infections**, and **malignancies** beyond lung cancer, hepatocellular carcinoma, and melanoma.[4,18,36-38]

Why Thymosin Was Not Approved in the United States

In the period of **1984-1988**, a company called Alpha 1 Biomedical conducted a clinical trial testing **thymosin alpha 1** in lung cancer patients.

While some patients benefited, the clinical trial did not yield sufficient statistical data to meet the **FDA's** stringent criteria. I was told that if just ONE more patient in this trial achieved predefined clinical endpoints that **thymosin alpha 1** would have been approved as a cancer drug.

But let's make it very clear: **thymosin alpha 1** by itself is not a miraculous cancer cure.

It offers cancer patients an immune boost to make existing therapies more effective and less toxic. This may be of particular value to cancer patients using checkpoint inhibitor drugs (Keytruda®, Optivo®, Yervoy®, CAR T, others.)

There should be more study on combining **thymosin** with other immune modulators such as differing **interferons**, **interleukin-2** and/or **granulocyte colony stimulating factor (G-CSF).** Since these drugs are off-patent, there is little economic incentive to initiate clinical trials that cost **tens of millions of dollars**.

And as we advocated **44 years** ago, thymosin alpha 1 should be studied in **humans** over age **65** who almost all suffer dangerous declines in immune function, i.e., **immune senescence**.

Page 54 of this month's issue reprints the article and editorial we published back in **November 1981**. We do this to capture the attention of those who wonder why **612,000** Americans will perish from **cancer** this year and another **350,000** from **sepsis**…with scant improvements in survival curves.

We at **Life Extension** continue to opine that many of these lives could be spared if **thymosin alpha 1** were approved as an affordable generic drug in the United States.

For longer life,

William Faloon, Co-Founder
Life Extension

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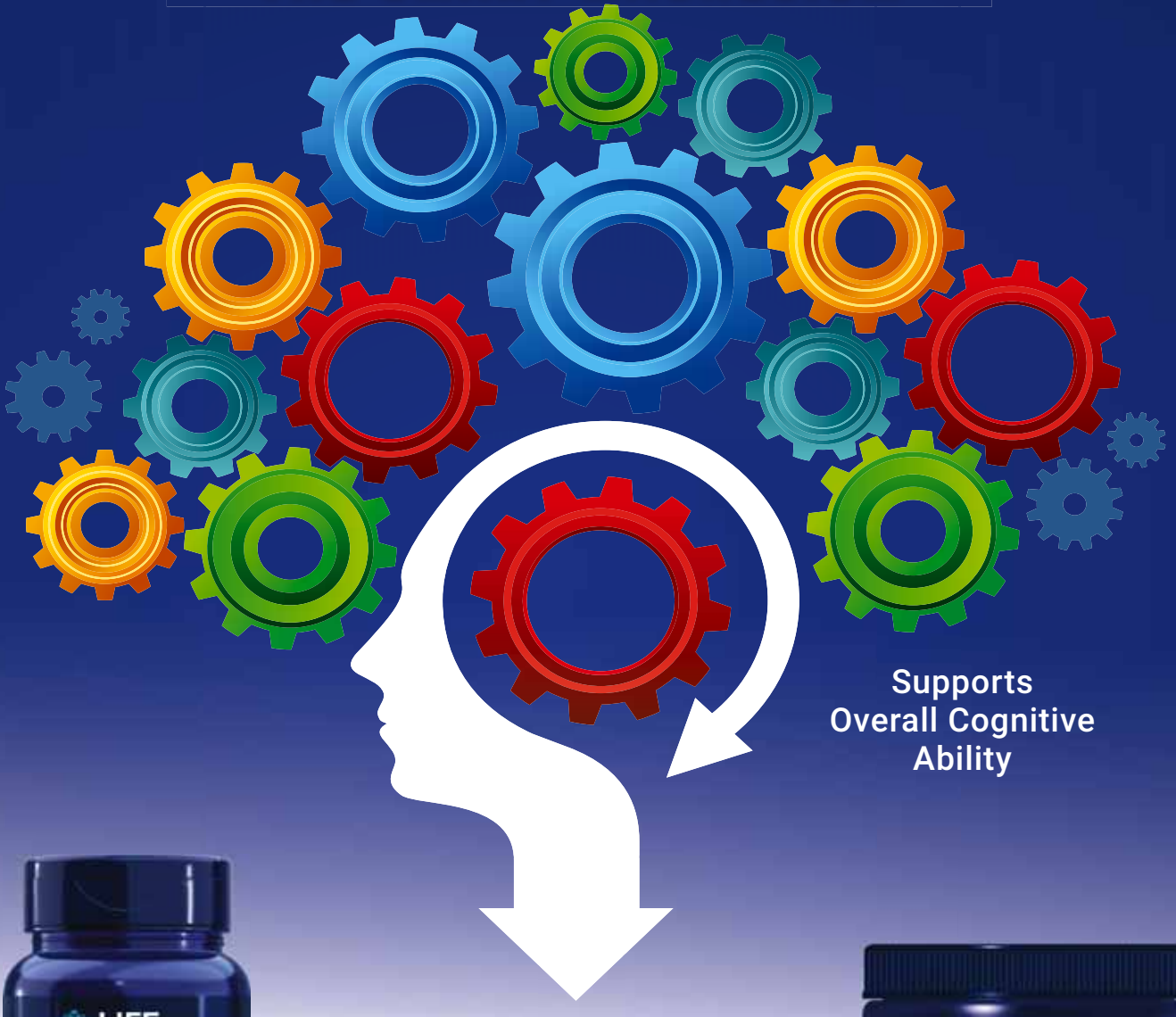

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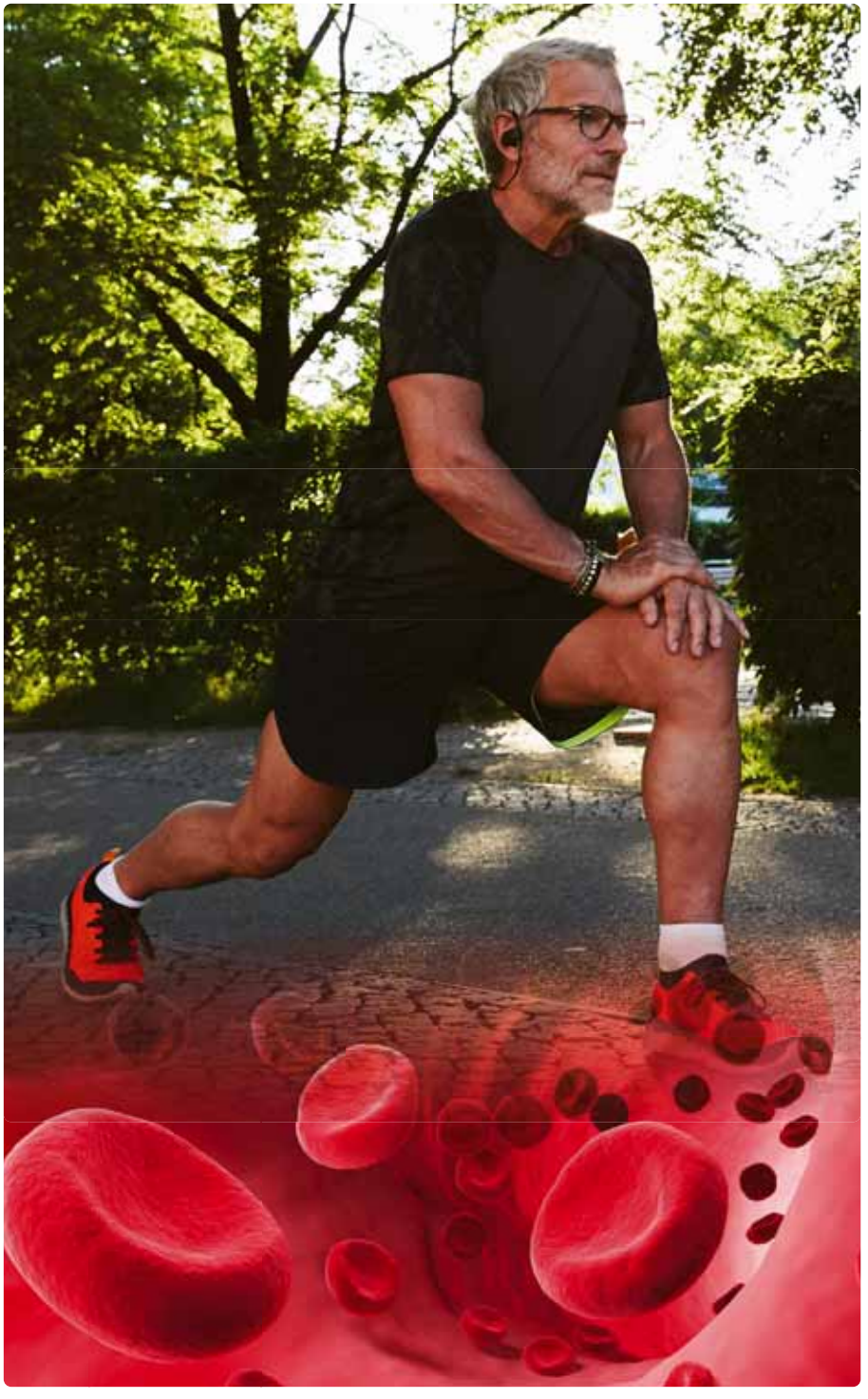
In the News



Nicotinamide Riboside Benefits People with Peripheral Artery Disease

A recent study showed that **nicotinamide riboside**, the most widely used precursor to **NAD+**, increased walking distance in people with peripheral artery disease (PAD), a condition in which narrowed arteries reduce blood flow to the legs, which can cause severe walking disability.*

In this randomized-controlled trial, 90 people with peripheral artery disease took either nicotinamide riboside (**1,000 mg**), nicotinamide riboside + resveratrol (**1,000 mg + 125 mg**), or a placebo daily for six months.

The study showed that nicotinamide riboside increased six-minute walking distance by **7.6 meters** (22.9 feet) at follow-up as compared to a 6-month decrease of **10.6 meters** (34.7 feet) in the placebo group. Where there was at least **75%** adherence to the program, subjects taking both versions of nicotinamide riboside increased their walking distance between **31 meters** (101.7 feet) and **26.9 meters** (88.2 feet) compared to the placebo group.

Editor's note: "NR meaningfully improved walking performance in PAD patients," researchers concluded.

* *Nat Commun.* 2024 Jun 13;15(1):5046.

High Antioxidant Intake May Help Protect Against Hair Loss

Consuming a diet containing high levels of antioxidants was linked to a lower risk of androgenetic alopecia: hair loss caused by male hormones, that also affects women, a recent study found.*

The investigation included 9,647 men and women enrolled in the Fasa Adult Cohort Study, which is a longitudinal prospective cohort study of adults over the age of 35 years. Of the participants, **24%** had metabolic syndrome. Questionnaires provided information about the foods they ate.

Having a higher dietary antioxidant index value was associated with **10%** lower odds of androgenetic alopecia, while a higher energy-adjusted dietary inflammatory index was associated with a **4%** greater risk.

The associations were significant only among women, who comprised about half of the participants. Those who had higher dietary antioxidant scores consumed more fruits and vegetables and less trans and saturated fats.

Editor's Note: "Antioxidant-rich diets protect against androgenetic alopecia hair loss, while pro-inflammatory diets increase the risk," the authors concluded.

* *Front. Nutr.*, 2024 Aug 15:11:1433962.

Carnitine Improves Sepsis Outcomes

People with sepsis who received L-carnitine had lower blood markers of inflammation, a reduced risk of 28-day mortality, and increased indicators of antioxidant defense, a recent study showed.[1]

Sixty adults with sepsis received **3 grams** per day L-carnitine or a placebo for seven days. At baseline, the researchers evaluated inflammatory markers C-reactive protein (CRP), a protein produced by the liver that indicates the level of acute inflammation, infection or injury in the body,[2] and erythrocyte sedimentation rate (ESR), a blood test that measures the speed at which red blood cells settle at the bottom of a blood sample, indicating the amount of inflammation in the body.[2] In addition, participants were evaluated for antioxidant biomarkers such as superoxide dismutase (SOD), an antioxidant produced in the body, that is a key enzyme in the detoxification of free radicals.[3]

Individuals were also evaluated for total antioxidant capacity, as well as the 28-day mortality rate.

After seven days, compared with the start of the trial, those who received L-carnitine had significantly lower C-reactive protein and erythrocyte sedimentation rate and higher superoxide dismutase and total antioxidant capacity, indicating a reduction in the inflammation that characterizes sepsis, and greater antioxidant defense. Compared with the placebo, there were significant improvements in C-reactive protein among those who received L-carnitine. There were 7 deaths in the group that received carnitine versus 15 in the placebo group within 28 days after finishing the intervention.

Editor's Note: "L-carnitine ameliorated inflammation, enhanced antioxidant defense, reduced mortality, and improved some clinical outcomes in critically ill patients with sepsis," the authors concluded.

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Aged Black Garlic May Have Prostate Health Benefits

Preclinical evidence suggests that an extract of aged black garlic may benefit prostate health by protecting against inflammation-induced prostate damage and reducing prostate cancer cells.*

The study found that aged black garlic extract lowered gene expression of pro-inflammatory biomarkers in mice prostates in response to an inflammatory stimulus.

In addition, when the effects of aged black garlic extract were evaluated on prostate cancer cell lines the researchers found that aged black garlic extract reduced cell proliferation, colony and tumorsphere formation, and cell migration.

Editor's Note: "Our results suggest that aged black garlic extract might be potentially used as a diet supplement for health promotion and a source of bio-organic compounds with antitumor properties in prostate cancer," the authors stated.

* *Nutrients*. 2024 Sep 7;16(17):3025.

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Cynatine® is a registered trademark of Roxlor, LLC. VERISOL® and Bioactive Collagen Peptides® are registered trademarks of GELITA AG.

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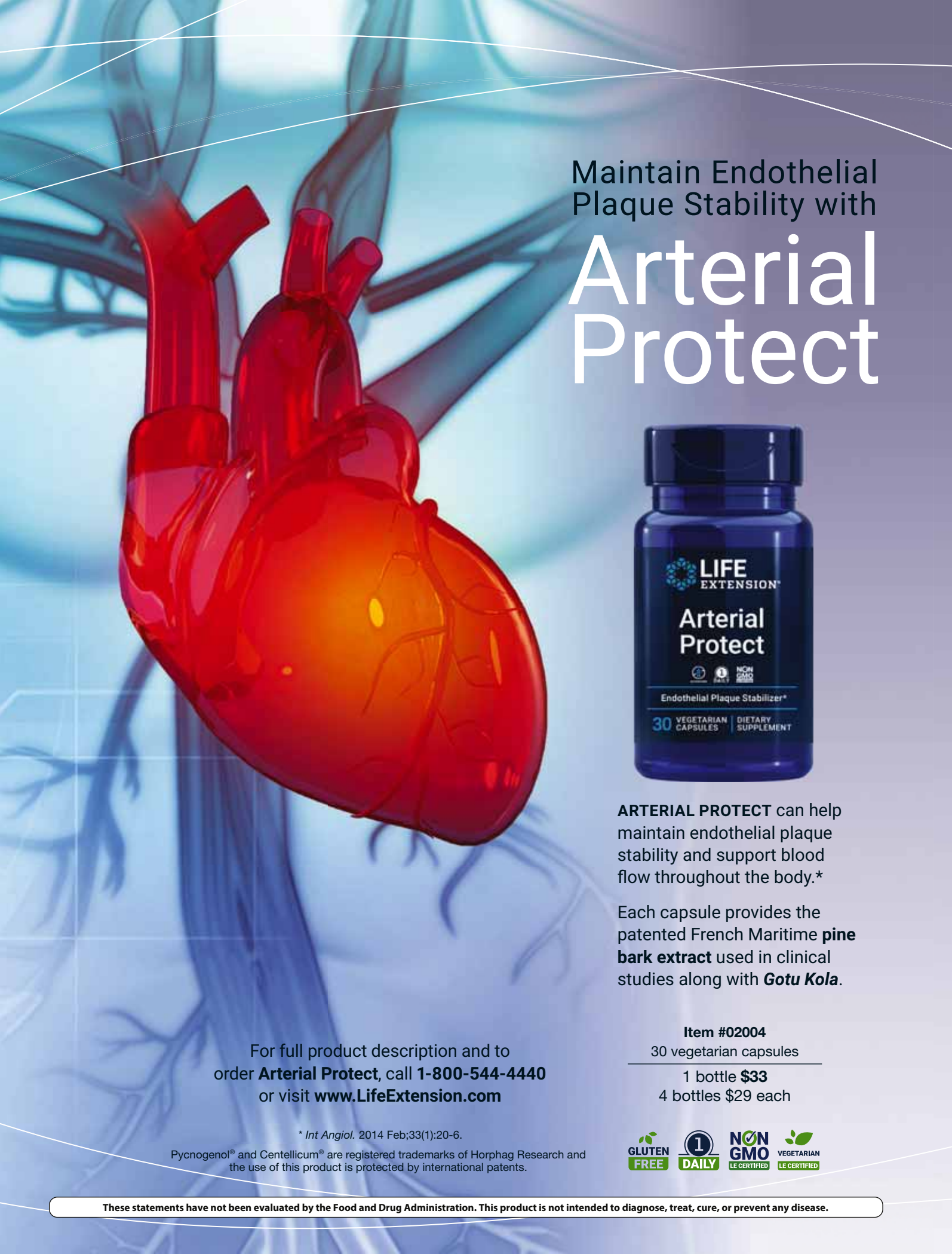

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* *Int Angiol.* 2014 Feb;33(1):20-6.

BY MARSHA MCCULLOCH, MS, RD

Relief for PREMENSTRUAL Symptoms

Roughly **48%** of women of reproductive age worldwide suffer from **premenstrual symptoms**.[1,2]

Painful cramps, mood swings, fatigue, nausea, and lower back pain are some of the most frequently reported complaints of what's commonly known as **premenstrual syndrome** or **PMS**.[3,4]

Many women take painkillers to cope. While over-the-counter pain medications ibuprofen and naproxen are effective in alleviating physical symptoms like cramps and back pain, they do not have a significant impact on mood symptoms.[3]

In two separate **clinical trials**, daily use of **ginger**, and a combination of **vitamin B6** and **magnesium**, have been shown to help relieve common premenstrual symptoms.

Women who took a standardized **ginger extract every day** for two months had a stunning ***84% reduction*** in the intensity of their **menstrual pain** and a complete elimination of nausea, with no side effects.[5]

A **daily** combination of **vitamin B6** and **magnesium** reduced period-related **mood swings** by about half.[6,7]

Taking these ingredients together may provide relief for a wide range of premenstrual symptoms.

Monthly Period Symptoms

A woman's "time of the month" is often marked by physical and emotional disruption known as **premenstrual syndrome** (PMS).

Some of the most common PMS symptoms include:[8]

- Menstrual cramps,
- Anxiety,
- Backache,
- Fatigue,
- Irritability,
- Mood swings, and
- Nausea.

PMS symptoms last an average of **six days a month**,[8] and can interfere with work, school, sleep, and social activities.[9-11]

What Causes PMS?

Many factors contribute to PMS, including hormonal fluctuations, inflammation, and disruptions in levels of specific neurotransmitters.[12]

Menstrual cramps are linked to high levels of hormone-like compounds called **prostaglandins**.[4,13,14]

Certain prostaglandins signal a woman's uterus to expel the lining that is created each month to prepare for a potential pregnancy. An excess of these prostaglandins may trigger inflammation and contraction of uterine muscles, which causes pain.[14,15]

To cope, women commonly turn to **nonsteroidal anti-inflammatory drugs (NSAIDs)** like ibuprofen (Advil®, Motrin®) or naproxen (Aleve®). These suppress prostaglandin production to help quell pain.[16]

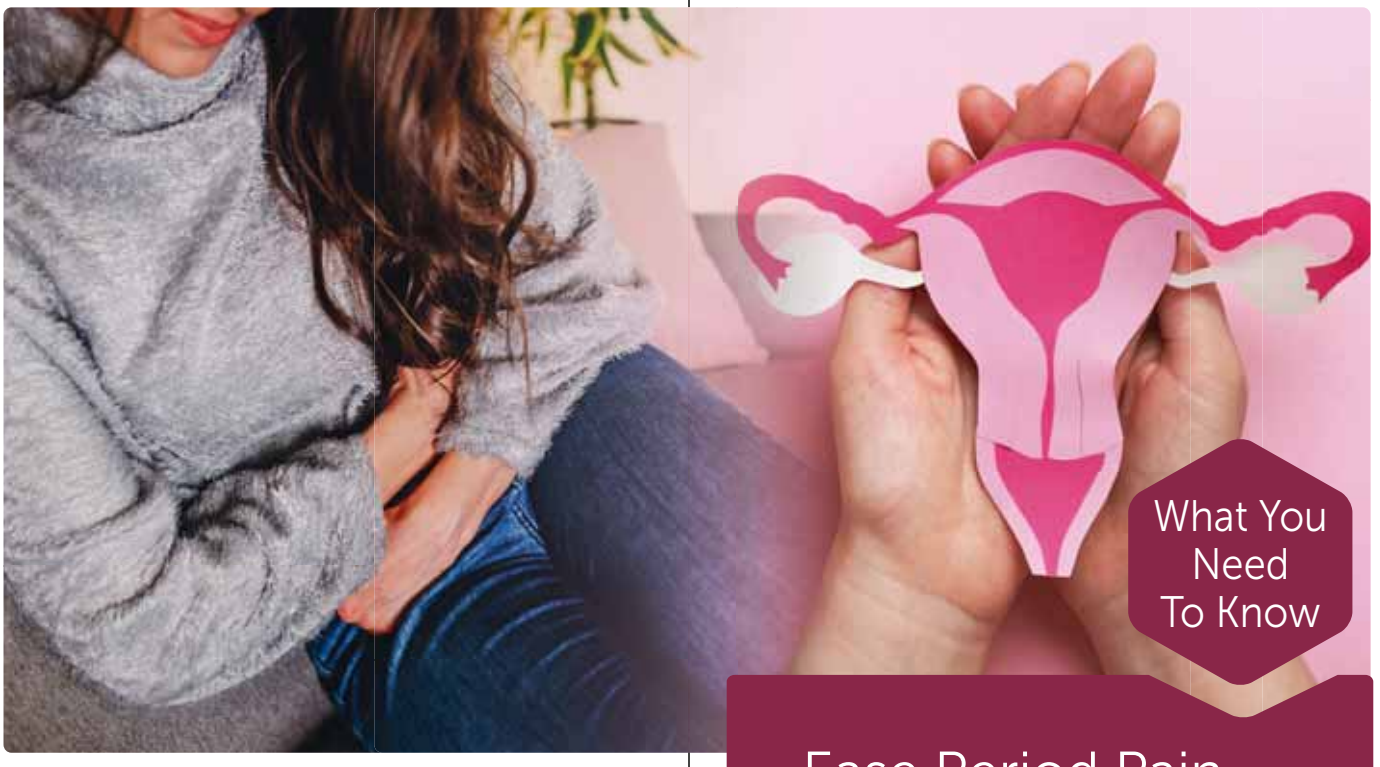
A review of 51 clinical trials found that **NSAIDs** fail to relieve menstrual pain in about **18%** of women.[17] NSAIDs can also cause **side effects** like headaches, indigestion[13] and ulcers.[18]

Ginger and Period Pain

Ginger has long been used as a remedy for **nausea**. Scientists have also validated its **anti-inflammatory** effects.[19]

A meta-analysis of five clinical trials found daily **ginger** extract intake was an effective measure to relieve **menstrual pain** as compared to **placebo**. In two clinical trials, oral **ginger** extract or powder reduced the severity of premenstrual pain in women with primary dysmenorrhea and was as effective as NSAIDs.[20]

Ginger contains **gingeroids** that counteract inflammation to relieve pain. For consistent effects, ginger formulas must contain enough of these active compounds and be consumed regularly.[21]



Scientists developed a ginger-root extract standardized to contain at least **26% gingeroids**. That is **five times** the amount in standard ginger.[5]

In a clinical trial, healthy women ages 18 to 35 with a history of moderately intense menstrual pain took **100 mg** of this standardized **ginger** extract or a placebo **twice daily** for two months.

Women taking the ginger extract, on average, had a remarkable **84%** reduction in the intensity of their **menstrual cramps**, representing a significant improvement compared to baseline, whereas the placebo group showed no improvement.[5]

In addition, the ginger extract eliminated period-related **nausea** and significantly reduced the number of women reporting **lower back pain** and **fatigue**.

The ginger extract had **no adverse effects**.[5]

A PMS-Relieving Pair

Diets low in **magnesium** and **vitamin B6** have been linked to PMS symptoms including depression and anxiety.[22]

Studies suggest the combination of magnesium and vitamin B6 is better at reducing PMS symptoms than either one alone.[23]

What You Need To Know

Ease Period Pain Without Drugs

- Women often experience painful **menstrual cramps** and other disruptive symptoms around the time of their period.
- Daily intake of a **standardized ginger root exact** for two months lowered women's menstrual pain by **84%** in a clinical trial. The extract also significantly decreased the experience of period-related nausea, lower back pain, and fatigue.
- In clinical trials, daily intake of a combination of **magnesium** and **vitamin B6** significantly reduced PMS-related anxiety, mood swings, irritability, and depressive symptoms.
- Taking ginger extract with magnesium glycinate and vitamin B6 may address a wide range of **premenstrual syndrome** symptoms.

Magnesium is thought to help premenstrual mood by regulating hormones and neurotransmitters involved in stress, including **cortisol**, and **GABA** (gamma-aminobutyric acid).[24,25]

Magnesium may also relax muscles of the uterus to ease painful menstrual **cramps**. In a clinical study of women with primary dysmenorrhea, the group receiving **200 mg** of magnesium during their menstrual cycle reported significant reduction in pelvic pain as compared to the placebo group.[26]

Vitamin B6 enhances the uptake of magnesium into cells.[27] It also plays a key role in the production of **serotonin**, a hormone that promotes a positive mood.[12] Low serotonin may be involved in PMS.[1]

In a placebo-controlled clinical trial, women ages 15 to 45 with PMS who took **250 mg** of **magnesium** plus **40 mg** of **vitamin B6** had a dramatic **59%** drop in overall **PMS symptoms** within two menstrual cycles.[6]

The improvements included less PMS-related **anxiety**, **depressive symptoms**, **nausea**, and **lower back pain**.[6]

Another placebo-controlled study found that daily intake of **200 mg** of **magnesium** and **50 mg** of **vitamin B6** for one menstrual cycle was more effective at improving **anxiety-related** premenstrual symptoms than either nutrient alone.[7]

Women taking the combination had a **44%** reduction in their premenstrual symptom score for anxiety, which included **mood swings**, **irritability**, and **nervous tension**.[7]

The study also indicated that daily supplementation for over a month is necessary for maximum benefits.

Maximizing Magnesium's Effects

The dosing regimen and form of magnesium could make a difference in relieving PMS symptoms.

Splitting magnesium over **two doses** in a day promotes more absorption than taking it all at once.[28]

In addition, certain forms of magnesium are absorbed differently. **Magnesium glycinate** is one of several **well-absorbed** forms of magnesium.[29]

Magnesium glycinate consists of magnesium bound to **glycine**, an amino acid. Glycine may contribute other benefits. It is an **anti-inflammatory** agent and supports **sleep**.[30,31]

Taking this form of magnesium with vitamin B6 and ginger extract may ease many different symptoms of PMS.

Summary

Women don't have to suffer from **premenstrual syndrome**.

Scientists have developed a **standardized ginger extract** shown to relieve menstrual **cramp pain**, nausea, lower back pain, and fatigue when taken daily.[5]

A combination of **magnesium** and **vitamin B6** has been clinically shown to relieve other PMS symptoms, including **anxiety**, **mood swings**, **irritability**, and **depressive symptoms**.[6,7]

Taking ginger extract in addition to magnesium glycinate and vitamin B6 may optimize relief from common PMS symptoms. ■

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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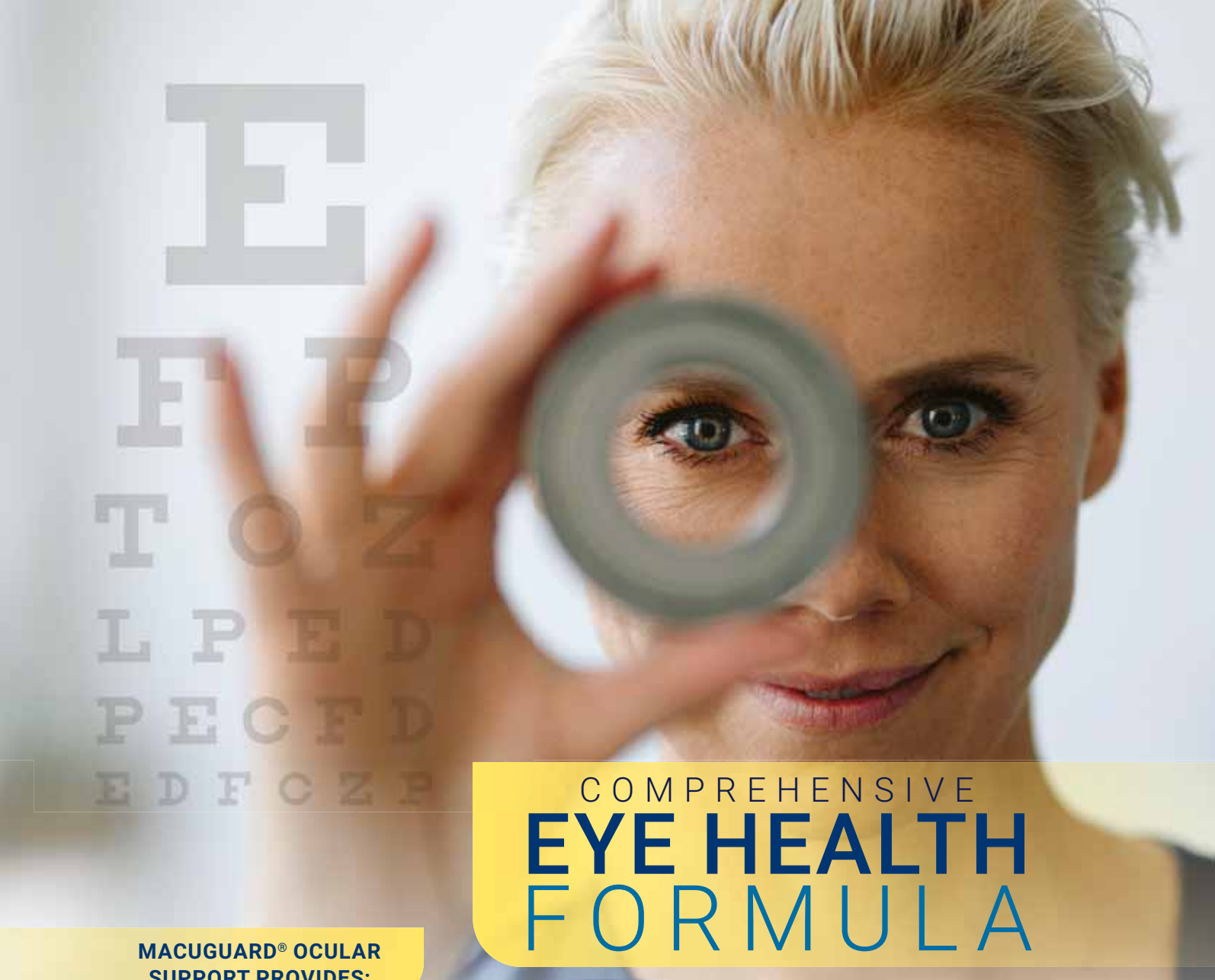

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This formula includes a **ginger extract**, standardized to contain at least **26%** *gingeroids*—**five times** the amount in standard ginger.

In a clinical study, taking **200 mg** of this extract daily resulted in an average **84%** reduction in menstrual-cramp discomfort score.

It also eased period-related nausea, fatigue, and low back pain.[1]

Magnesium and **vitamin B6** are included in this nutrient blend.

Taken together daily, in clinical studies, the combination helped alleviate PMS related irritability and mood swings.[2,3]

Item #02537
60 vegetarian capsules
1 bottle **$15**

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For full product description and to order **Daily PMS Relief**, call **1-800-544-4440** or visit **www.LifeExtension.com**

LITHIUM'S Potential to Promote Healthy Aging

BY SCOTT ROSEN

There is increasing interest about the potential benefits of ingesting small amounts of a mineral called **lithium**.

In animal models, lithium has been shown to **extend lifespan**[1,2]—by as much as **46%** in one study.[3]

A 2024 review of observational studies concluded that trace lithium levels in drinking water may reduce the incidence and mortality rates associated with **dementia**.[4]

In one clinical study, a daily dose of **300 mcg** of lithium decreased ***cognitive decline*** in patients with Alzheimer's disease, compared to a placebo.[5]

Trace amounts or microdoses of lithium may play a role in promoting healthy aging.

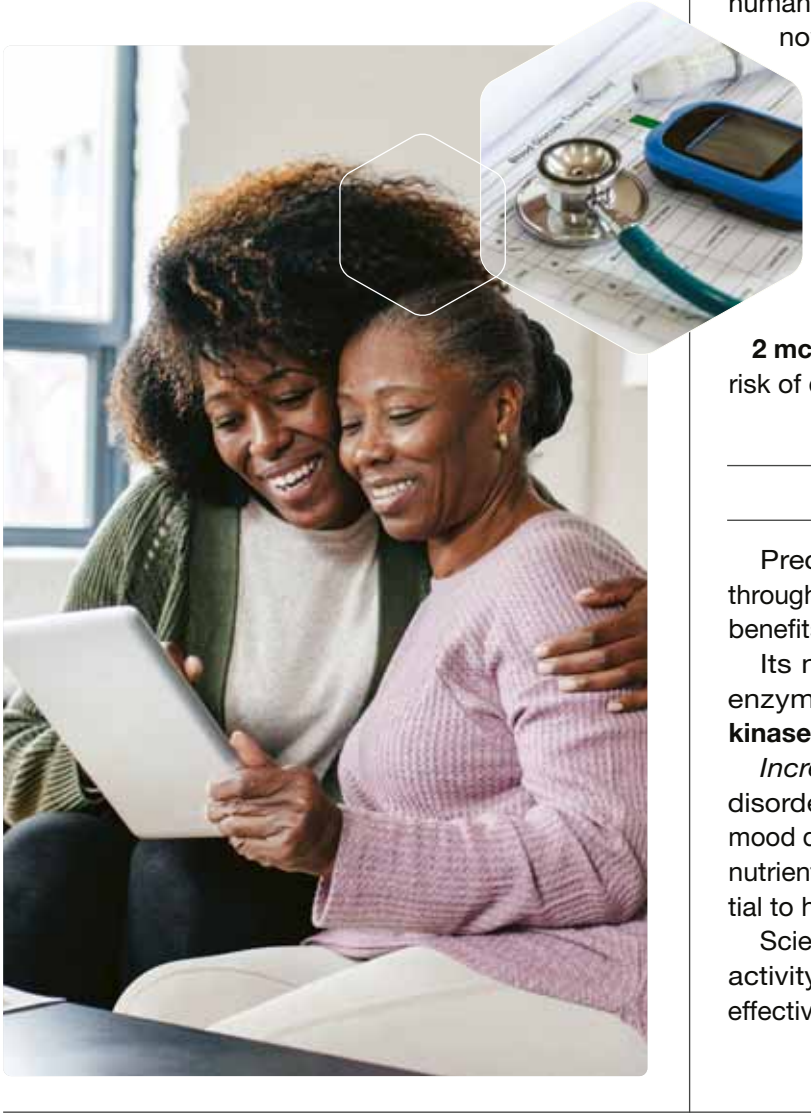
Understanding Lithium's Benefits

For centuries, people have made pilgrimages to lithium-rich mineral springs,[6] believing that drinking and bathing in the water had a positive effect on mood and overall health.

In the mid-20th century, researchers discovered that ***high doses*** of lithium could effectively treat bipolar disorder and certain forms of depression.[7]

While higher doses of lithium are used as **prescription** treatments for bipolar and psychiatric illnesses[6,8] multiple studies suggest that **trace amounts** of lithium in drinking water may be associated with body-wide health benefits.[4,9-11]

A recent review of preclinical and clinical studies suggests that **low-dose lithium** may support cardiovascular, musculoskeletal, metabolic, and **cognitive functions** in aging individuals.[10] One research group reported striking findings: long-term intake of trace amounts of lithium from drinking water was associated with ***reduced risk of all-cause mortality***.[11,12]



In addition, several aspects of mental and physical health have been found to be better in areas where the water supply naturally contains **trace amounts** of lithium.[8,10]

A review of recent preclinical and clinical literature suggests that lithium can have beneficial effects on mechanisms related to:[10]

- Metabolic diseases like diabetes,
- Death due to cardiovascular disease,
- Death due to Alzheimer's disease, and
- Death due to any cause.

Scientists have estimated that at low doses of just **1,000 mcg** (or **1 mg**) daily, lithium plays crucial roles in human biology.[13] Many scientists working in this field now believe that low-dose lithium supports multiple body systems and aspects of health,[10,14] especially for those at risk of dementia.[4]

A recent systematic review of five observational studies examined the association between trace levels of lithium in drinking water and risk of dementia. The findings suggest that the presence of trace lithium levels in drinking water, at concentrations between **2 mcg** to **56 mcg per liter**, is associated with a lower risk of **dementia** incidence and mortality.[4]

How Lithium Works

Preclinical studies have revealed mechanisms through which lithium may provide wide-ranging health benefits.[8,10]

Its most important effect appears to be on an enzyme known as **GSK-3 (glycogen synthase kinase-3)**.

Increased **GSK-3** activity is linked to metabolic disorders (diabetes), neurological (Alzheimer's) and mood disorders, as well as some cancers.[1,15] Drugs and nutrients that inhibit activity of **GSK-3** have the potential to help prevent these conditions.

Scientists investigating methods to reduce **GSK-3** activity discovered that lithium is among the most effective **GSK-3 inhibitors**.[15]

Other ways that lithium may counter mechanisms of aging and disease include:

- Enhancing **transport of nutrients** into brain cells,[13]
- Activating **autophagy** (cellular housekeeping),[8,16]
- Preventing abnormal accumulations of the proteins **tau** and **beta-amyloid**, which are associated with neurodegeneration,[8]
- Increasing **brain-derived neurotrophic factor**,[13,16] a signaling molecule that protects brain cells and supports their function,
- Helping to maintain *longer* **telomeres**[3,16] (protective caps on the ends of chromosomes tied to increased longevity),
- Protecting against threats to brain function, including **glutamate toxicity**,[1]
- Augmenting **immune cell** function,[8] and
- Inducing **stem cell** growth.[13]

Lithium administration has also been shown to extend **lifespan** in roundworms and fruit flies. In one study, lithium increased the lifespan of worms by an astonishing **46%**.[3]

Many researchers are enthusiastic about the potential of safe microdose or trace amounts of lithium for supporting longevity and healthy aging.[1,9,10,14] However, further studies and human trials are needed to clarify existing findings.

Human Trials of Lithium

To date, most lithium trials in humans have focused on potential brain-health benefits. In subjects with both **mild cognitive impairment** and **Alzheimer's disease**, lithium has improved cognitive performance and stabilized disease progression.

A randomized controlled trial showed the potential of **microdose lithium**.

In this study, a daily dose of just **300 mcg** of lithium was given to **Alzheimer's** patients for 15 months. While a **placebo** group continued to show deterioration in mental function, those receiving lithium **stabilized** throughout the course of the study.[5]

Health Benefits of Low-Dose Lithium

- The mineral **lithium** has long been used at high doses to treat mental health conditions. Scientists now are encouraged that **low doses** may support healthy aging and longevity.
- In observational studies, those with regular intake of small amounts of lithium in their drinking water have lower rates of **death from any cause**.
- In animal studies, lithium has been shown to extend a healthy **lifespan**.
- In a clinical study, microdose lithium intake for **15 months** stabilized **cognitive function** in patients with Alzheimer's disease, preventing the expected decline in mental abilities.

In a placebo-controlled trial, 45 patients with **mild cognitive impairment** who were given lithium daily in high doses of **150 mg**, **300 mg**, **450 mg**, or **600 mg** for a year had significantly improved cognitive performance and attention on tasks, compared to those who took a placebo. Cerebrospinal fluid levels of **hyperphosphorylated tau**—an abnormal protein that serves as a hallmark of Alzheimer's disease—were reduced in participants taking lithium.[17]

In a later randomized controlled trial by this same research group, older adults with **mild cognitive impairment** received one of the four doses of lithium mentioned above, or placebo for two years; after completing the study, participants were followed for an additional two years. The placebo group continued to suffer cognitive and functional declines, while those receiving lithium remained **stable** over the entire study.[18]

Another meta-analysis of eight clinical studies compared efficacy and tolerability of high-dose lithium treatment with the newer class of monoclonal antibody Alzheimer's drugs. This study found that lithium treatment may be safer than available monoclonal antibody medications.[19]

Summary

Low-dose **lithium** has considerable promise for lowering rates of cardiovascular disease, cognitive disorders, metabolic disease, and **death from *any* cause**.

In a clinical trial, microdose lithium stabilized **cognitive function** in patients with Alzheimer's disease, preventing the expected decline in mental abilities.

A growing number of scientists believe that a small amount of daily lithium can help promote healthy aging, cognitive wellness, and more. ■

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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FOOD *Freedom*

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Take one capsule before the heaviest meals, up to three times daily.

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CAUTION: This product breaks down histamine but won't prevent severe allergic or gluten-related (celiac) reactions. Do not knowingly ingest food you are allergic to.

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Peter
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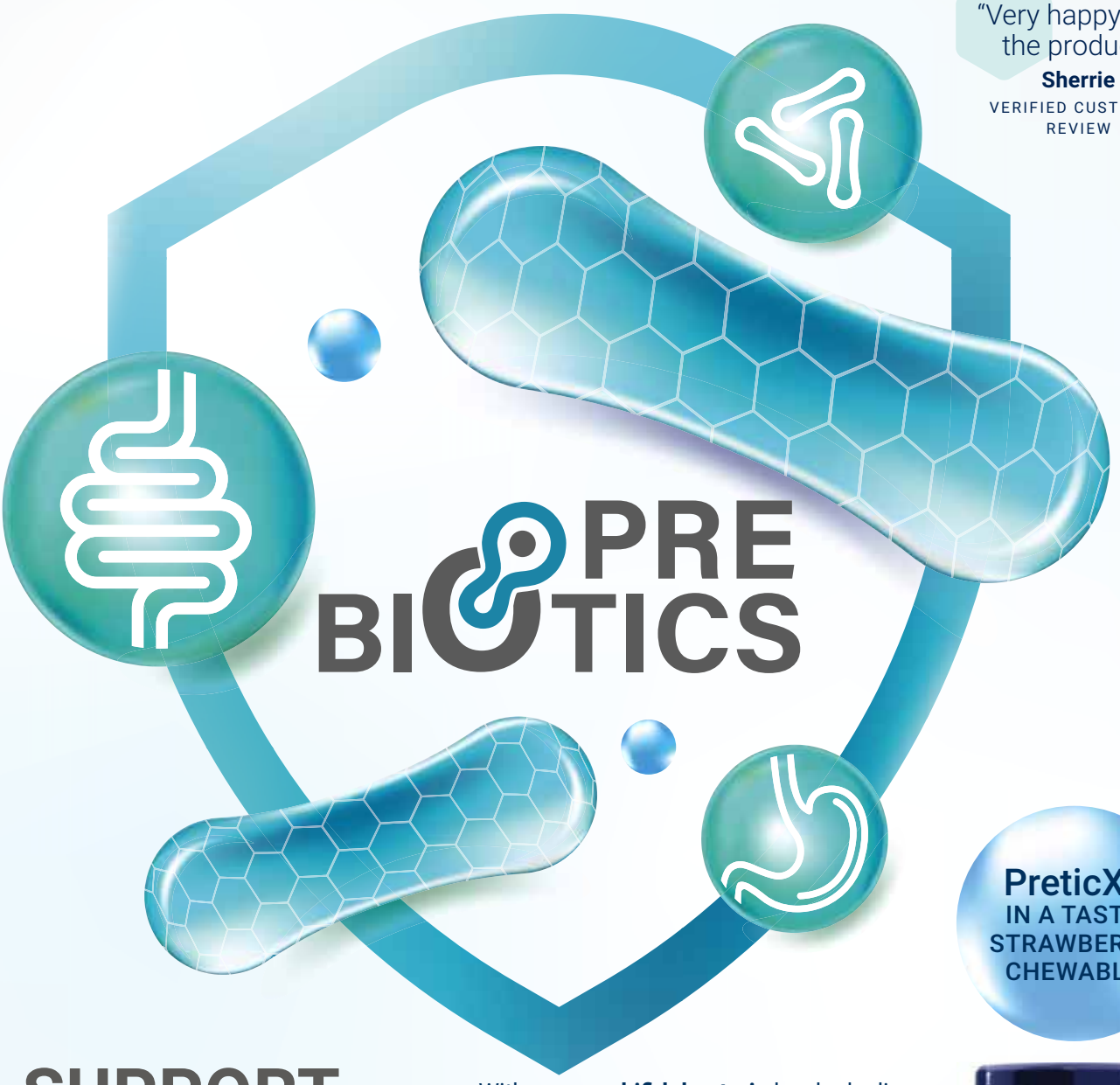
MaquiBright® is a registered trademark of MAQUI NEW LIFE S.A, Chile and ORYZA OIL & FAT CHEMICAL CO., LTD., Japan.

"Very happy with the product."

Sherrie

VERIFIED CUSTOMER REVIEW



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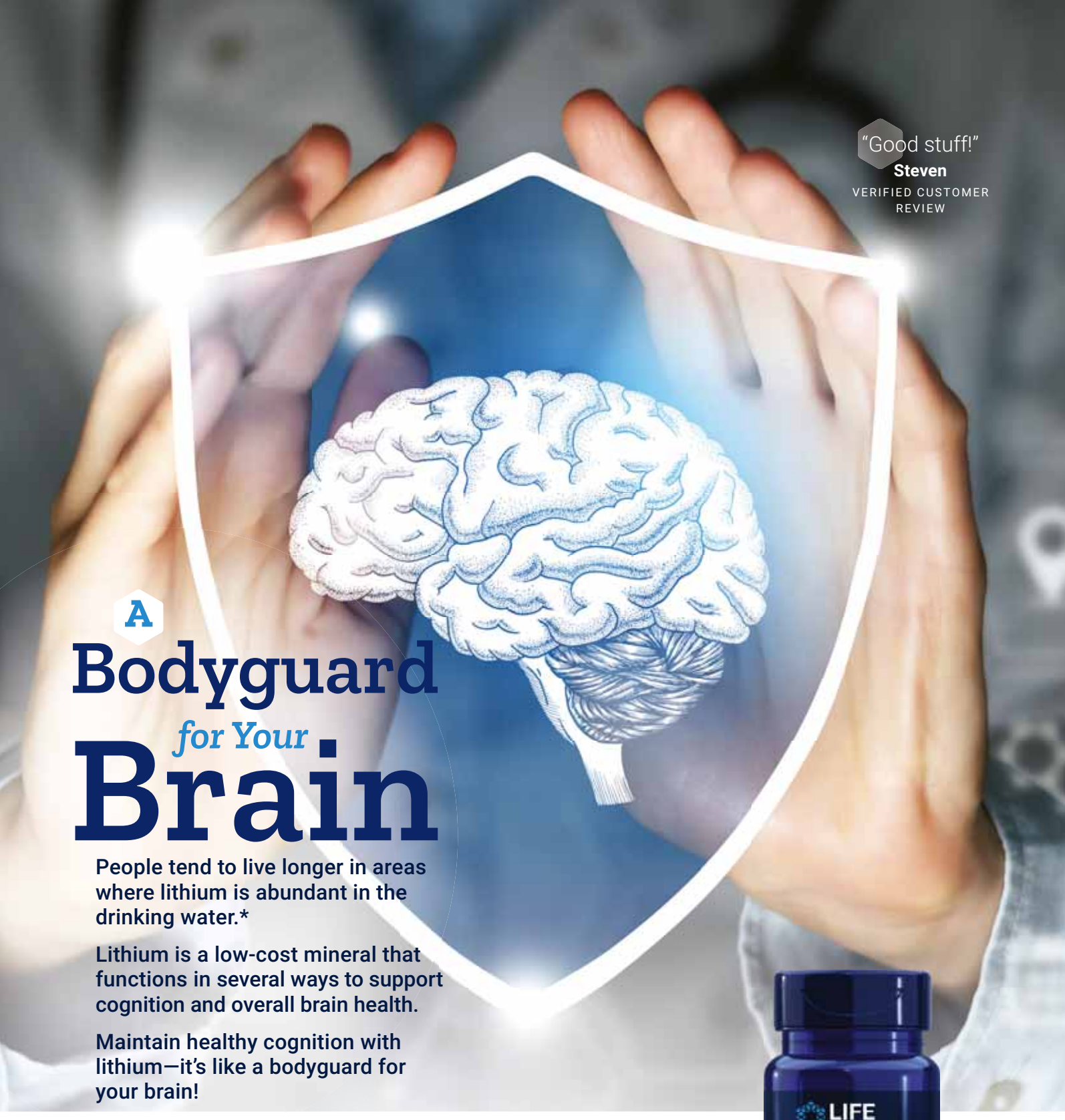

"Good stuff!"
Steven
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A Bodyguard *for Your* Brain

People tend to live longer in areas where lithium is abundant in the drinking water.*

Lithium is a low-cost mineral that functions in several ways to support cognition and overall brain health.

Maintain healthy cognition with lithium—it's like a bodyguard for your brain!

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

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Each bottle lasts 100 days.

European Journal of Nutrition. 2011;50(5):387-389.

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.

TRIGLYCERIDE Control with Fish Oil

BY MARK RASCAUX

Plenty of people worry about their atherogenic lipids like oxidized **LDL** and **apolipoprotein B (ApoB)**.

But having high levels of another lipid called **triglycerides** can *also* increase risk of **heart** disease and **strokes**.[1]

Drugs are frequently prescribed to reduce elevated LDL and usually work to reduce ApoB. However, in many people statins fail to adequately lower triglycerides.[2]

According to a study of nearly 10,000 U.S. adults, over **30%** of statin users have **triglyceride** levels of **150 mg/dL** or above.[3]

Inadequately controlled triglyceride levels leave behind a significant residual risk for **cardiovascular disease** even with statin use.[4]

One meta-analysis found that supplementation with **omega-3** fatty acids is associated with a lower risk of heart attacks, total coronary disease events and mortality, along with a **35%** reduced risk of **fatal heart attacks**.[5]

Why Are Triglyceride Levels Important?

Triglycerides are the most common type of fat (lipid) in our body. In the blood, they are transported by particles called **lipoproteins**.[6]

Our body stores unused or excess fat as triglycerides, in fat cells. Excess triglycerides in the blood significantly increase the risk of cardiovascular events, such as heart attack or stroke. This condition may be genetic, related to diet, or a part of **metabolic syndrome**.[6]

Elevated triglyceride levels are also associated with dangerous, small, dense, low density lipoprotein particles. These can significantly increase risk for **atherosclerosis** (the buildup of plaque in arteries).[7]

Triglyceride levels are usually considered to be healthy when lower than **150 mg/dL** on blood tests.[6]

However, at **Life Extension**, we have long advocated for aiming to keep levels below **100 mg/dL**. This is particularly important for those with any other risk factors for cardiovascular disease, such as obesity, high blood pressure, abnormal cholesterol levels, type II diabetes, and a history of smoking.

How Fish Oil Helps

Fish oil is rich in the **omega-3** fatty acids **EPA** (eicosapentaenoic acid) and **DHA** (docosahexaenoic acid).

Fish oil consumption has been shown to have a wide range of health benefits, including helping to prevent abnormal blood clots, reducing inflammation, lowering blood pressure, and preventing heart arrhythmias.[8,9]

Fish oils appear to **lower triglycerides** in several different ways, including by:[10-12]

- Reducing the liver's production and secretion of triglyceride-containing lipoproteins,
- Speeding up the clearance of triglyceride-rich lipoproteins from the blood, and
- Increasing the activity of the enzyme lipoprotein lipase, which breaks down triglycerides.

Lowering Triglycerides

Hypertriglyceridemia, characterized by elevated levels of triglyceride-rich lipoproteins and their remnants, is a risk factor for atherosclerosis or hardening of the arteries.[13] Inadequately controlled triglyceride levels leave a significant residual risk for cardiovascular disease, even with statin use.[4]

A study analyzed data from the Health and Nutrition Examination Survey (NHANES) 2007-2014 and examined the prevalence of elevated triglycerides in over 9,000 U.S. adults, some of whom were taking statins and some who were not.

The study found that over **30%** of statin users have triglyceride levels of **150 mg/dL** or above. The odds of high triglycerides in this population were associated with greater age, high BMI, low HDL, high LDL and diabetes.[3]

Fish oil may be the answer.

The ability of fish oils to **lower triglycerides** has been observed in numerous human trials, some of which compared them head-to-head against statins.

Fish oils have been found to be effective in lowering triglycerides in subgroups who are at particularly high risk for cardiovascular disease, including **overweight** or **obese** adults. In two separate clinical trials of overweight or obese adults, fish oil doses of **2-4 grams daily** for a period of 12 -16 weeks reduced triglycerides by **16%- 24%**.[14,15]

What You Need To Know

Omega-3s Reduce High Triglycerides

- Elevated **triglycerides** significantly increase the risk of cardiovascular disease and strokes.
- Inadequately controlled triglyceride levels leave behind a significant residual risk for cardiovascular disease even with statin use.
- Human trials show that fish oil-derived **omega-3 fatty acids** can effectively lower triglyceride levels by up to over **50%**.
- Fish oil intake has been shown in some studies to lower the risk of **heart attacks** and **cardiovascular mortality**.

Non-alcoholic fatty liver disease (**NAFLD**) is a risk factor for cardiovascular disease.[16] A meta-analysis of 22 clinical trials of individuals with NAFLD found that the addition of fish oil produced *"a remarkable decrease in triglycerides."*[17]

A review of over 20 clinical trials of EPA and/or DHA in healthy adults with normal or borderline-high triglycerides revealed that daily supplementation with omega-3s, for a range of two weeks to a year at doses of **1-4 grams**, reduced fasting triglyceride levels by **4%-51%**.[18]

Reduced Cardiovascular Risk

These reductions in triglyceride levels translate to reduced risk for **cardiovascular disease** and its potentially devastating consequences.

Extensive evidence supports the cardiovascular benefits of **fish oil**.

A large meta-analysis of **40** clinical trials found that **EPA** and **DHA** intake were associated with a significant reduction in several cardiovascular disease events, including a stunning **35% reduction** in risk of **fatal heart attack**. Higher doses of omega-3 fatty acids were found to provide more robust risk reduction against cardiovascular events and heart attacks.[5]

Another meta-analysis of 86 randomized controlled trials found that omega-3 fat consumption lowers triglycerides and is associated with a lower risk of cardiovascular mortality, and may reduce the risk of coronary heart disease events and mortality.[19]

A science advisory from the **American Heart Association** stated that taking **4,000 mg** per day of the omega-3 fatty acids **EPA** and **DHA** reduces very high triglycerides by **30%** or more.[11]

ADDITIONAL CARDIOVASCULAR BENFITS

Fish oils with EPA + DHA work in various ways to reduce cardiovascular risk.

A clinical trial demonstrated that patients taking **2 grams** of **EPA/DHA** per day for 90 days significantly reduced levels of various markers of **chronic inflammation** such as TNF-α and CRP in hypertensive patients.[20]

In patients with type II diabetes who were also overweight, **4 grams** of fish oil per day for eight weeks, reduced levels of markers of inflammation such as TNF-α, IL- 1β, and IL-6, and improved insulin sensitivity and lipid profile.[21]

Meta-analysis of seven clinical trials of patients on hemodialysis found daily fish oil supplementation reduced CRP levels, especially in those with elevated baseline CRP.[22]

Summary

Elevated **triglyceride** levels increase the risk for cardiovascular diseases and strokes.

Inadequately controlled triglyceride levels leave behind a significant residual risk for cardiovascular disease, even with statin use.

Numerous studies show that taking **fish oil** containing **omega-3 fatty acids** can effectively reduce triglyceride levels by up to over **50%**.

Fish-oil intake has also been shown to reduce risk for **heart disease** events like **heart attacks** as well as death from coronary 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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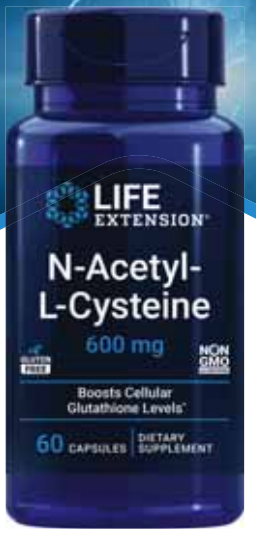

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Life Extension Advocated for Thymosin alpha 1 in 1981

What follows is a reprint from our archives of an article & editorial we published in **November 1981** that advocated for rapid approval of **thymosin alpha 1** as a drug.

Please excuse the poor quality of this **44-year** copy from our archives.

ANTI-AGING NEWS

The *Insider's* Report on Efforts to Prevent Aging and Rejuvenate the Aged

ANTI-AGING NEWS VOL. 1 NO. 11 NOVEMBER 1981

Thymosin: The Immunity Hormone

The thymus gland is a small organ located behind the breastbone and below the neck. It is called the "master gland" of immunity because it controls the activity of the immune system. Thymosin is the name given to a family of hormones secreted by the thymus gland that "instruct" cells from the bone marrow, lymph nodes, and spleen to reject foreign tissue and combat attacking organisms.

Thymosin was first isolated by Allan Goldstein and Abraham White in the 1960s. Since then, Dr. Goldstein has been studying its effects in both animals and humans. The following interview with Dr. Goldstein was conducted by ANTI-AGING NEWS Editor/Publisher Saul Kent at George Washington University School of Medicine in Washington, D.C., where Dr. Goldstein is Chairman of the Dept. of Biochemistry.

What led to your discovery of thymosin?

In June 1964, I was fortunate enough to join the endocrine lab of Dr. Abraham White of the Albert Einstein School of Medicine in New York as a post doctoral fellow. Dr. White was a major figure in endocrinology, who is known widely for his purification of prolactin, ACTH, and some of the glucocorticoid hormones.

At about this time, the thymus gland was being "rediscovered" after many years of neglect. Animal experiments had shown that if the thymus is removed surgically (thymectomy) shortly after birth (the neonatal period), the animal's immune system fails to develop

normally and the animal fails to grow properly. Invariably, a thymectomized animal develops wasting disease associated with overwhelming infection.

So it was known that the thymus gland plays a key role in the maturation of the immune system, but it hadn't yet been determined whether its mechanism of action is endocrine or cellular.

There had been a few experiments in which it was possible to prevent some of the wasting disease and immunosuppression in neonatally thymectomized animals by transplanting thymus tissue into the abdomen—either by itself or within a Millipore diffusion chamber. So there was already circumstantial evidence that there might be a cell-free hormonal substance within the thymus gland.

How did you go about searching for this hormone?

We started extracting and isolating materials from the thymus. The earliest assay we developed was called a lymphopoietic assay, which we used to measure the ability of these crude thymic extracts to stimulate the growth of lymphoid tissue in mice. We found that some thymic extracts could stimulate lymphoid tissue quite well.

After working with these extracts for about a year and a half, we were able to isolate an active substance that had lymphopoietic activity. We named it thymosin, which means from the thymus gland.

At that time, we thought there was only one hormone that controlled the maturation of the immune system; today we know that thymosin is really a family of polypeptide hormones that control the maturation, differentiation, and functioning of different subpopulations of lymphocytes.

We've isolated and characterized several of these hormonal-like peptides including thymosin alpha-1 and thymosin beta-4. Other research groups have isolated other thymic hormones. It now appears that there may be as many as 20 biologically active hormones produced by the thymus gland.

How do the thymic hormones influence the cells that confer immunity?

To begin with, there are two major branches of the immune system: cell-mediated immunity, in which specific cells fight off invading cells; and humoral immunity, in which antibodies are produced against viral and bacterial invaders. Thymosin is primarily involved in the control of cell-mediated immunity, although it also influences humoral immunity.

There are three compartments in the system that constitutes cell-mediated immunity:

First is the pluripotential stem cells in the bone marrow that mature into lymphocytes (a type of white blood cell) under the influence of the thymic hormones. These are called thymic dependent lymphocytes or T-cells. There are various subpopulations of T-cells that have specialized functions.

The second compartment of cell-mediated immunity is within the thymus itself--the epithelial cells that produce thymic hormones. Cells from the bone marrow migrate to the thymus through the blood vessels, where they undergo further maturation within its protected environment.

After they become mature, the T-cells go out into the third compartment—the peripheral lymphoid system, which consists of the lymph nodes, spleen, and the blood circulation--where they serve as the body's police force. The T-cells endow us with our tumor immunity, transplant immunity, mycobacterial immunity, a good part of our viral immunity, and part of our fungal immunity.

T-cells also stimulate antibody production by B-cells in a very complex fashion. The B-cell-produced antibodies provide us with most of our bacterial immunity and some of our viral immunity.

How did you discover the biologic effects of thymosin?

By administering the hormone to neonatal animals whose thymus had been removed. We found that thymosin lowered the incidence of wasting disease, increased the number of circulating T-cells, and improved immune function in these animals. We showed that a cell-free, hormonal-like substance could induce the normal maturation of the immune system—even in the absence of the thymus gland.

The results of 10 years of such animal experiments led us to conclude that thymosin might be able to "turn on" the immune system of children born without a functioning thymus gland.

When did you first use thymosin in humans?

In June 1974, we received permission from the FDA to start giving thymosin to children with primary immunodeficiency diseases, in which they are born without a functioning thymus--either because they lack the organ entirely or because it doesn't work properly.

Our first patient was a 5 1/2-year-old California girl named Heather who had severe problems with infection, couldn't gain weight, and had a variety of other immunologic problems.

Before we started treatment, Heather had very few T-cells in her blood, but after we gave her thymosin her T-cells went from about 10% to 45-50%, while the number of infections she suffered diminished and she began to gain weight. The positive effects of thymosin therapy in Heather stimulated considerable interest in thymosin as a treatment for immunologic diseases.

At this time, over 100 children, suffering from such diseases have been treated with thymosin. The ones who have responded best have been patients with classical thymic malfunction diseases, such as DiGeorge Syndrome.

Have you used thymosin to treat suppressed immune function in adults?

Yes. After animal studies showed that thymosin could improve depressed immune function in animals with tumors, we started phase I studies to see if thymosin could improve depressed immune function in cancer patients.

In about 50% of patients with cancer, death comes because of infection due to immunosuppression caused by treatment (chemotherapy or radiotherapy) to reduce tumor mass. We found that thymosin could increase T-cell numbers and improve immune function significantly in such patients.

As a result, a phase II, randomized trial of thymosin as an adjunct to conventional anticancer therapy was launched in 1976 by Dr. Paul Chretien (who was then associate chief of the surgery branch of the National Cancer Institute) and Dr. Martin Cohen of the V.A. Hospital in Washington, D.C. Thymosin fraction 5 was given to patients with advanced oat cell carcinoma of the lungs after they had received highly potent drugs to reduce tumor mass.

The results showed that giving thymosin for 6 weeks following chemotherapy could double the survival time of these patients.

This highly promising finding, coupled with the good effects of thymosin in children, led the National Cancer Institute to initiate national trials of thymosin therapy in cancer patients at five centers in the United States.

Where are these centers?

Clinical trials are now being conducted at the University of California Medical Center in San Diego, the University of California Medical Center in San Francisco, Sloan-Kettering Cancer Center in New York, the Fred Hutchinson Cancer Center in Seattle, and right here at the George Washington University Medical Center.

The strategy in all these studies is to determine the correct dose and regimen for thymosin and to determine if thymosin can restore normal immune function in patients who have received chemotherapy or radiotherapy, and if it can boost the body's own natural anti-tumor activity. We'll know the results of these studies in about a year.

Is anyone interested in giving thymosin to patients at-risk for cancer?

No, not yet. The question of whether maintenance of immunologic vigor can prevent cancer is related to aging. It's not being explored yet because the normal progression in medicine is to test a therapy on the sickest patients first before trying it on those who are not really ill.

Further, in modulating the immune system, you have to be careful that you don't overdo it because immunity can be a double-edged sword. There are a wide variety of diseases where the body's immune system seems to work too well. Instead of only attacking pathogens, the T-cells actually attack the body itself.

Has thymosin been used to treat autoimmune disease?

Yes, it's been shown that thymosin boosts T-cell suppressor function in autoimmune-susceptible mice, and there's also been some work in humans.

Dr. Jerry Daniels and his colleagues at the University of Texas Medical Branch in Galveston have given thymosin to patients with systemic lupus--an autoimmune disease. In a preliminary study, they found evidence that thymosin could correct certain immunologic imbalances in these patients. They are currently doing a randomized study to see if thymosin can cure lupus. We plan to initiate a trial in patients with rheumatoid arthritis at the George Washington University Medical Center in the near future.

Have there been any studies to test the effects of thymosin in old animals?

One study being conducted at the Radiobiological Institute in Rome by Dr. Gino Doria indicates that thymosin can increase antibody production in older animals. Another study in France by Dr. George Mathe indicates that thymosin can restore certain aspects of cell-mediated immunity in older animals.

To date, there have been no systematic studies reported on chronic administration of thymosin in aged animals, or any attempt made to see if long-term thymosin treatment can extend lifespan.

We've been planning such a study for several years, but have been unable to obtain funding to do it. One question that needs to be answered is the best age to start thymosin treatment. We know that the thymus begins to atrophy at puberty, at which time there is a sharp decline in blood levels of thymosin. Therefore, I suspect that the ideal time to start preventive, anti-aging therapy with thymosin might be in the 20s and no later than the mid 30s.

How much money would it take to perform a lifespan study with thymosin?

In order to do a meaningful study, with enough animals for significant statistics, we'd need $200,000 a year for at least three years. So it would take about $600,000 to determine the effect of thymosin on health and longevity.

Is anyone studying age changes in thymosin levels in humans?

Yes. We've been studying the immunology of patients with rheumatic diseases. As part of that study, we've developed a radioimmunoassay to measure blood levels of thymosin alpha-1, which boosts the production of "helper" T-cells as a means of amplifying the immune system.

We've found that thymosin alpha-1 levels decrease markedly at puberty just as the thymus begins to shrink and that there is a gradual decline in thymosin levels thereafter. The amount of thymosin alpha-1 in normal aged persons is very low.

We've also found that the number of epithelial cells that produce thymosin diminish very significantly at puberty.

So there's good reason to suspect that thymosin may play an important role in the aging process, and that maintaining juvenile levels of thymosin might add years of health and vigor to the human lifespan.

Aging & The Maintenance of Health: Sources of Information, Part II

By Durk Pearson & Sandy Shaw

In last month's column, we reviewed a selection of books that provide valuable life extension information. This month we review additional secondary sources of information that can help prepare a careful reader of above average intelligence (but not necessarily a college graduate) to plan his or her own rational life extension program.

PAGE 88 ANTI-AGING NEWS VOL. 1 NO. 11 NOVEMBER 1981

Is Thymosin An Anti-Aging Therapy?

Saul Kent

This month's interview with Dr. Allan Goldstein provides further evidence of the scientific establishment's continued neglect of the effects of the aging process on health and longevity.

For decades, it's been known that the thymus gland begins to atrophy at puberty and that it declines in function thereafter. Dr. Goldstein and others have proved that the thymus operates by producing a variety of hormones, and that the age-related decline in thymic size and function is expressed by the depletion and diminished capacity of these hormones.

It's clear that the decline in thymic function that starts at puberty is an integral part of the aging process because it occurs in everyone-without exception. It's also clear that the depressed immunity that results from this decline in thymic function makes us increasingly vulnerable to diseases such as cancer with advancing age. Finally, it's clear that thymic hormone replacement is potentially a highly promising anti-aging therapy.

Not An Anti-Cancer Drug

The problem is that the medical profession finds it difficult to understand the concept of an anti-aging therapy. Their only model for therapeutic benefit is the reversal of disease states. According to this model, any therapy that doesn't help to cure a disease is worthless.

And so thymosin is now being used to treat advanced cancer patients, although it is not an anti-cancer drug. Its apparent usefulness in extending the survival time of cancer patients is testimony to its ability to boost immune response, but is not the most logical application for this type of therapy.

Disease Prevention

Since the purpose of the immune system is to prevent diseases from occurring in the first place, the most promising therapeutic use for thymosin is likely to be as a means of preventing or reversing the age-related decline in immune function.

What the scientific establishment has to understand is that
always better than trying to cure it.
advanced cancer patients, for example, have already suffered too much damage to be salvaged, whereas cancer is potentially preventable in everyone who has not yet been afflicted with the disease.

A Potential Anti-Aging Therapy

Thymosin is a natural hormone produced by the "master gland" of our own defense system to protect us against diseases. As we grow older, we suffer a progressive loss of this essential hormone that leaves us increasingly vulnerable to pathogenic attack.

By replenishing the thymosin we've lost due to the aging process, we may be able to improve the odds of avoiding cancer and many other diseases and of living a longer, healthier life. And if immune system dysfunction proves to be intrinsic to the aging process, it's possible that thymosin therapy could extend our lifespan radically.

As Dr. Goldstein points out in his interview, the question of whether thymosin can be an effective anti-aging therapy can begin to be resolved quite easily by conducting a lifespan study in mice of the effects of chronic administration of the hormone. Clinical studies could

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with pectin—a fruit-based form of dietary fiber that binds to bile acids in the intestine to increase their rate of excretion.

Ginter gave a group of 21 healthy persons with mild hypercholesterolemia a granulated daily dose of 15 grams of citrus pectin and 450 mg. of vitamin C for 6 weeks. He found that this regimen produced a "striking increase" of blood levels of vitamin C and, in two-thirds of the subjects, led to a total cholesterol.

When he tried this therapy in outpatients with high cholesterol levels, he found that the combination of vitamin C & pectin reduced cholesterol levels to "almost 20% of their initial values".

Ginter also found that HDL-cholesterol levels (which protect against heart disease) did not decline in these subjects. The entire decline seemed to occur in LDL-cholesterol levels (which are associated with increased risk of heart disease).

These findings underscore the importance of fresh fruits and vegetables (the most significant natural sources of vitamin C and pectin) in the human diet. They also suggest that supplemental vitamin C and pectin can protect us against cardiovascular diseases.

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New Anti-Aging Therapy?

(continued from page 88)

also be conducted in humans at-risk for cancer and other aging-related diseases, as well as in elderly persons in general, who are at-risk for death.

If thymosin proves to have significant health and longevity benefits, it could be combined with other hormone replacement treatments, such as estrogen therapy for postmenopausal women, as well as other anti-aging techniques such as calorie restriction.

Other Research Areas

One potentially important area of research is the possible interaction between the hormones produced by the thymus and pituitary glands. Now that we know that the thymus "controls" immunity in the same way that the pituitary "controls" reproduction, sexual function, growth, maturation, temperature, and other essential life functions, we should be pursuing the ways in which the profound life-maintenance effects generated by these two organs affect the aging process.

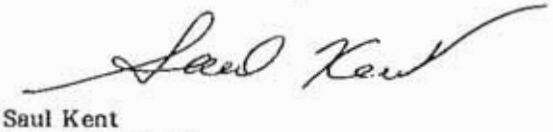
A clue to the possible interaction between these two organs may be the fact that the thymus begins to shrink in size and lose function at puberty—the same time that the pituitary has been said to release a "death" hormone that may trigger the aging process. (see ANTI-AGING NEWS, Vol. I, No. 10 - cover story).

Lack of Support

Unfortunately, none of these research avenues are currently being pursued. Allan Goldstein can't even get the money to investigate the effects of thymosin on health and longevity in mice—a relatively simple, straightforward study that could reveal enormous benefits for all of us.

Of course, his story is far from unique. Those of you who have been reading ANTI-AGING NEWS for the past year are well aware of the scandalous neglect of anti-aging research by both government and private industry.

We point this out to you, over and over again, not to discourage you in any way, but to make it clear that private contributions to organizations such as the LIFE EXTENSION FOUNDATION are necessary to fund the kind of research that could save your life.



Saul Kent
Editor/Publisher

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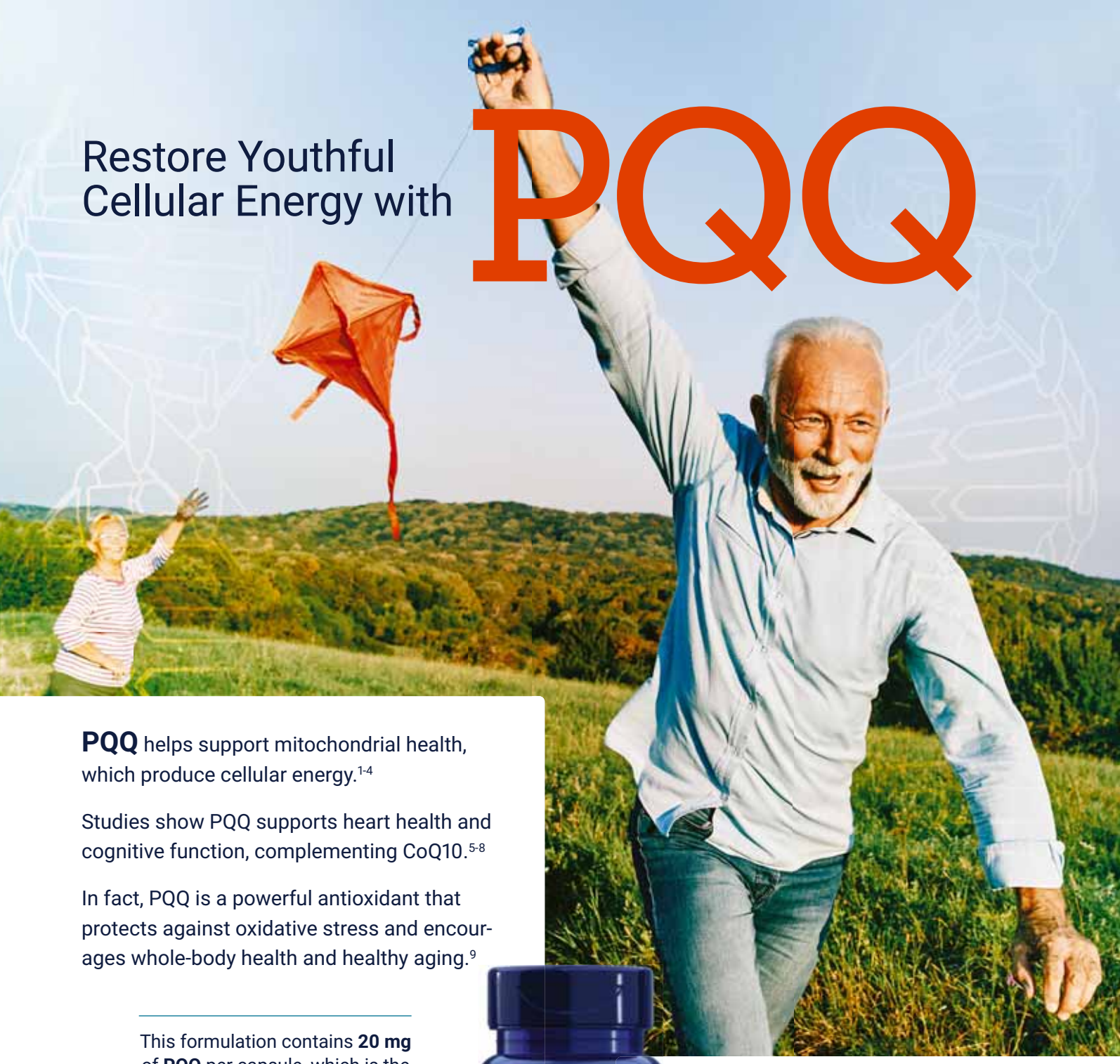

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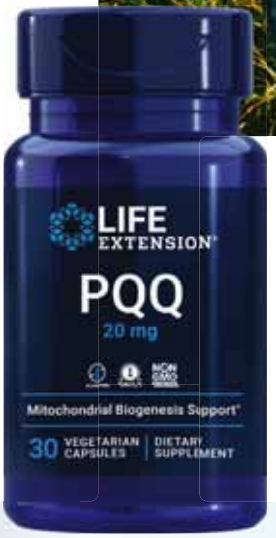

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The Alliance for Longevity Initiatives

Promoting Policies to Increase Healthspan

BY WILLIAM FALOON

Aging is the greatest risk factor for chronic diseases and conditions.

Yet less than **1%** of the **National Institutes of Health** (**NIH**) budget is allocated to studying **aging biology**.[1]

Enter the **Alliance for Longevity Initiatives** (**A4LI**). This nonprofit organization is devoted to advancing biomedical technology and increasing its availability, with the ultimate goal of boosting **healthy human lifespan**.

Founded in 2022, A4LI has already made strides in getting key players from **government** and the **longevity industry** on the same page in ways that may have a major health impact.

What is the Alliance for Longevity Initiatives?

The **Alliance for Longevity Initiatives** (**A4LI**) is an independent 501(c)(4) nonprofit organization that advocates for legislation and policies aimed at extending human **healthspan** (the number of healthy, disease-free years we live) and eventually ending the threat of **age-related disease**.

It also focuses, according to its mission statement, "on accelerating equitable access to **next-generation therapies**."

Since its founding, the Alliance for Longevity Initiatives has helped foster collaboration between **policy advocates** and **longevity scientists** in academic institutions and biotechnology companies to ensure legislative action is supporting the needs of scientists and entrepreneurs.

Early Achievements

In February 2023, the Alliance for Longevity Initiatives was the driving force behind the formation of the first **Longevity Science Caucus**. This *bipartisan* group of Congressional House members is composed of members of the Energy and Commerce Committee, which has jurisdiction over biomedical research in the U.S.

The caucus was formed to help Americans sustain a healthy **lifespan** by:

- Promoting an increase in appropriations for **biology-of-aging research**,
- Supporting aging and longevity **biotechnology**, and
- Facilitating streamlined **regulations**.

The **A4LI** also worked with Montana's State Senate to facilitate passage of Senate Bill 422, which expands patient access to **therapeutics** under the existing **Right to Try** law.

As a result, since October 2023, ***all patients*** in Montana—not just terminally ill patients—have the right to access therapeutics that have passed Phase I safety trials, dramatically reducing the time required to go from lab to bedside.

This expansion of Montana's Right to Try law may lead to a similar expansion across the country, ensuring that many more Americans have the right to access life-saving **health and longevity therapeutics** as soon as possible.

The A4LI is also working towards making longevity therapeutics that are still in the pipeline more *rapidly* accessible and equitable to the public. For example, the organization produced a white paper titled ***The Advanced Approval Pathway for Longevity Medicine***. It lays out a fast-track approval process to expedite the market entry of **anti-aging** therapies.

The First "DC Fly-In"

In March 2024, the A4LI held its inaugural "**DC Fly-In**" event, attended by 80 representatives of the longevity industry and over two dozen Congressional staffers.

This two-day event kicked off with a panel with the **Advanced Research Projects Agency for Health** (**ARPA-H**). Featured were Arunan Skandarajah, PhD, and Geoffrey Ling, MD, PhD, who each spoke about the agency's goals and how it should best incorporate and fund research into **geroscience** (how aging drives disease).

The Congressional briefing included the **Longevity Science Caucus** co-chairs, Congressmen Paul Tonko (NY-D) and Gus Bilirakis (FL-R), who spoke about their interests in being more supportive of this emerging field.

For the benefit of Congressional staffers in attendance, longevity industry leaders Kristen Fortney, Joe Betts-LaCroix, and Matt Kaeberlein presented '**Longevity 101**' lectures.

The briefings also emphasized to Representatives Tonko and Bilirakis that the longevity industry is a vibrant and evolving sector that needs strong political leadership to push for **pro-longevity legislative action**.

In attendance were **Newt Gingrich**, former Speaker of the House, and **Mike Stebbins**, former Assistant Director of Biotechnology in the Obama White House Office of Science and Technology Policy, and a driver of ARPA-H's creation. Both delivered keynote addresses that highlighted the importance of **A4LI**'s initiatives and its political action moving forward.

Following the success of this event, the **Alliance for Longevity Initiatives** plans to continue hosting annual "DC Fly-Ins." This will allow the A4LI and longevity industry leaders to continue educating members of Congress and interested federal agencies about the longevity industry and the role it can play in the future of healthcare.

A4LI's Response to Proposed NIH Reform

In August 2024, Chair of the House Energy and Commerce Committee Cathy McMorris-Rodgers (R-WA) proposed reforms for the **National Institutes of Health** with the aim of enhancing clarity, transparency, and oversight.

The reforms included changing the name of the **National Institute on Aging** (**NIA**) to the ***National Institute on Dementia***. The A4LI believes that this name change would *hinder* progress in longevity and the biology of aging research.

Instead, the A4LI proposed the establishment of a new **National Institute for Longevity and Aging Research** (**NILAR**).

The proposed new institute would enhance the existing National Institute on Aging by:

- Further increasing support for **aging biology** research and **geroscience**,
- Acting as a collaborative institute with other NIH age-related-disease institutes to advance **cures** for individual diseases, and
- Working with the **U.S. Food and Drug Administration (FDA)** to address obstacles that companies face in bringing gerotherapeutics (drugs that target causes of aging) to market.

The **A4LI** gathered nearly 700 signatures in support of the proposed institute in less than two weeks. If the institute can win Congressional approval, it will mark a substantial achievement in promoting longer **healthspan** and **lifespan** for all Americans.

Looking Ahead

The **Alliance for Longevity Initiatives** "is very proud of what we have accomplished," says founder and CEO Dylan V. Livingston. "But the work done so far is just the tip of the iceberg."

To make a difference in the years ahead, he notes, "we must sustain and expand [our] legislative impact. We must reorient the U.S. government's priorities, so that its main focus is keeping its citizenry as healthy as possible, for as long as possible."

To read more, visit: https://a4li.org/.

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

Reference

1. Available at: https://a4li.org/. Accessed December 6, 2024.

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4. *J Clin Periodontol.* 1984 Oct;11(9):619-28.
5. *Ann Stomatol (Roma).* 2011 Mar-Jun; 2(3-4):10-8.

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Dr. Michael Aziz
The Ageless Revolution
Looking Younger, and Living Longer

BY LAURIE MATHENA

Dr. Michael Aziz is a premier anti-aging doctor with a mission to help people defeat disease, reverse aging, and live longer.

In addition to his large anti-aging practice in New York City, Dr. Aziz has been a keynote speaker for groups like the American Academy of Anti-Aging Medicine, and he has appeared on television programs such as *The Doctors, The View, Fox and Friends, CBN*, and more.[1]

In his latest book, *The Ageless Revolution*, Dr. Aziz gives step-by-step instructions for tackling key hallmarks of aging.

The result is an anti-aging blueprint that guides the reader through what to do—and what NOT to do—to live a healthier, longer life.

This book is the culmination of years of study and research—and of Dr. Aziz's own personal experience utilizing the tools he recommends.

A New Start

During Dr. Aziz's three decades practicing as a board-certified internal medicine doctor, he saw firsthand that the traditional medical system is flawed.

"There's very little you can do in a short 15-minute visit when you're seeing 30 patients a day," said Dr. Aziz. "You're only putting a band-aid on the problem and not fixing any underlying issue. I was not able to make a dramatic difference in people's lives."

In addition, Dr. Aziz was facing his own health struggles despite following common medical advice.

By age 38, he was overweight, had prediabetes, and was tired all the time.

To address these issues Dr. Aziz retrained to be a functional medicine physician. During this time, he learned how to get to the root of health issues and how to be proactive in the fight against aging.

"Doctors treat aging as normal. In reality, aging is a disease," said Dr. Aziz. "It's ok to get older, but it's not ok to get sick. I want to teach people how to slow down the aging process and extend life."

His latest book, *The Ageless Revolution*, puts this plan into action.

An Arsenal of Anti-Aging Weapons

In his book, Dr. Aziz focuses on 10 hallmarks of aging.

These hallmarks include gut dysbiosis, the accumulation of senescent cells, mitochondrial dysfunction, epigenetic changes, shortened telomeres, and others.

To tackle Dr. Aziz's proposed hallmarks, he recommends working in stages.

Stage one is to focus on basics like diet, exercise, and reducing bad habits.

A healthy diet is a cornerstone of any healthy aging regimen. But Dr. Aziz warns against popular diets like low-fat, low-carb, or keto—all of which can lead to more health problems than benefits.

Instead, Dr. Aziz has a simple message, "Eat a clean, balanced diet without too much fat or protein."

Beyond diet, reducing bad habits like going to bed late, eating processed food, or not exercising, can help fight aging by reducing epigenetic changes.

"Bad habits are like switches that turn on genes for cancer, skin aging, and other conditions," said Dr. Aziz.

For the next level up, he recommends taking targeted anti-aging supplements.

This includes supplements like **omega-3** fatty acids, which are linked to living longer because they improve heart health and fight inflammation,[3] and folic acid, which may reduce the risk of stroke by **18%**.[4]

Dr. Aziz recommends **nicotinamide riboside** because it boosts NAD^+ in the body, which he has dubbed "the fountain-of-youth supplement" for its ability to optimize DNA repair and brain function, protect nerves, decrease pain, and slow the aging process.

Others on his must-have list include taurine, resveratrol, quercetin, fisetin, carnosine, selenium, ubiquinol, nattokinase, and more.

Dr. Aziz, who takes close to 30 supplements per day, says that, "Supplements are a nice insurance to eating right and exercising. Taking the right supplements can extend your life."

Take Anti-Aging to the Next Level

Dr. Aziz's next level up in the quest to combat the hallmarks of aging includes practicing *hormetic* stress, a type of beneficial stress that builds resilience in your body.

For example, intermittent fasting, which involves going a period of time without eating, has been shown to reduce inflammation and markers of oxidative stress while boosting antiaging processes. One study in cardiac catheterization patients found that those who fasted routinely during at least five years were associated with a **49%** lower risk of early death.[5]

Cryotherapy, a treatment that exposes the body to near-freezing temperatures, builds collagen in the skin,[6] and stimulates healthy, metabolically active brown fat.[7]

On the other end of the temperature extremes, using a sauna four times a week has been tied to a lower risk of heart attack.[8]

Dr. Aziz recommends utilizing advanced blood tests to check for hormone imbalances, nutrient deficiencies, genetic testing, and other biomarkers.

Success Stories

Since becoming a functional medicine doctor, Dr. Aziz has helped thousands of patients turn their health—and their life—around.

Like Carly, who lost more than 100 pounds following Dr. Aziz's diet plan and was able to avoid knee surgery after a torn ACL.

Or Chris, who was able to resolve his type II diabetes and stop taking medication.

Or Steve, who resolved his issues with fatigue, low libido, and erectile dysfunction by addressing the underlying issue with diet, supplements, and testosterone replacement therapy.

Countless other patients have been able to stop taking their cholesterol and blood pressure medications, normalize kidney function, or no longer need a sleep apnea machine.

Another one of Dr. Aziz's success stories is himself. Today, at age 59, Dr. Aziz says that by implementing the steps he lays out in his book, he has turned his health around.

"When I look at myself, I think I'm really becoming ageless myself. I'm fit now, I'm not overweight. My blood pressure is perfect. My blood sugar is good," said Dr. Aziz

One big reason is because he has implemented yet another key strategy of people who have long lifespans: He is living his life with purpose.

"My purpose in life is bigger than just becoming a doctor," said Dr. Aziz. "I want to help people live better, to prevent age-related diseases, and to live longer. This book is the biggest gift I can give to anybody." •

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Dr. Michael Aziz practices in Manhattan. To book an appointment with Dr. Aziz, visit **www.michaelazizmd.com**

To order a copy of *The Ageless Revolution*, call 1-800-544-4440 or visit **www.LifeExtension.com**

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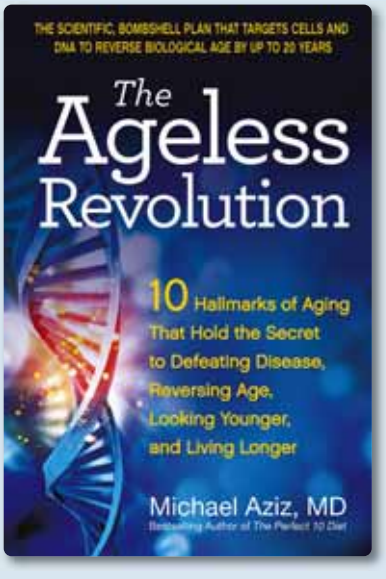

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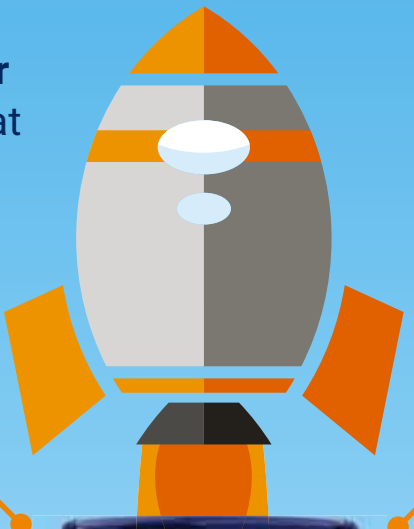

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02357 Life Extension Mix™ Tablets with Extra Niacin
02365 Life Extension Mix™ Tablets without Copper
02292 Once-Daily Health Booster • 30 softgels
02291 Once-Daily Health Booster • 60 softgels
02313 One-Per-Day Tablets
02317 Two-Per-Day Capsules • 60 capsules
02314 Two-Per-Day Capsules • 120 capsules
02316 Two-Per-Day Tablets • 60 tablets
02315 Two-Per-Day Tablets • 120 tablets
02428 Whole Food Multivitamin

NERVE & COMFORT SUPPORT

02202 ComfortMAX™
02303 Discomfort Relief

PERSONAL CARE

02322 Hair, Skin & Nails Collagen Plus Formula
01278 Life Extension Toothpaste
00408 Venotone
02252 Youthful Legs

PET CARE

01932 Cat Mix
01931 Dog Mix

PROBIOTICS

01622 Bifido GI Balance
01825 FLORASSIST® Balance
02421 FLORASSIST® Daily Bowel Regularity
02125 FLORASSIST® GI with Phage Technology
01821 FLORASSIST® Heart Health
02250 FLORASSIST® Mood Improve
02208 FLORASSIST® Immune & Nasal Defense
02120 FLORASSIST® Oral Hygiene
02203 FLORASSIST® Prebiotic
02505 FLORASSIST® Probiotic Women's Health

SKIN CARE

02423 Daily Skin Defense
01938 Shade Factor™
02129 Skin Care Collection Anti-Aging Serum
02130 Skin Care Collection Day Cream
02131 Skin Care Collection Night Cream
02096 Skin Restoring Ceramides
02528 Vegan Pro Collagen

SLEEP

01512 Bioactive Milk Peptides
02300 Circadian Sleep
01511 Enhanced Sleep without Melatonin
02234 Fast-Acting Liquid Melatonin
01669 Glycine
02308 Herbal Sleep PM
01722 L-Tryptophan
01668 Melatonin • 300 mcg, 100 veg capsules
01083 Melatonin • 500 mcg, 200 veg capsules
00329 Melatonin • 1 mg, 60 capsules
00330 Melatonin • 3 mg, 60 veg capsules
00331 Melatonin • 10 mg, 60 veg capsules
00332 Melatonin • 3 mg, 60 veg lozenges
02201 Melatonin IR/XR
01787 Melatonin 6 Hour Timed Release 300 mcg, 100 veg tablets
01788 Melatonin 6 Hour Timed Release 750 mcg, 60 veg tablets
01786 Melatonin 6 Hour Timed Release 3 mg, 60 veg tabs
01721 Optimized Tryptophan Plus
01445 Quiet Sleep Melatonin • 5 mg, 60 veg capsules
02502 Rest & Renew
02526 Serene Sleep

VITAMINS

01533 Ascorbyl Palmitate
00920 Benfotiamine with Thiamine
01945 BioActive Complete B-Complex
00102 Biotin
00084 Buffered Vitamin C Powder
02229 Fast-C® and Bio-Quercetin®
02075 Gamma E Mixed Tocopherol Enhanced with Sesame Lignans
02070 Gamma E Mixed Tocopherol & Tocotrienols
01913 High Potency Optimized Folate
01674 Inositol Caps
02244 Liquid Vitamin D3 • 50 mcg (2000 IU)
02232 Liquid Vitamin D3 (Mint) • 50 mcg (2000 IU)
01936 Low-Dose Vitamin K2
00373 No Flush Niacin
01939 Optimized Folate (L-Methylfolate)
01217 Pyridoxal 5'-Phosphate Caps
01400 Super Absorbable Tocotrienols
02334 Super K
01863 Super Vitamin E
02422 Vegan Vitamin D3
02028 Vitamin B5 (Pantothenic Acid)
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® 60 veg tablets
02227 Vitamin C and Bio-Quercetin® 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
01432 Optimized Saffron
02511 Thermo Weight Control
02509 Waistline Control™

WOMEN'S HEALTH

01942 Breast Health Formula
02537 Daily PMS Relief
02534 Estrogen Balance Elite
01894 Estrogen for Women
02204 Menopause Relief
02319 Prenatal Advantage
02536 Sexual Health for Her
01649 Soy Isoflavones
02513 Women's Bladder Support

1000 MG Glycine CAPSULES

For Restful Sleep and Much More

Item #01669
100 vegetarian capsules

1 bottle **$12**
4 bottles $11 each

GLUTEN FREE · NON GMO LE CERTIFIED · VEGETARIAN LE CERTIFIED

For occasional sleeplessnes.

Glycine is an amino acid that functions as a precursor to *multiple* bodily functions.[1]

Glycine has properties for promoting calming sleep.[1,2]

It also plays a role in gene expression,[1] and metabolic,[1,2] cardiovascular,[2] and brain health.[1,2]

A randomized controlled trial in a small number of older adults suggests that relatively high doses of glycine plus N-acetylcysteine may help support several functional and structural factors associated with decline during aging.[3]

For full product description and to order **Life Extension® Glycine**, call **1-800-544-4440** or visit **www.LifeExtension.com**

References
1. *Oxid Med Cell Longev.* 2017;2017:1716701.
2. *Ochsner J.* 2018 Spring;18(1):81-7.
3. *J Gerontol A Biol Sci Med Sci*. 2023;7(1):75-89.

GLUTEN FREE

NON GMO LE CERTIFIED

#1 Rated
Multivitamins | 11 Time Winner![†]

Good Things Come in Twos

Two-Per-Day Multivitamin Tablets

Item #02315 | 120 tablets
1 bottle **$18.38**
4 bottles $16.25 each

Two-Per-Day Multivitamin Capsules

Item #02314 | 120 capsules
1 bottle **$19.13**
4 bottles $17 each

Each bottle provides a two-month supply.

For full product description and to order
Two-Per-Day Multivitamin,
call **1-800-544-4440** or visit **www.LifeExtension.com**

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. Vitamin D supplementation is not recommended for individuals with high blood calcium levels.

† Ratings based on results of the 2024 ConsumerLab.com Survey of Supplement Users. More information at www.consumerlab.com/survey.

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TWO-PER-DAY Multivitamin provides:

Vitamin A (beta-carotene, and acetate)	**1500 mcg RAE^**
Vitamin D3 (cholecalciferol)	**(2,000 IU) 50 mcg**
Vitamin C (ascorbic acid, calcium and niacinamide ascorbates)	**470 mg**
Vitamin E (D-alpha tocopheryl succinate, D-alpha tocopherol)	**67 mg**
Vitamin E (gamma, delta, alpha, beta tocopherols)	**20 mg**
Vitamin B1 (thiamine HCl)	**75 mg**
Vitamin B2 (riboflavin, riboflavin 5'-phosphate)	**50 mg**
Vitamin B3 (niacinamide, niacinamide ascorbate)	**50 mg NE•**
Vitamin B5 (D-calcium pantothenate)	**50 mg**
Vitamin B6 (pyridoxine HCl, pyridoxal 5'-phosphate)	**75 mg**
Folate (5-MTHF)	**680 mcg DFE°**
Vitamin B12 (methylcobalamin)	**300 mcg**
Biotin	**300 mcg**
Iodine (potassium iodide)	**150 mcg**
Magnesium (magnesium oxide)	**100 mg**
Zinc (zinc citrate, L-OptiZinc® zinc mono-L-methionine sulfate)	**25 mg**
Manganese (manganese citrate, gluconate)	**2 mg**
Chromium [Crominex® 3+ chromium stabilized with Capros® amla extract (fruit), PrimaVie® Shilajit]	**200 mcg**
Molybdenum (amino acid chelate)	**100 mcg**
Inositol	**50 mg**
Alpha lipoic acid	**25 mg**
Bio-Quercetin® Proprietary Blend providing 35% quercetin (5 mg) [from Japanese sophora concentrate (flower bud)], 30% galactomannans (4 mg) [from fenugreek (seed)]	**14 mg**
Marigold extract [std. to 5 mg *trans*-lutein, 155 mcg *trans*-zeaxanthin]	**11.12 mg**
Apigenin	**5 mg**
Boron (boron amino acid chelate)	**3 mg**
Lycopene [LycoBeads® natural tomato extract (fruit)]	**1 mg**
Selenium [as sodium selenite, SelenoExcell® high selenium yeast, Se-methyl L-selenocysteine]	**200 mcg**

^ RAE (retinol activity equivalents). °DFE (dietary folate equivalents). •NE (niacin equivalents).

For complete list of ingredients and dosages, visit **www.LifeExtension.com**

LIFE EXTENSION®

The Science of a Healthier Life®

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FORT LAUDERDALE, FLORIDA 33340-7198

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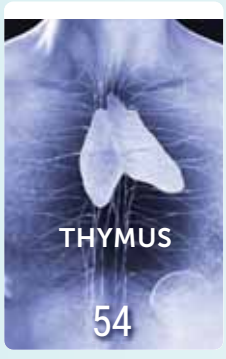

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