



The Science of a Healthier Life®

LifeExtension.com

November 2021

FEATURE ARTICLES

- 7 Misconceptions about Vitamin C
- 24 Enhance Your Joint Mobility
- 34 Sage Boosts Short-Term Memory
- 44 Whole-Body Impact of Vitamin K
- 54 Combat Sore Throats
- 63 Boron's Anti-Cancer Effects
- 68 Reduce Atherosclerotic Risk
- 77 Taurine Helps Resist Infections

More Vitamin C



PLUS: PAGE 24

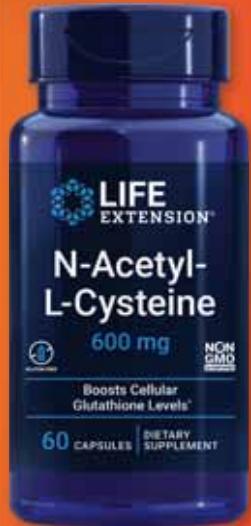
Nutrients that Combat Joint Discomfort

BREATHE EASY



N-ACETYL-L-CYSTEINE

Supports Healthy
Respiratory Tract Function



N-Acetyl-L-Cysteine (NAC) supports healthy levels of **glutathione**, a molecule utilized by all cells for protection against free-radical damage and attacks from pathogens.

NAC is a powerful antioxidant that helps clear airways, and benefits bronchial, respiratory, liver, and immune health.

For full product description and to order **N-Acetyl-L-Cysteine**, call 1-800-544-4440 or visit www.LifeExtension.com

Caution: Those who supplement with NAC should drink 6 to 8 glasses of water daily in order to prevent cysteine renal stones. Cysteine renal stones are rare but do occur.

Item #01534
600 mg, 60 capsules

1 bottle \$10.50
4 bottles \$9.25 each



REPORTS



7 ON THE COVER

MISCONCEPTIONS ABOUT VITAMIN C

Vitamin C is only partially **absorbed** at doses above **200 mg** and is then rapidly used up.

A **liposomal “hydrogel”** formula elevates **vitamin C** blood levels **6.8 times more** and provides **24-hour protection** with **one daily dose**.

24 BOOST JOINT MOBILITY AND REDUCE PAIN

In a clinical trial of non-arthritic men and women, two **plant extracts** improved walking distance and speed, knee range-of-motion, and joint pain.

34 SAGE BOOSTS BRAIN FUNCTION

Older adults taking a **sage extract** had an approximate **60%** better performance in a composite measure of **memory** and about a **2.5-fold** increase in a measure of **attention**. Results were seen within hours.

44 WHOLE-BODY BENEFITS OF VITAMIN K

Vitamin K has demonstrated multifunctional effects throughout the body to reduce heart disease, build stronger bones, promote brain health, and lower inflammation. A human study published by the **American Heart Association** shows that *higher vitamin K* intake lowered risk of cardiovascular disease and hospitalizations.

54 PROBIOTIC HELPS PREVENT STREP THROAT

Strep throat can have complications such as rheumatic heart disease and kidney damage. In human trials, a novel **probiotic** reduced the incidence of **strep throat** by **84%** in adults and **97%** in children.

63 WHAT IS BORON?

The trace mineral boron provides profound **anti-cancer** effects, in addition to maintaining stronger bones.

68 REDUCE ATHEROSCLEROTIC RISK

New human data further validate how two **plant extracts** can slow and reverse atherosclerosis.

DEPARTMENTS

17 IN THE NEWS

Tea may lower risk of cardiovascular disease; lifestyle + diet changes reduce biological age; melatonin increases survival in men with metastatic prostate cancer; omega-3s linked to fewer migraines.

77 RESEARCH UPDATE: TAURINE

A study finds that taurine metabolites feed beneficial gut microbiota to potentially combat dangerous intestinal bacteria.

81 SUPER FOODS

Low-calorie spinach contains calcium, magnesium, iron, vitamin K, nitrates, and lutein. It may help slow cognitive decline, improve blood flow, and protect against age-related blindness.



85 WELLNESS PROFILE

Fitness expert and TV celebrity Jillian Michaels shares her personal health and anti-aging journey, her recommendations for a diet and exercise program, and key ways to age well.





The Science of a Healthier Life®

LifeExtension.com

November 2021

Volume 27 • Number Eleven
Publisher • LE Publications, Inc.

Help yourself to healthy savings!

Get \$10 Off +
FREE Shipping on orders of \$75+ when you sign up for emails & texts.

Offer Expires August 31, 2021. By signing up via text, you agree to receive recurring automated promotional and personalized marketing text messages (e.g. cart reminders) from Life Extension at the cell number used when signing up. Consent is not a condition of any purchase. Reply HELP for help and STOP to cancel. Msg frequency varies. Msg & data rates may apply. See Offer for details. View Terms <https://www.lifeextension.com/legal/legal-notices-01#TextAndPrivacy>

Text "HEALTH" to 543339 to sign up for emails & texts.

Customer care is available to take your calls 24 hours a day, 7 days a week: 1-800-544-4440

Visit the Life Extension® Nutrition Center Store

- The Most Complete Line of Life Extension Supplements
- Blood Testing and Analysis
- Personal Consultation with Life Extension Product/Wellness Specialist



NEW LOCATION

Nutrition Center of Florida, Inc., 900 North Federal Highway, Fort Lauderdale, FL 33304 • Phone: 954-766-8144

Hours: Monday-Friday 9 am-8 pm, Saturday 9 am-6 pm, Sunday 11 am-5 pm



#1 Rated
Catalog/Internet Merchant
6 Time Winner!*

* Ratings based on results of the 2021 ConsumerLab.com survey of supplement users.
More information at www.ConsumerLab.com/survey.

LIFE EXTENSION (ISSN 1524-198X) Vol. 27, No. 11 ©2021 is published monthly except bi-monthly in April by LE Publications, Inc. at 3600 West Commercial Blvd., Ft. Lauderdale, FL 33309-3338. LE Publications, Inc. All rights reserved. Published 13 times a year. Subscription rate: \$40 per year in the United States. US \$47 in Canada. US \$60 in other countries. Mail subscriptions or address changes to: LE Publications, Inc., P.O. Box 407198, Ft Lauderdale, FL 33340-7198, USA. Or phone us toll-free at: 1-800-841-5433. Canada Subscriptions: Publications mail agreement number 40028967. Return undeliverable Canadian addresses to PO Box 503, RPO West Beaver Creek, Richmond Hill, ON L4B4R6. You will be sent your first issue within six weeks after LE Publications, Inc. receives your subscription fee. Periodicals Postage paid at Ft Lauderdale, FL and at additional mailing offices. POSTMASTER: Send address changes to Life Extension, P.O. Box 407198, Ft Lauderdale, Florida 33340-7198, USA. Printed in USA. The articles in this magazine are intended for informational purposes only. They are not intended to replace the attention or advice of a physician or other health-care professional. Anyone who wishes to embark on any dietary, drug, exercise, or other lifestyle change intended to prevent or treat a specific disease or condition should first consult with and seek clearance from a qualified health-care professional. **LEGAL NOTICE:** Health claims contained in articles and advertisements in this publication have not been approved by the FDA with the exception of FDA-approved, qualified health claims for calcium, antioxidant vitamins, folic acid and EPA and DHA omega-3 fatty acids, and selenium as noted where applicable. *Life Extension® Magazine* does not endorse any of the businesses or the products and/or services that may appear in advertisements for non-Life Extension branded products or services contained in it, except to state that they are advertisers who may have paid Life Extension for placement of an advertisement in this publication. Life Extension disclaims any and all responsibilities or warranties as to the accuracy of information contained in advertisements for non-Life Extension branded products or services. For Canadian customers send change of address information and blocks of undeliverable copies to P.O. Box 1051, Fort Erie, ON L2A 6C7.

Editorial

Editor-in-Chief • Philip Smith
Executive Managing Editor • Renee Vermeulen
Medical Editor • Hernando Latorre, MD, MSc
Senior Editor • Dan Jewel
Senior Staff Writer • Michael Downey
Department Editor • Laurie Mathena
Associate Editor • Rivka Rosenberger, EdD
Creative Director • Robert Vergara
Art Director • Alexandra Maldonado

Chief Medical Officer Chief Scientific Officer
Steven Joyal, MD Andrew Swick, MS, PhD

Scientific Advisory Board

Richard Black, DO • John Boik, PhD • Aubrey de Grey, PhD
Deborah F. Harding, MD • Steven B. Harris, MD • Sandra C. Kaufmann, MD
Peter H. Langsjoen, MD, FACC • Dipnarine Maharaj, MD
L. Ray Matthews, MD, FACS • Ralph W. Moss, PhD
Michael D. Ozner, MD, FACC • Jonathan V. Wright, MD • Xiaoxi Wei, PhD

Contributors

Michael Cortez • Michael Downey • Paz Etcheverry, MS, PhD
Chancellor Faloon • Laurie Mathena • Jan Newton

Advertising

Vice President of Marketing • Rey Searles • rsearles@lifeextension.com
National Advertising Manager • JT Hroncich • 404-347-4170

Senior Director of Sales and Business Development

Carolyn Bouchard • cbouchard@lifeextension.com • 954-202-7685

Circulation & Distribution

Life Extension • 3600 West Commercial Blvd., Ft. Lauderdale, FL 33309
Editorial offices: 954-766-8433 • fax: 954-491-5306

Customer Service: 800-678-8989 • Email: customerservice@LifeExtension.com
Wellness specialists: 800-226-2370 • Email: wellness@LifeExtension.com

Life Extension® Magazine values your opinion and welcomes feedback. Please mail your comments to *Life Extension Magazine*, Attn: Letters to the Editor, PO Box 407198, Ft Lauderdale, FL 33340 or email us: LEmagazine@LifeExtension.com

THiNK ZiNC

FOR IMMUNE HEALTH



You know zinc is good for you—but are you getting enough?

Zinc promotes healthy immune responses.

Life Extension® provides **50 mg** of highly **absorbable** zinc in each vegetarian capsule.



Item #01813

50 mg • 90 vegetarian capsules

1 bottle \$6.75 • 4 bottles \$6 each



Caution: Supplemental zinc can inhibit the absorption and availability of copper. If more than 50 mg of supplemental zinc is to be taken daily for more than four weeks, 2 mg of supplemental copper should also be taken to prevent copper deficiency.

For full product description and to order Zinc Caps call 1-800-544-4440 or visit www.LifeExtension.com

OptiZinc® is a registered trademark of InterHealth Nutritionals, Inc.

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.

MEDICAL ADVISORY BOARD

Gustavo Tovar Baez, MD, operates the Life Extension Clinic in Caracas, Venezuela. He is the first physician in Caracas to specialize in anti-aging medicine.

Ricardo Bernales, MD, is a board-certified pediatrician and general practitioner in Chicago, IL, focusing on allergies, bronchial asthma, and immunodeficiency.

Mark S. Bezzek, MD, FACP, FAARM, FAAEM, is boardcertified in internal medicine, emergency medicine, and anti-aging/regenerative medicine. He is the director of Med-Link Consulting, which specializes in bioidentical hormone replacement therapy, natural alternatives, anti-aging, and degenerative diseases. He holds U.S. patents for a multivitamin/mineral supplement, an Alzheimer's/dementia compilation, and a diabetic regimen.

Thomas F. Crais, MD, FACS, a board-certified plastic surgeon, was medical director of the micro-surgical research and training lab at Southern Baptist Hospital in New Orleans, LA, and currently practices in Sun Valley, ID.

William Davis, MD, is a preventive cardiologist and author of *Wheat Belly: Lose the Wheat, Lose the Weight and Find Your Path Back to Health*. He is also medical director of the online heart disease prevention and reversal program, *Track Your Plaque* (www.trackyourplaque.com).

Martin Dayton, MD, DO, practices at the Sunny Isles Medical Center in North Miami Beach, FL. His focus is on nutrition, aging, chelation therapy, holistic medicine, and oxidative medicine.

John DeLuca, MD, DC, is a 2005 graduate of St. George's University School of Medicine. He completed his internal medicine residency at Monmouth Medical Center in Long Branch, NJ, in 2008 and is board-certified by the American Board of Internal Medicine. Dr. DeLuca is a Diplomate of the American Academy of Anti-Aging Medicine and has obtained certifications in hyperbaric medicine, pain management, nutrition, strength and conditioning, and manipulation under anesthesia.

Sergey A. Dzugan, MD, PhD, was formerly chief of cardiovascular surgery at the Donetsk Regional Medical Center in Donetsk, Ukraine. Dr. Dzugan's current primary interests are anti-aging and biological therapy for cancer, cholesterol, and hormonal disorders.

Patrick M. Fratellone, MD, RH, is the founder and executive medical director of Fratellone Associates. He completed his internal medicine and cardiology fellowship at Lenox Hill Hospital in 1994, before becoming the medical director for the Atkins Center for Complementary Medicine.

Norman R. Gay, MD, is proprietor of the Bahamas Anti-Aging Medical Institute in Nassau, Bahamas. A former member of the Bahamian Parliament, he served as Minister of Health and Minister of Youth and Sports.

Mitchell J. Ghen, DO, PhD, holds a doctorate in holistic health and anti-aging and serves on the faculty of medicine at the Benemerita Universidad Autonoma De Puebla, Mexico, as a professor of cellular hematopoietic studies.

Gary Goldfaden, MD, is a clinical dermatologist and a lifetime member of the American Academy of Dermatology. He is the founder of Academy Dermatology of Hollywood, FL, and COSMESIS Skin Care.

Miguelangelo Gonzalez, MD, is a certified plastic and reconstructive surgeon at the Miguelangelo Plastic Surgery Clinic, Cabo San Lucas.

Garry F. Gordon, MD, DO, is a Payson, Arizona-based researcher of alternative approaches to medical problems that are unresponsive to traditional therapies. He is president of the International College of Advanced Longevity Medicine.

Richard Heifetz, MD, is a board-certified anesthesiologist in Santa Rosa, CA, specializing in the delivery of anesthesia for office-based, plastic/cosmetic surgery, chelation therapy, and pain management.

Roberto Marasi, MD, is a psychiatrist in Brescia and in Piacenza, Italy. He is involved in anti-aging strategies and weight management.

Maurice D. Marholin, DC, DO, is a licensed chiropractic physician and board-certified osteopathic family physician. While training at the University of Alabama, he completed fellowships in Clinical Nutrition and Behavioral Medicine. He is currently in private practice in Clermont, FL.

Professor Francesco Marotta, MD, PhD, of Montenapoleone Medical Center, Milan, Italy, is a gastroenterologist and nutrigenomics expert with extensive international university experience. He is also a consulting professor at the WHO-affiliated Center for Biotech & Traditional Medicine, University of Milano, Italy and honorary resident professor, Nutrition, Texas Women's University. He is the author of more than 130 papers and 400 lectures.

Philip Lee Miller, MD, is founder and medical director of the Los Gatos Longevity Institute in Los Gatos, CA.

Michele G. Morrow, DO, FAAFP, is a board-certified family physician who merges mainstream and alternative medicine using functional medicine concepts, nutrition, and natural approaches.

Filippo Ongaro, MD, is board-certified in anti-aging medicine and has worked for many years as flight surgeon at the European Space Agency. He is a pioneer in functional and anti-aging medicine in Italy where he also works as a journalist and a writer.

Lambert Titus K. Parker, MD, an internist and a board- certified anti-aging physician, practices integrative medicine from a human ecology perspective with emphasis on personalized brain health, biomarkers, genomics and total health optimization. He serves as the Medical Director of Integrative Longevity Institute of Virginia, a 501(c)3 Non-Profit Medical Research Institute. He also collaborates on education and research for Hampton Roads Hyperbaric Therapy.

Ross Pelton, RPh, PhD, CCN, is scientific director for Essential Formulas, Inc.

Patrick Quillin, PhD, RD, CNS, is a clinical nutritionist in Carlsbad, CA, and formerly served as vice president of nutrition for Cancer Treatment Centers of America, where he was a consultant to the National Institutes of Health.

Allan Rashford, MD, graduated from the University of Iowa Medical School. Upon completing medical training, he became chief of medicine at St. Francis Hospital in South Carolina, and he was later named president of the Charleston Medical Society.

Marc R. Rose, MD, practices ophthalmology in Los Angeles, CA, and is president of the Rose Eye Medical Group. He is on the staff of Pacific Alliance Medical Center, Los Angeles, and other area hospitals.

Michael R. Rose, MD, a board-certified ophthalmologist with the Rose Eye Medical Group in Los Angeles, CA, is on the staff of the University of Southern California and UCLA.

Ron Rothenberg, MD, is a full clinical professor at the University of California San Diego School of Medicine and founder of California HealthSpan Institute in San Diego.

Roman Rozencwaig, MD, is a pioneer in research on melatonin and aging. He practices in Montreal, Canada, as research associate at Montreal General Hospital, Department of Medicine, McGill University.

Michael D. Seidman, MD, FACS, is the director of skull base surgery and wellness for the Adventist Health System in Celebration, FL.

Ronald L. Shuler, BS, DDS, CCN, LN, is involved in immunoncology for the prevention and treatment of cancer, human growth hormone secretagogues, and osteoporosis. He is board-certified in anti-aging medicine.

SCIENTIFIC ADVISORY BOARD



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.



Richard Black, DO, is a dedicated nuclear medicine physician practicing as an independent contractor out of Cleveland, Ohio. Dr. Black is board certified in internal medicine and nuclear medicine, and is licensed to practice medicine in multiple states throughout the United States.



John Boik, PhD, is the author of two books on cancer therapy, *Cancer and Natural Medicine* (1996) and *Natural Compounds in Cancer Therapy* (2001). He earned his doctorate at the University of Texas Graduate School of Biomedical Sciences with research at the MD Anderson Cancer Center, focusing on screening models to identify promising new anti-cancer drugs. He conducted his postdoctoral training at Stanford University's Department of Statistics.



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.



Deborah F. Harding, MD, is founder of the Harding Anti-Aging Center. She is double board-certified in internal medicine and sleep disorder medicine. She also earned the Cenegenics certification in age management medicine. She is a faculty member of the University of Central Florida Medical School.



Steven B. Harris, MD, is president and director of research at Critical Care Research, a company that grew out of 21st Century Medicine in Rancho Cucamonga, CA. Dr. Harris participates in groundbreaking hypothermia, cryothermia, and ischemia research. His research interests include antioxidant and dietary-restriction effects in animals and humans.



Peter H. Langsjoen, MD, FACC, is a cardiologist specializing in congestive heart failure, primary and statin-induced diastolic dysfunction, and other heart diseases. A leading authority on coenzyme Q10, Dr. Langsjoen has been involved with its clinical application since 1983. He is a founding member of the executive committee of the International Coenzyme Q10 Association, a fellow of the American College of Cardiology, and a member of numerous other medical associations.

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.



L. Ray Matthews, MD, FACS, is a professor of surgery and director of Surgical Critical Care at Morehouse School of Medicine in Atlanta, GA, and a trauma and critical care surgeon at Grady Memorial Hospital. He has published widely and is known as one of the top vitamin D experts. Dr. Matthews has spoken before the U.S. Food and Drug Administration several times, presenting a recent update about clinical research on vitamin D.



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 *The Great American Heart Hoax*, *The Complete Mediterranean Diet* and *Heart Attack Proof*. For more information visit www.drozner.com.



Jonathan V. Wright, MD, is medical director of the Tahoma Clinic in Tukwila, WA. He received his MD from the University of Michigan and has taught natural biochemical medical treatments since 1983. Dr. Wright pioneered the use of bioidentical estrogens and DHEA in daily medical practice. He has authored or co-authored 14 books, selling more than 1.5 million copies.



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.



Our Most Complete Omega-3 FISH OIL FORMULA

Super Omega-3 provides higher EPA/DHA potencies PLUS components found in Mediterranean-style diets.

This advanced formula provides:

1. EPA/DHA Fish Oil

(ultra pure/highly concentrated)

2. Olive polyphenols

(to inhibit LDL oxidation)

3. Sesame lignans

(to extend stability of DHA in the blood)

4. Astaxanthin

(protects against lipid peroxidation)

5. Krill oil

(a source of EPA/DHA)



Item #01988 • 120 softgels

1 bottle \$33.75

4 bottles \$31.50 each

For full product description and to order **Super Omega-3 Plus EPA/DHA Fish Oil, Sesame Lignans, Olive Extract, Krill & Astaxanthin**,
call 1-800-544-4440 or visit www.LifeExtension.com

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

MISCONCEPTIONS ABOUT VITAMIN C



WILLIAM FALOON



With each new discovery, the tragic **mistakes** of the past become brutally apparent.

In the **March 2014** issue of *Life Extension® Magazine*, an article was published titled:

"When Technology Goes in Reverse."¹

The article revealed that **cardiopulmonary resuscitation** was described in the Hebrew scriptures, gained acceptance amongst some medical groups, but then its use stopped and started repeatedly over thousands of years.

It was not until the late **1950s** that "**revival of dead persons**" using chest compression and other techniques became universally accepted.

Even more egregious **errors** were made in finding a **cure for scurvy**.

Scurvy was so prevalent that shipowners assumed a **50% death rate** from **scurvy** for their sailors on any long voyage.²

Yet scurvy "cures" were demonstrated many times, but then discredited because of **mistakes**, such as using boiled lime juice that was devoid of **vitamin C**.^{2,3}

Dr. Linus Pauling is often considered one of the greatest scientists of all time, having won two undivided **Nobel Prizes**. Much of what we take for granted today in the field of **biochemistry** is attributable to Dr. Pauling's pioneering research.⁴

Above-ground **nuclear bomb** testing was halted by virtue of Dr. Pauling's tireless efforts in alerting the world about the dangers of **radioactive fallout**.^{5,6}

Forty years after Dr. Pauling persuaded Russia and the United States to ban it, the **federal government** admitted that **15,000** Americans died of **cancer** caused by exposure to nuclear bomb fallout.⁷ In the early **1960s**, our government denied this risk and sought to **imprison** Pauling for his efforts to ban above-ground nuclear testing.⁶

Linus Pauling's final mission was to identify the benefits of **vitamin C** that extend *beyond* curing scurvy.

Analogous to the persecution Dr. Pauling endured in his efforts to ban nuclear bomb testing, much of what he advocated about **vitamin C** was ridiculed. Serious **mistakes** were then made when testing **vitamin C** in humans.

This editorial brings out new information about **optimal** use of **vitamin C**, some originating from what **Linus Pauling** espoused decades ago.

When one eats processed foods containing **nitrosamine** precursors (hot dogs, bacon, ham, sausage), **vitamin C** can help neutralize this **carcinogen** in the stomach.^{8,9}

Beyond this benefit, the purpose of ingesting vitamin C-rich foods and supplements is to achieve consistent levels of **vitamin C** in the **blood**.

The challenge is that **vitamin C** is only partially **absorbed** at doses above 200 mg and then rapidly **utilized** throughout the body.

A typical vitamin C supplement provides a few hours of elevated blood levels that then return to baseline.

One way of partially overcoming this obstacle is to take vitamin C several times throughout the day, which creates a compliance issue for most people.

Figure 1: The **red** line on the chart below shows a sharp increase in blood (plasma) vitamin C levels at **200 mg daily** dosing. The **blue** line depicts the smaller additional increases in response to **higher** vitamin C doses (**400-2,500 mg**).¹⁰

For intakes of vitamin C up to **200 mg**, **70%-90%** of the ingested vitamin C is **absorbed** as indicated by the plasma levels achieved.

At doses greater than **200 mg**, the proportion of **absorbed** vitamin C decreases.

Therefore, although higher doses (**400-2,500 mg**) result in greater plasma levels, the proportion of the dose that is absorbed is significantly diminished.

A new formulation overcomes this limitation, resulting in a greater proportion of the vitamin being **absorbed** and remaining at a **higher** and **sustained** blood plasma level throughout the day.

Higher Doses Only Partially Work

What some people do is take **higher vitamin C doses (1,000-2,500 mg)** that provide a slightly longer degree of acting protection.

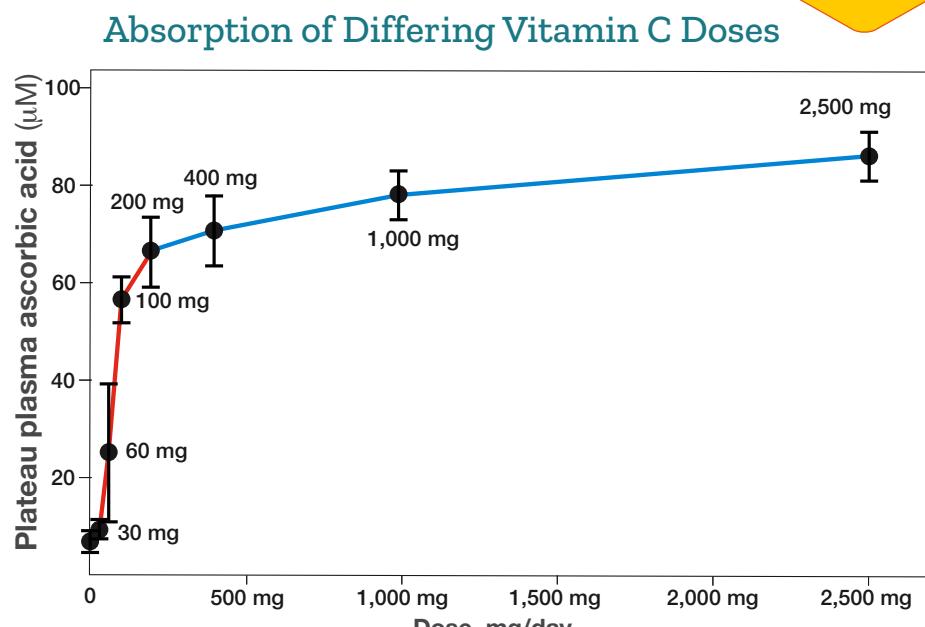
These **higher** doses, however, do not increase vitamin C **blood levels** at the same **rate** that occurs with the initial 200 mg dose.

To put this in perspective, the body rapidly **absorbs** the initial 200 mg of vitamin C swallowed, and partially absorbs some of the excess beyond **200 mg**. The remainder is removed through the bowels, sometimes in the form of diarrhea.

Some people use **high-dose** vitamin C powder combined with magnesium and/or potassium as a **laxative**.

The primary objective, however, is to achieve **higher** and **sustained** **vitamin C** levels in the **bloodstream** and cells.

Figure 1 on this page shows vitamin C plasma levels spiking sharply higher with the first 200 mg taken daily, with only modest plasma increases at doses ranging from **400-2,500 mg**.





Horrors in Those Who Survived

Historic accounts of **scurvy** reveal it caused some of the worst medical disasters faced by sailors at sea.

A 16th century surgeon describes his ordeal with scurvy as follows:²

"It rotted all my gums, which gave out a black and putrid blood. My thighs and lower legs were black and gangrenous, and I was forced to use my knife each day to cut into the flesh in order to release this black and foul blood. I also used my knife on my gums, which were livid and growing over my teeth..."

"When I had cut away this dead flesh and caused much black blood to flow, I rinsed my mouth and teeth with my urine, rubbing them very hard... And the unfortunate thing was that I could not eat, desiring more to swallow than to chew... Many of our people died of it every day, and we saw bodies thrown into the sea constantly, three or four at a time."

If only we could travel back in time to enlighten these sailors that scurvy could be eradicated by ingesting just a few fruits and vegetables.

Our challenge, however, would be the same as it was for others who were ridiculed for showing that **citrus** protected against scurvy.

Millions needlessly perished from scurvy when the cure was so tantalizingly close.

Most Animals Make Their Own Vitamin C—But Humans Don't!

The need for vitamin C is so critical that most species have a built-in mechanism to internally convert glucose into **vitamin C**.¹¹

If you observe gorillas or chimps in the wild or a zoo, you may notice they frequently eat vitamin C-rich fruits/vegetables.

Doing so provides their bodies with a continuous flow of vitamin C.

Humans, guinea pigs and most primates are among the few mammals that cannot produce **vitamin C** internally¹¹—it must be obtained from food, supplements, and/or infusions.

If vitamin C is not included in **guinea pig** chow, they die of **scurvy**, the same way **humans** do when they are severely **vitamin C** deficient.



What are Optimal Vitamin C Doses?

Vitamin C was discovered in the **1920s** and first synthesized in **1933**.¹²

The ability to **precisely dose** vitamin C enabled scientists to ascertain minimum levels of ascorbate (vitamin C) to eradicate scurvy in modern societies.

Conclusive proof of vitamin C's efficacy resulted in Hungarian biochemist Albert Szent-Györgyi being awarded the **Nobel Prize in Physiology for Medicine** in **1937**.¹³

This breakthrough ended the controversy as to what caused **scurvy** and the *only* effective therapy, which is vitamin C.

Hundreds of scurvy **treatment attempts** were made over many centuries. The cure turned out to be adequate **vitamin C**, found in most fresh fruits and vegetables.

As knowledge of vitamin C's *other* effects arose, lively debates erupted as to how many **milligrams of vitamin C** are needed to obtain **optimal** benefits.

The **federal government** has increased the daily value of vitamin C most Americans should ingest to **75 mg to 90 mg**.¹⁴ While this dose prevents **scurvy**, it appears inadequate to fully garner vitamin C's other lifesaving effects.

Vitamin C Holds Our Body Together

Our skin, bones, teeth, gums, ligaments, blood vessels, and other body structures are held together by **collagen**.¹⁵

Vitamin C is required for continual **renewal** of **collagen** throughout our body.¹⁵ I emphasize “*required*” because our **structure** literally falls apart without adequate **vitamin C**.

Vitamin C performs many functions, including promoting **immunity** and creating certain brain **neurotransmitters**.^{16,17}

But for simplicity’s sake, when one realizes that our body undergoes continuous **renewal** that is **vitamin C** dependent, the desirability of maintaining sustained ascorbate blood levels throughout the day becomes strikingly apparent.

One of the leading causes of disability and death in the U.S. is **cardiovascular** disorders.¹⁸

By enhancing collagen synthesis and supporting nitric oxide production, **vitamin C** offers protection and improves the function of the inner lining of cells in our blood vessels or endothelium.¹⁹

If one looks at virtually all health problems inflicted by **aging**, be it tooth loss, osteoporosis, atherosclerosis, organ dysfunction, and wrinkled skin, **vitamin C** plays a critical role in a biochemical symphony that sustains our life.²⁰⁻²⁴

Published data suggest that doses *higher* than the **90 mg** a day of vitamin C recommended by the **federal government** can yield greater benefits.^{21,25,26}

Modern Day Research Mistakes

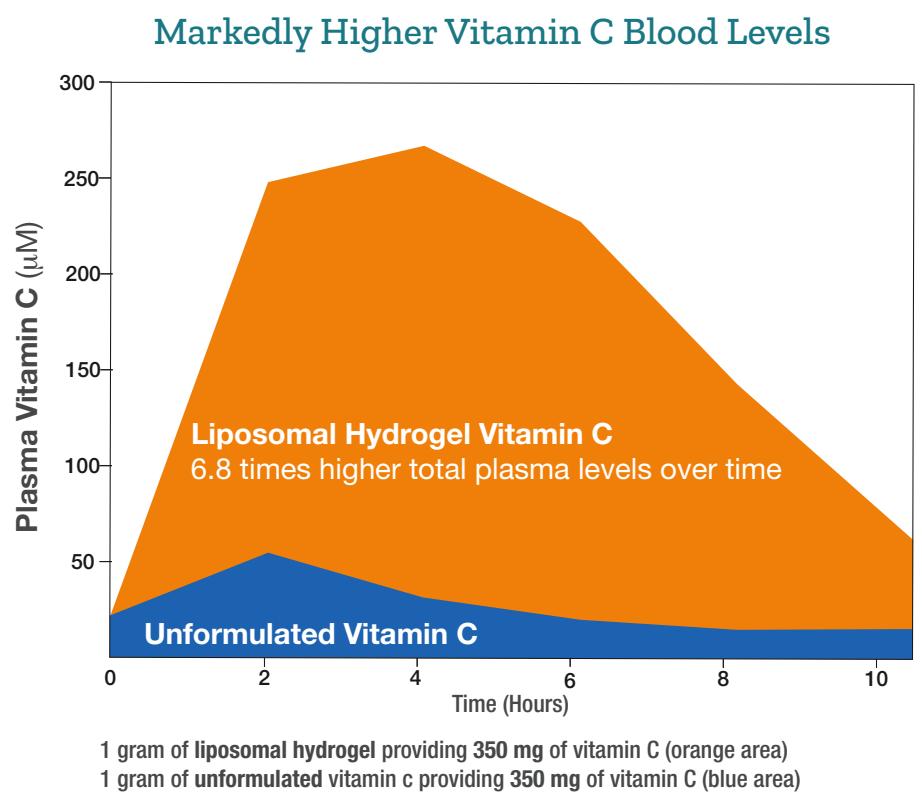
Research published in the 1950s showed that taking **500 mg** of **vitamin C** three times a day for only two to six months, reduced arterial plaques, which are associated with coronary artery disease, in **60%** of human study subjects with atherosclerosis.²⁷

More recent findings have identified specific mechanisms by which vitamin C improves vascular health.²⁶

Yet studies utilizing single daily-dose vitamin C supplements have not always yielded reductions in **heart attack** risk.



Figure 2: A new “hydrogel” liposomal formula yields elevated vitamin C blood levels with once-a-day dosing. It reduces the need for higher doses that cause some people gastrointestinal upset. This graph shows total **vitamin C** plasma exposure increased almost **seven times** in response to this new hydrogel formula compared to regular vitamin C.²⁸



One obvious reason is that there are over **17 independent risk factors** that cause arteries to clog during normal aging. Expecting vitamin C by *itself* to prevent strokes and heart attacks is irrational.

Another reason why **vitamin C** has not demonstrated more robust results is that taking a **single daily dose** provides only limited protection. Within a few hours of ingesting vitamin C, **blood levels** return to where they were before the supplement was taken.

Up until now, the only way of achieving continuous vitamin C blood levels was to ingest it in food or supplement form throughout the day and night, something that is impractical for most people.

To put this into perspective, most mammals synthesize vitamin C internally **24 hours** a day. Humans don't synthesize **any** vitamin C.

Perhaps the greatest **blunder** made in research that seeks to identify vitamin C's other benefits is dosing it just once or twice daily. This leaves the body with less-than-optimal ascorbate levels throughout most of the day and night.

A Practical Solution

Many of you take supplements several times a day and obtain more consistent vitamin C **blood levels** compared to people who take a **multivitamin** just once a day.

Scientists at **Life Extension®** have spent the past several years searching for ways to formulate a supplement that provides sustained **vitamin C** blood levels.

We've been aware of companies that offer "liposomal" vitamin C supplements. We've been unable to validate if they provide long-acting protection.

If you look at figures 2 and 3, a new liposomal "hydrogel" formula not only elevated blood-plasma vitamin C exposure **6.8 times** more than regular vitamin C, but it also achieved *higher* levels over an extended period.

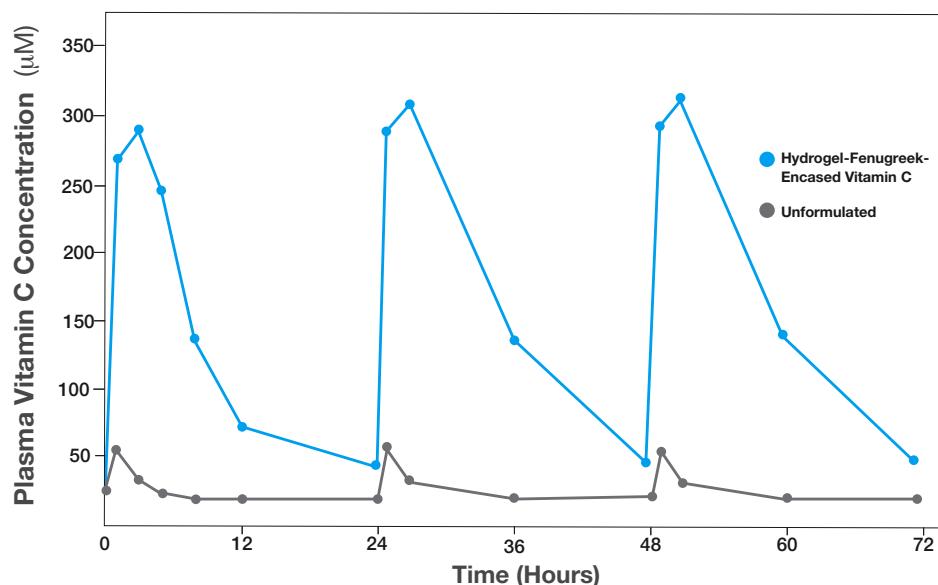
Based on daily use of this novel formula, one can obtain sustained, accumulated *higher* vitamin C blood levels providing all-day/all-night protection.



Figure 3: When looking at the half-life of vitamin C in plasma, taking one capsule daily of a new **hydrogel-encased liposomal vitamin C** will result in significantly *higher* vitamin C plasma levels that persist for 24 hours. The chart to the right is a simulated model based on the half-life of vitamin C in blood plasma, precisely measured in a clinical study that compared **liposomal hydrogel-encased** vitamin C to regular vitamin C.



Achieving Sustained and Higher Vitamin C Blood Levels



Model is based on clinical data from single dose study with **1 gram** of **liposomal hydrogel** providing **350 mg** of vitamin C and **1 gram** of **unformulated** vitamin C providing **350 mg** of vitamin C.

Look Forward to Future Research Findings

Life Extension® donates supplements to physician-scientists who use them in clinical trials to ascertain efficacy against a wide range of degenerative disorders.

In 2021, a study was published using **20 mg melatonin** capsules that **Life Extension®** specially formulated to study on non-small-cell lung cancer patients.²⁹ We also provided identical-looking **placebo** capsules for this outside research group.

The box on this page highlights the improved survival in those receiving **20 mg** of melatonin compared to placebo.

We look forward to donating this first-of-its kind vitamin C formula to scientists in upcoming trials to see if providing people with **24-hour higher** vitamin C blood levels yields greater benefits.

I also look forward to adding this new formulation to my personal program to see if there are improvements in my clinical measures of biological aging.

For longer life,



William Faloon, Co-Founder
Life Extension

References

- Available at: <https://www.lifeextension.com/magazine/2014/3/when-technology-goes-in-reverses>. Accessed August 16, 2021.
- Available at: <https://www.sciencehistory.org/distillations/the-age-of-scurvy>. Accessed August 16, 2021.
- Lee S, Choi Y, Jeong HS, et al. Effect of different cooking methods on the content of vitamins and true retention in selected vegetables. *Food Sci Biotechnol*. 2018 Apr;27(2):333-42.
- Available at: <https://www.britannica.com/biography/Linus-Pauling>. Accessed August 18, 2021.
- Available at: <https://www.nobelprize.org/prizes/peace/1962/pauling/biographical/>. Accessed August 18, 2021.
- Available at: <https://www.britannica.com/biography/Linus-Pauling/Humanitarian-activities>. Accessed August 18, 2021.
- Available at: <https://www.cnn.com/2002/US/03/01/nuclear.fallout/index.html>. Accessed August 19, 2021.
- Robles H. Nitrosamines. In: Wexler P, ed. *Encyclopedia of Toxicology*. Oxford: Academic Press; 2014:584-5.
- Tannenbaum SR, Wishnok JS, Leaf CD. Inhibition of nitrosamine formation by ascorbic acid. *Am J Clin Nutr*. 1991 Jan;53(1 Suppl):247S-50S.
- Levine M, Conry-Cantilena C, Wang Y, et al. Vitamin C pharmacokinetics in healthy volunteers: evidence for a recommended dietary allowance. *Proc Natl Acad Sci U S A*. 1996 Apr 16;93(8):3704-9.
- Chatterjee IB. Evolution and the biosynthesis of ascorbic acid. *Science*. 1973 Dec 21;182(4118):1271-2.
- Carpenter KJ. The discovery of vitamin C. *Ann Nutr Metab*. 2012;61(3):259-64.
- Available at: <https://www.nobelprize.org/prizes/medicine/1937/szent-gyorgyi/biographical/>. Accessed August 19, 2021.
- Available at: <https://ods.od.nih.gov/factsheets/VitaminC-HealthProfessional/>. Accessed, August 6.
- Available at: <https://www.ncbi.nlm.nih.gov/books/NBK507709/>. Accessed August 16, 2021.
- Carr AC, Maggini S. Vitamin C and Immune Function. *Nutrients*. 2017 Nov 3;9(11).
- Harrison FE, May JM. Vitamin C function in the brain: vital role of the ascorbate transporter SVCT2. *Free Radic Biol Med*. 2009 Mar 15;46(6):719-30.
- Available at: <https://www.cdc.gov/chronicdisease/about/index.htm>. Accessed August 16, 2021.
- May JM, Harrison FE. Role of vitamin C in the function of the vascular endothelium. *Antioxid Redox Signal*. 2013 Dec 10;19(17):2068-83.
- Malmir H, Shab-Bidar S, Djafarian K. Vitamin C intake in relation to bone mineral density and risk of hip fracture and osteoporosis: a systematic review and meta-analysis of observational studies. *Br J Nutr*. 2018 Apr;119(8):847-58.
- Available at: <https://lpi.oregonstate.edu/mic/vitamins/vitamin-C>. Accessed August 6, 2021.
- Iwasaki M, Manz MC, Taylor GW, et al. Relations of serum ascorbic acid and alpha-tocopherol to periodontal disease. *J Dent Res*. 2012 Feb;91(2):167-72.
- Ravetti S, Clemente C, Brignone S, et al. Ascorbic Acid in Skin Health. *Cosmetics*. 2019;6(4):58.
- Gillis K, Stevens KK, Bell E, et al. Ascorbic acid lowers central blood pressure and asymmetric dimethylarginine in chronic kidney disease. *Clin Kidney J*. 2018 Aug;11(4):532-9.
- Schlueter AK, Johnston CS. Vitamin C: Overview and Update. *Journal of Evidence-Based Complementary & Alternative Medicine*. 2011;16(1):49-57.
- Morelli MB, Gambardella J, Castellanos V, et al. Vitamin C and Cardiovascular Disease: An Update. *Antioxidants (Basel)*. 2020 Dec 3;9(12).
- Willis GC, Light AW, Gow WS. Serial arteriography in atherosclerosis. *Can Med Assoc J*. 1954 Dec;71(6):562-8.
- Akay Internal Study. Liposomal hydrogel vitamin C pharmacokinetics. Data on file. 2021.
- Grutsch J, Hrushesky W, Lis C, et al. Daily evening melatonin prolongs survival among patients with advanced non-small-cell lung cancer. *Biological Rhythm Research*. 2021:1-15.

Daily evening melatonin prolongs survival among patients with advanced non-small-cell lung cancer

- **20 mg** melatonin as an adjunctive to standard chemo treatment.
- Reduced risk of death by **39%**.
- Individuals with normal baseline sleep had a median survival of **17.6 months** with evening melatonin compared to **10.4 months** in the placebo group.

Acknowledgments: We would like to thank

William Faloon of Life Extension for providing melatonin and placebo for this study.

Biological Rhythm Research. 2021:1-15.



Low-Cost Biologically Active

B COMPLEX

Enzymatically Active Vitamins

BioActive Complete B-Complex provides enzymatically active forms of meaningful potencies of each B vitamin.

This includes the **pyridoxal 5'-phosphate** form of vitamin B6 shown to protect lipids and proteins against **glycation** and the most biologically active form of folate called **5-methyltetrahydrofolate (5-MTHF)**, which is up to **7 times** more bioavailable than folic acid.*



Item #01945 • 60 vegetarian capsules

1 bottle \$9 • 4 bottles \$8 each

For full product description and to order
BioActive Complete B-Complex, call
1-800-544-4440 or visit www.LifeExtension.com

* *Br J Pharmacol.* 2004 Mar;141(5):825-30.

Caution: Temporary flushing, itching, rash, or gastric disturbances may occur.

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





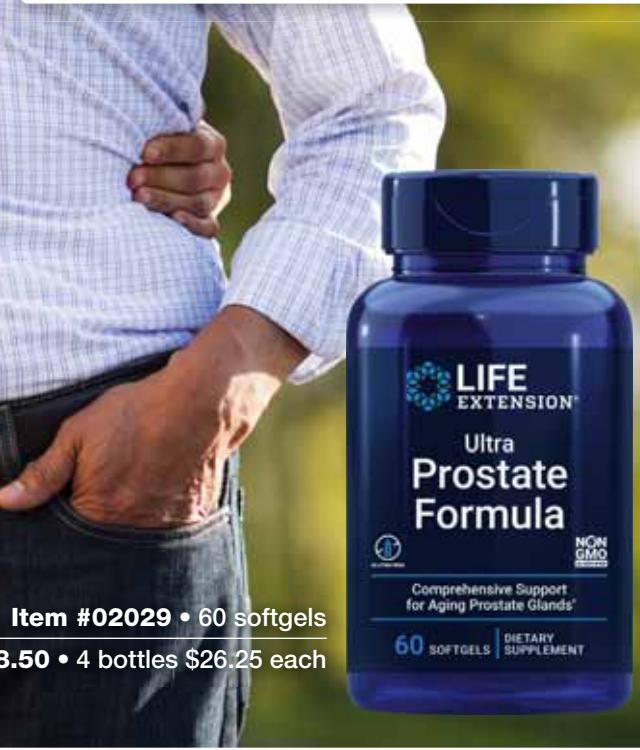
PROSTATE HEALTH

The best way to keep
You in the picture.

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 \$28.50 • 4 bottles \$26.25 each

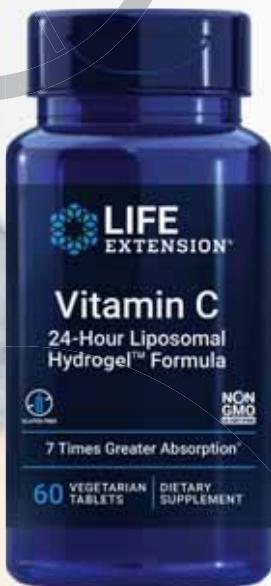
AprèsFlex® is a registered trademark of Laila Nutraceuticals exclusively licensed to PL Thomas-Laila Nutra LLC. HMRlignan™ is a trademark used under sublicense from Linnea S.A. Lyc-O-Mato® is a registered trademark of Lycored Corp. Albion® is a registered trademark of Albion Laboratories, Inc. Graminex® is a registered trademark of Graminex LLC.



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

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

A Better Vitamin C



Liposomal-Hydrogel

V I T A M I N

For full product description and to order **Vitamin C 24-Hour Liposomal Hydrogel™ Formula**, call 1-800-544-4440 or visit www.LifeExtension.com

For those seeking *higher vitamin C levels* throughout the day, Life Extension® has developed a **Vitamin C Liposomal Hydrogel™** formula.

This combination of buffered **ascorbate** encased in two plant extracts (liposomes plus hydrogel fenugreek) increases blood (plasma) exposure nearly **seven times** more compared to an equivalent dose of regular vitamin C.

It also maintains *higher vitamin levels* throughout the day.¹

Just one vegetarian tablet daily provides **around-the-clock** vitamin C support.

Item #02501 • 60 vegetarian tablets

1 bottle \$25.50 • 4 bottles \$23 each



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

Sweet DREAMS

Fast-Acting Liquid Melatonin is a popular way to achieve more rapid sleep onset.

The nice-tasting, citrus-vanilla flavor enables convenient “drop” dosing of **Fast-Acting Liquid Melatonin** each night or when needed.



Item #02234 • 3 mg per 20 drops, 2 fl. oz

1 bottle \$9 • 4 bottles \$8.25 each

FOR OCCASIONAL SLEEPLESSNESS.

Life Extension also offers a full range of melatonin in solid forms and a variety of dosages.

For full product description and to order **Fast-Acting Liquid Melatonin**, call 1-800-544-4440 or visit www.LifeExtension.com

CAUTION: Do not consume alcohol, drive or operate heavy machinery after taking this product.



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.

In the News



Tea May Protect Against Coronary Artery Disease

A review of randomized trials published in the journal *Clinical Nutrition ESPEN*, concluded that regular intake of **green tea** and its active components may help reduce the risk of cardiovascular disease.*

Among the effects revealed by the trials, regular tea consumption was associated with lower blood pressure and enhanced bioavailability of **nitric oxide**, which indicate a beneficial effect for tea on endothelial function. In some studies, tea was associated with lower markers of oxidative stress and inflammation, both of which also suggest improved endothelial function.

Editor's Note: "The reduction of oxidized low-density lipoprotein and C-reactive protein levels could be a sign of improved endothelial function in individuals at increased risk of developing CVD," the authors stated.

* *Clin Nutr ESPEN*. 2021 Feb;41:77-87.



Biological Age Reversed with Diet, Lifestyle

The journal *Aging* published the results of an eight-week randomized clinical trial which resulted in a reduction in biological age among men who participated in lifestyle changes and consumed nutritional supplements.*

In this eight-week diet and lifestyle treatment program, the Horvath **DNA methylation age** (DNAmAge) test was used to assess biological age. This DNAmAge test is considered the most accurate method to assess whether an intervention(s) is slowing or reversing biological aging.

The Horvath DNAmAge clock evaluates DNA methylation patterns as a marker of biological age.

The “Horvath Clock” is named after Steve Horvath, Professor in Human Genetics and Biostatistics researcher at UCLA.

Eighteen men, aged 50 to 72, consumed a plant-based, low carbohydrate diet that included limited animal proteins and was supplemented with a vegetable and fruit powder and a probiotic.

The healthy diet/lifestyle group had scores averaging **1.96 years younger** at the end of the program than at the beginning, while control participants averaged **1.27 years older** at the end.

The difference between the healthy diet/lifestyle group and the controls was **3.23** biological years.

Editor's Note: The lifestyle group was advised to do a minimum of 30 minutes of physical exercise daily and to perform breathing exercises twice daily to reduce stress.

* *Aging (Albany NY)*. 2021 Apr 12;13(7):9419-9432.



Melatonin Helps Prostate Cancer Patients

Research published in *Oncotarget* found an increase in survival among prostate cancer patients with a poor prognosis who were treated with melatonin, the sleep-promoting hormone.*

For men with a poor prognosis who did not use melatonin, overall survival was **64 months**. For those treated with melatonin it was **153.5 months**. Men who had a favorable or intermediate prognosis did not significantly differ in median overall survival during follow-up.

At a five-year median follow-up, patients who received melatonin had survived an average of **13 months longer** than those who did not receive it.

Editor's Note: The retrospective study included 955 men who received standard treatment for prostate cancer between 2000 and 2019.

* *Oncotarget*. 2020 Oct 13;11(41):3723-3729.

Fewer Migraines with Diet Rich in Omega-3 Fatty Acids

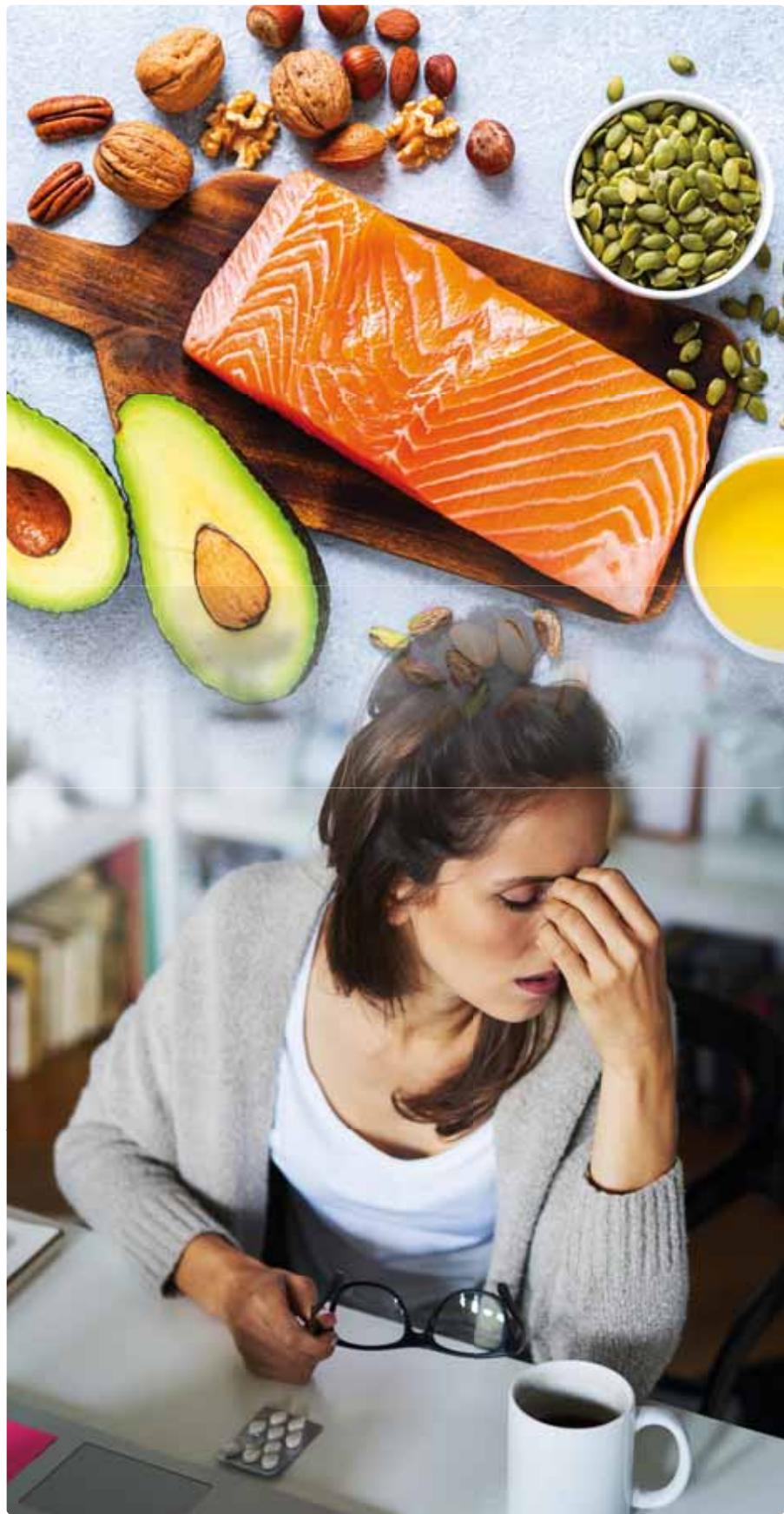
Fewer migraine headaches occurred among 182 patients who consumed a diet richer in omega-3 fatty acids than a control group, *The BMJ* reported.*

Participants were given either a high-omega-3 diet that provided **1,500 mg** per day EPA and DHA, a high-omega-3/reduced-omega-6 diet, or a control diet that provided average U.S. intakes of EPA and DHA and **7.2%** of daily calories from the omega-6 fatty acid linoleic acid for 16 weeks.

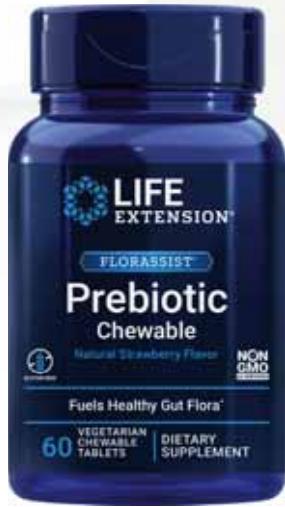
Headache frequency declined by **two days** per month in the high-omega-3 diet group and by **four days** in the high-omega-3/reduced-omega-6 group.

Editor's Note: Time spent daily with a headache was lowered by **1.3 hours** in the high-omega-3 group and by **1.7 hours** in the high-omega-3/reduced-omega-6 group.

* *BMJ*. 2021;374:n1448.



PreticX™
IN A TASTY
STRAWBERRY
CHEWABLE



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

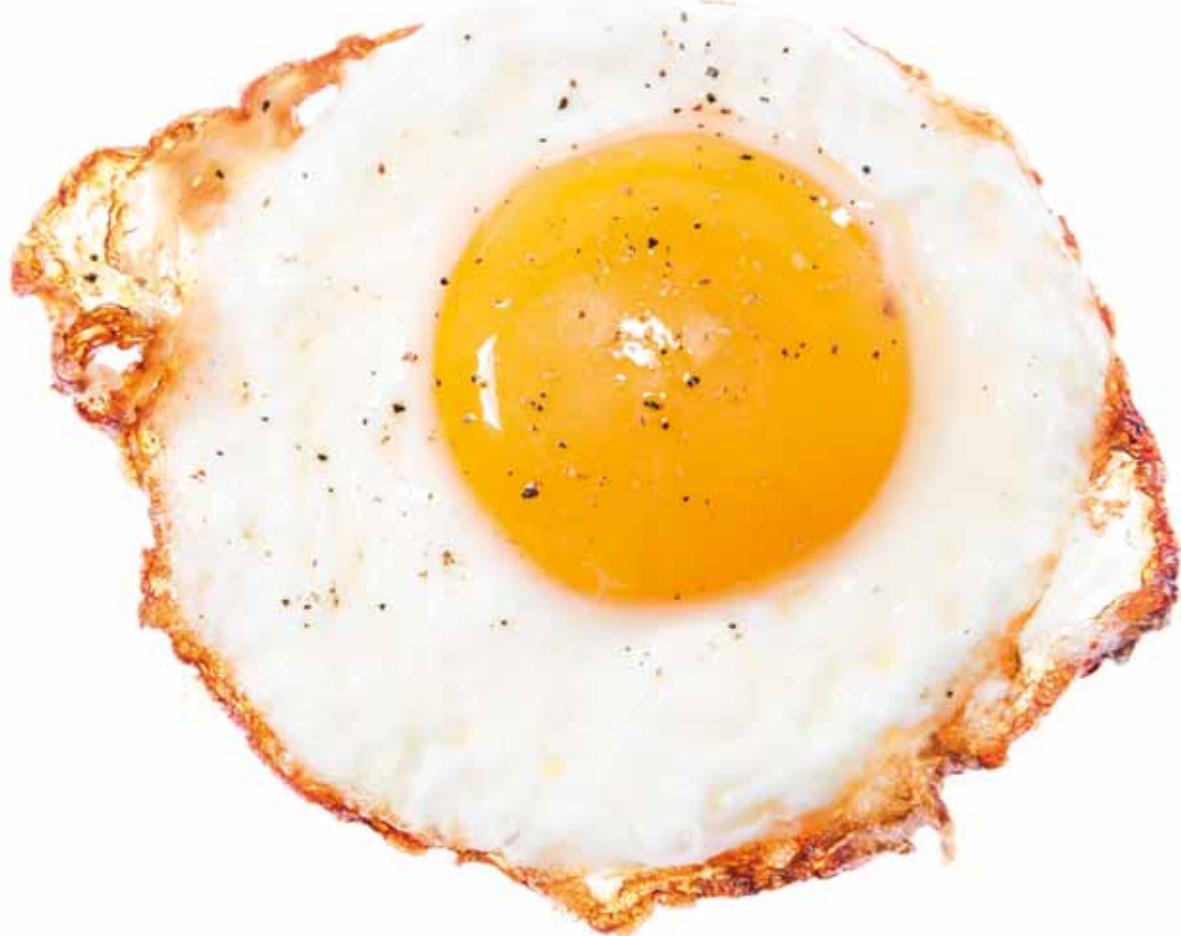
1 bottle \$15 • 4 bottles \$13 each

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

References

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

PreticX™ is a trademark of AIDP, Inc.



Feeling Fried?

Has life lost that sizzle? General fatigue or lack of motivation might be the result of declining NAD⁺ levels.

NAD⁺ facilitates the production of ATP, which your body uses for fuel. Our best-selling **NAD⁺ Cell Regenerator™** formula helps maintain the youthful levels of NAD⁺ you need to thrive.

NAD⁺ Cell Regenerator™ and Resveratrol

Nicotinamide riboside (300 mg), trans-resveratrol and other cell-energizing nutrients in one capsule.

Item #02348 • 30 veg. caps.

* NAD⁺ Cell Regenerator™

300 mg of nicotinamide riboside per capsule.

Item #02344 • 30 veg. caps.

* For pricing available to readers of this magazine, call 1-800-544-4440 or visit LifeExtension.com/NAD

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



For full product description and to order **NAD⁺ Cell Regenerator™** or **NAD⁺ Cell Regenerator™ and Resveratrol**, call 1-800-544-4440 or visit www.LifeExtension.com

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



CONQUER BELLY FAT — WITH — **AMPK**

Studies show that *increasing AMPK* activity encourages cells to stop storing fat and start *burning* it for energy. So we've created AMPK Metabolic Activator to help trigger AMPK, causing your body to burn unwanted fat—particularly around your abdomen.



Item #02207 • 30 vegetarian tablets

1 bottle \$28.50 • 4 bottles \$24 each

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

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

Actiponin® is a trademark of TG Biotech Co., Ltd.



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.



BOOST JOINT MOBILITY AND REDUCE JOINT PAIN

BY MICHAEL DOWNEY





Joint pain is common among adults, even those without arthritis.¹

Persistent discomfort makes it difficult to perform day-to-day activities.²⁻⁴ And of course, pain reduces **quality of life**.

Pain and stiffness can also lead to decreased daily physical activity, which is detrimental to overall health.

Pain relief medications are not designed for long-term use, and often come with **side effects**.^{5,6}

Scientists have identified **two plant extracts** that have demonstrated **joint-health** benefits.

In a trial of people with non-arthritis **knee joint pain** following exercise, subjects who took the **plant extracts** were able to walk a remarkable **118 feet farther** in six minutes than those taking a **placebo**.⁷

The **plant extract** group also had a significant **increase in range of motion** and **reduction in joint pain**.⁷

Joint Pain and Medications

Joint pain can be a symptom indicating underlying inflammation.

In some cases, joint pain and/or inflammation are the result of deteriorating **cartilage** that covers the ends of the bones where they come together to form joints.⁸

Common pain **medications** can help in the short term, but are proving even more dangerous than previously thought.

A meta-analysis found that **ibuprofen** (Motrin® or Advil®) can raise heart attack risk by **48%** in less than a week.⁵ The same analysis found a week of **naproxen** (Aleve®) use increased heart attack risk by **53%** compared to non-users.⁵

Aware of these risks, scientists searched for safe treatment for joint pain.

They identified **two nutrients** that work together to reduce joint stiffness and discomfort.

In a clinical trial, these ingredients allowed patients to walk farther, faster, and with improved knee joint flexibility and range of motion.⁷

Tamarind Reduces Inflammation

Researchers identified the leaves and seeds of **tamarind** as a nutrient for **joint** health.

This fruit-bearing tree has long been safely used in traditional Indian and African medicine for its **anti-inflammatory** effects.⁹

Tamarind has also been traditionally used for fever reduction, liver ailments, and digestive support, among other health issues.

Tamarind is rich in **procyanidins**, a group of polyphenols with **antioxidant** and **anti-inflammatory** properties. It also contains the minerals phosphorus, potassium, calcium, and magnesium.⁹

To most effectively target the pain and limitations that often accompany joint aging, scientists combined the anti-inflammatory plant tamarind with an *additional* compound also known for anti-inflammatory activity.

Turmeric Limits Inflammation

The **turmeric** plant has been used in traditional medicine for almost 4,000 years.¹⁰ Its rhizome, or underground stem, is a rich source of a group of polyphenols called **curcuminoids**.⁷

The best-known curcuminoid, **curcumin**, is well-established in the scientific and medical literature as a particularly powerful **anti-inflammatory**.^{11,12}

One review paper presented data on six **human** trials and concluded that curcumin was safe and that it has **anti-inflammatory** activity.¹²

Curcumin is also a **free-radical scavenger** and can influence the expression of antioxidant enzymes in different cell lines.^{13,14}

Turmeric + Tamarind = Joint Pain Relief



A Rigorous Clinical Trial

Scientists developed a blend of **tamarind seed** and **turmeric rhizome** extracts in a **6:3 ratio**.⁷ A team of researchers from the Netherlands, the U.S., and India tested this blend in a randomized, controlled **clinical trial** that took place at two sites in India.⁷

The team enlisted healthy, non-arthritic adult volunteers who experienced knee **joint discomfort** caused by physical activity. Men and women were included, with an average age of 45.

The 90 participants were divided into three groups:⁷

- **Group 1** was given **125 mg** of the blend twice daily (**total 250 mg daily**).
- **Group 2** was given **200 mg** of the blend twice daily (**total 400 mg daily**).
- **Group 3** was given a **placebo**.

The trial continued for **90 days**. To thoroughly assess joint function and pain following exercise, the scientists performed a range of tests:⁷

Primary Endpoint:

- **Six-Minute Walk Test**, which measures distance walked in a six-minute period.

Secondary Endpoints:

- **Stair-Climb Test**, timing how long it takes to walk up and down nine steps,
- **Visual Analog Scale**, in which participants rate how much pain they're experiencing,
- **WOMAC Scale (Western Ontario and McMaster Universities Arthritis Index)**, which consists of 24 questions assessing pain, stiffness, and physical functioning, and
- **Range-of-Motion Knee Flexion**, which evaluates the mobility of the knee.

Easing Pain and Boosting Function

Every outcome measured was improved by taking the **tamarind-turmeric** blend.

As far as the study's secondary endpoints, on the **WOMAC** and **Visual Analog** scales, treated participants



WHAT YOU NEED TO KNOW

Relief for Joint Pain

- Many adults have frequent **joint stiffness** and **joint pain**, which reduces quality of life. **Inflammation** is one potential cause of this discomfort.
- Extracts of two plants, **tamarind** and **turmeric**, have a long history of safe use in traditional medicine.
- Working together, **tamarind** and **curcumin** (from turmeric) inhibit key enzymes to **reduce inflammation**.
- A rigorous clinical trial tested a **blend** of these extracts in non-arthritic men and women with **knee joint pain** following exercise. In 90 days or less, the extracts led to remarkable improvements in pain, walking speed, joint range-of-motion, and more.

reported significant improvement in both **pain relief** and **musculoskeletal functions** compared to those taking a placebo.⁷

The **physical functions** evaluated by the WOMAC Scale included normal daily activities such as shopping, doing domestic chores, using stairs, rising from sitting, bending, getting in or out of a car, putting on socks, and others.

Taking tamarind and curcumin *improved* the ability to perform these daily functions.

The **Stair-Climb Test** further confirmed that those taking the blend were able to go up and down steps in less time.

Results of the study's primary outcome, the **Six-Minute Walk** test, were even more impressive.



Greater Distance Walked

The **Six-Minute Walk Test** showed that both treatment groups increased their walking distance in **just 14 days**. By that time, both groups outperformed the placebo group in distance walked.

By **90 days**, the subjects who took **400 mg** of the blend daily were able, in six minutes, to walk:⁷

- **40 feet farther** than those who took **250 mg** daily, and **118 feet farther** than the **placebo** group.

Compared to the distance walked before treatment began, the distance walked after **90 days** of treatment *increased* by:⁷

- **7.4%** for the group taking **250 mg** daily, and
- **10.4%** for the group taking **400 mg** daily.

Improved Walking Speed

Both treatment groups also increased their **walking speed** over the first **60 days** and maintained this higher speed at the end of **90 days**:⁷

- The volunteers taking **250 mg** daily increased their average walking speed by **0.18 mph**, and
- The volunteers taking **400 mg** daily increased their average walking speed by **0.25 mph** (a **10%** improvement), from **2.5 mph** to **2.75 mph**.

These are *not* minor improvements. In one study of men over age 70, scientists noted that there were ***no deaths*** during a **53.9-month** period among those who could walk about **3.0 mph**.¹⁵

The same study found that, in those men, the ability to walk faster than **1.8 mph** was associated with a **23%** reduced risk of dying.¹⁵

Wider Range-of-Motion

Another important assessment of joint improvement was range of motion.

The **Range-of-Motion Knee Flexion** test measures the angle in degrees that the knee can be bent away from a straightened position.

At the end of the study, participants who supplemented with the plant extract blend daily showed up to a **4.34%** improvement in knee flexion from baseline. The placebo group showed a mere **0.82%** improvement. This represents more than **five-times greater** improvement in the **tamarind-turmeric** group!

The authors of this study concluded that this **tamarind-turmeric** blend substantially relieved knee pain after exercise and improved joint function in non-arthritis adults.⁷

Working Together

Inflammation is often a key factor in joint pain and stiffness.

There are two key *enzymes* involved with inflammation:

- The enzyme **5-LOX** (5-lipoxygenase) transforms arachidonic acid into pro-inflammatory compounds known as **leukotrienes**, and
- The enzyme **COX2** (cyclooxygenase 2) transforms arachidonic acid into pro-inflammatory mediators such as **prostaglandin E2**.

Tamarind and **turmeric** inhibit these two enzymes involved in the production of inflammatory compounds.^{10,16-19}

The clinical study described earlier showed that a blend of tamarind and turmeric extracts significantly increased range of motion and reduced joint pain in people with non-arthritis knee joint pain following exercise.⁷

The blend also delivers **antioxidants** that help to protect joint cells and tissues.

Together, this blend can significantly improve walking speed, functional limitations, and joint range-of-motion and pain.



Resolving Inflammation After It Has Developed

Tamarind and turmeric extracts **inhibit** inflammation before it can contribute to **joint pain**.⁷

But research has shown that **resolving** inflammation after it has flared up may be just as important.^{20,21}

Scientists have identified compounds produced in the body that help resolve inflammation, returning inflamed tissues to their healthy state. They are known as **pro-resolving mediators** or **PRMs**.

PRMs are a family of naturally occurring lipid mediators, sometimes also referred to as *Specialized Pro-resolving Mediators* (SPMs).

For years, it has been known that **omega-3 fatty acids** found in fish oil have *anti-inflammatory* properties, but it was not fully understood why.

As it turns out, **PRMs** are fat- or lipid-based compounds. They are produced from oily substances, including the omega-3 fatty acids found in fish oils (such as **DHA** and **EPA**).

Adequate intake of these omega-3s is *required* for the production of adequate levels of PRMs in the body.

To optimally resolve inflammation, higher amounts of PRMs than may be available from fish oil alone can be considered.

Scientists demonstrated that taking an enriched fish oil supplement containing omega-3 plus a combination of **PRM precursors**, including **18-HEPE**, **17-HDHA**, and **14-HDHA** was effective at raising blood levels of PRMs.²²

Taking PRM precursors in addition to anti-inflammatory compounds may be the best way to put an end to harmful, ongoing inflammation.

Summary

Joint stiffness and **pain** can limit physical activity and reduce quality of life.

One of the factors involved in many cases of joint pain is **inflammation**.

Deteriorating joint cartilage combined with inflammation are other common causes of joint pain.

Scientists have combined extracts of two plants, **tamarind** and **turmeric**, long known for their **anti-inflammatory** effects.

A clinical trial of non-arthritic men and women demonstrated a remarkable *improvement* in functional abilities such as walking distance and speed, knee range-of-motion, as well as joint pain, all within **90 days**. ●

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

References

- Available at: <https://www.hopkinsmedicine.org/health/conditions-and-diseases/knee-pain-and-problems>. Accessed August 23, 2021.
- Pisters MF, Veenhof C, van Dijk GM, et al. The course of limitations in activities over 5 years in patients with knee and hip osteoarthritis with moderate functional limitations: risk factors for future functional decline. *Osteoarthritis Cartilage*. 2012 Jun;20(6):503-10.
- Feinglass J, Thompson JA, He XZ, et al. Effect of physical activity on functional status among older middle-age adults with arthritis. *Arthritis Rheum*. 2005 Dec 15;53(6):879-85.
- Rosemann T, Kuehlein T, Laux G, et al. Osteoarthritis of the knee and hip: a comparison of factors associated with physical activity. *Clin Rheumatol*. 2007 Nov;26(11):1811-7.
- Bally M, Dendukuri N, Rich B, et al. Risk of acute myocardial infarction with NSAIDs in real world use: bayesian meta-analysis of individual patient data. *BMJ*. 2017 May 9;357:j1909.
- Hsu CC, Wang H, Hsu YH, et al. Use of Nonsteroidal Anti-Inflammatory Drugs and Risk of Chronic Kidney Disease in Subjects With Hypertension: Nationwide Longitudinal Cohort Study. *Hypertension*. 2015 Sep;66(3):524-33.
- Rao PS, Ramanjaneyulu YS, Prisk VR, et al. A Combination of Tamarindus indica seeds and Curcuma longa Rhizome Extracts Improves Knee Joint Function and Alleviates Pain in Non-Arthritic Adults Following Physical Activity. *Int J Med Sci*. 2019;16(6):845-53.
- Available at: <https://www.ncbi.nlm.nih.gov/books/NBK482326/>. Accessed August 23, 2021.
- De Caluwé E, Halamová K, Van Damme P. Tamarind (*Tamarindus indica* L.): A Review of Traditional Uses, Phytochemistry and Pharmacology. *African Natural Plant Products: New Discoveries and Challenges in Chemistry and Quality*. Vol 1021: American Chemical Society; 2009:85-110.
- Aggarwal S, Ichikawa H, Takada Y, et al. Curcumin (diferuloyl-methane) down-regulates expression of cell proliferation and antiapoptotic and metastatic gene products through suppression of IκappaBalphak kinase and Akt activation. *Mol Pharmacol*. 2006 Jan;69(1):195-206.



- Chandran B, Goel A. A randomized, pilot study to assess the efficacy and safety of curcumin in patients with active rheumatoid arthritis. *Phytother Res*. 2012 Nov;26(11):1719-25.
- Chainani-Wu N. Safety and anti-inflammatory activity of curcumin: a component of turmeric (*Curcuma longa*). *J Altern Complement Med*. 2003 Feb;9(1):161-8.
- Farombi EO, Shrotriya S, Na HK, et al. Curcumin attenuates dimethylnitrosamine-induced liver injury in rats through Nrf2-mediated induction of heme oxygenase-1. *Food Chem Toxicol*. 2008 Apr;46(4):1279-87.
- Abrahams S, Haylett WL, Johnson G, et al. Antioxidant effects of curcumin in models of neurodegeneration, aging, oxidative and nitrosative stress: A review. *Neuroscience*. 2019 2019/05/15;/406:1-21.
- Stanaway FF, Gnjidic D, Blyth FM, et al. How fast does the Grim Reaper walk? Receiver operating characteristics curve analysis in healthy men aged 70 and over. *BMJ*. 2011 Dec 15;343:d7679.
- Komakech R, Kim YG, Matsabisa GM, et al. Anti-inflammatory and analgesic potential of *Tamarindus indica* Linn. (Fabaceae): a narrative review. *Integr Med Res*. 2019 Sep;8(3):181-6.
- Chun KS, Keum YS, Han SS, et al. Curcumin inhibits phorbol ester-induced expression of cyclooxygenase-2 in mouse skin through suppression of extracellular signal-regulated kinase activity and NF-κappaB activation. *Carcinogenesis*. 2003 Sep;24(9):1515-24.
- Kunnunurakkara AB, Guha S, Krishnan S, et al. Curcumin potentiates antitumor activity of gemcitabine in an orthotopic model of pancreatic cancer through suppression of proliferation, angiogenesis, and inhibition of nuclear factor-κappaB-regulated gene products. *Cancer Res*. 2007 Apr 15;67(8):3853-61.
- Ponnurangam S, Mondalek FG, Govind J, et al. Urine and serum analysis of consumed curcuminoids using an IκappaB-luciferase surrogate marker assay. *In Vivo*. 2010 Nov-Dec;24(6):861-4.
- Krishnamoorthy N, Abdulnour RE, Walker KH, et al. Specialized Proresolving Mediators in Innate and Adaptive Immune Responses in Airway Diseases. *Physiol Rev*. 2018 Jul 1;98(3):1335-70.
- Serhan CN, Chiang N, Dalli J. New pro-resolving n-3 mediators bridge resolution of infectious inflammation to tissue regeneration. *Mol Aspects Med*. 2018 Dec;64:1-17.
- Souza PR, Marques RM, Gomez EA, et al. Enriched Marine Oil Supplements Increase Peripheral Blood Specialized Pro-Resolving Mediators Concentrations and Reprogram Host Immune Responses: A Randomized Double-Blind Placebo-Controlled Study. *Circ Res*. 2020 Jan 3;126(1):75-90.



Don't Weight Around

MEAL PLAN

	BREAKFAST	LUNCH	DINNER
DAY 1			
DAY 2			
DAY 3			
DAY 4			
DAY 5			



Item #02478

60 vegetarian capsules

1 bottle \$36

4 bottles \$32 each

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

Maintain Optimal Hormone Levels

7-Keto® is a metabolite of DHEA ideal for weight management.

Maintaining youthful DHEA levels can help support immune function, circulatory health, mood, libido, and more.

DHEA Complete delivers 7-Keto® DHEA (100 mg) and regular DHEA (25 mg), plus extracts from curcumin, green tea, and whole red grapes.

Caution: Consult a physician or licensed qualified health care professional before using this product if you have, or have a family history of breast cancer, prostate cancer, or other hormone-sensitive diseases.

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

7-Keto® brand is a registered trademark of InterHealth N.I. U.S. Patent 7,199,116.



You asked, we listened. Get rewarded for your healthy lifestyle with Life Extension's most exclusive loyalty program—*now with even more perks!*



Get 4% Back on Every Purchase

Earn LE Dollars you can use or any Life Extension product & lab services!



Unlimited Free Shipping

No matter how big or small the order, U.S. shipping is always free.



Exclusive Savings

Get sneak peeks into sales & special pricing.



Premium Content

Exclusive webinars, plus a free subscription to *Life Extension Magazine*®!



Surprise Gifts

Not only will you get rewarded on your birthday month, but you'll get extra goodies—just because!



Rewards Galore

Earn rewards for taking surveys and posting reviews about your favorite products.

Costs \$49.95 a year...Instant \$50 sign-up credit means zero cost to enroll!

Visit LifeExtension.com/YourPremier or call 1-866-670-4147

Please use code **YOURPREMIER**



Premier service expires 12 months after date of purchase or renewal and can only be renewed 6 months after Premier purchase or renewal. Includes FREE standard delivery (3 to 5 business days) to any mailing address within the United States, excluding U.S. territories. Discounts on non-standard and international shipping also available. International customers pay \$59.95 for Premier. During checkout, redeem LE Dollars (one is equal to \$1 U.S. Dollar) to purchase products, blood tests, sale items, and shipping fees.

DUAL-ACTION
JOINT SUPPORT

Get Moving!

Joint Mobility is a patent-pending blend
of tamarind and turmeric extracts.



A placebo-controlled **clinical trial*** shows these **plant extracts** help:

- Promote greater walking ability and endurance or walking distance and speed
- Support increased joint flexibility
- Relieve occasional joint discomfort
- Inhibit inflammation to support continued joint health

Joint Mobility

Item #02424 • 60 vegetarian capsules

Each capsule provides 200 mg of
standardized **tamarind-curcumin** extract

1 bottle \$18.75 • 4 bottles \$17 each

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

*Int J Med Sci. 2019;16(6):845-53.

TamaFlex® is a trademark of NXT USA, Inc. Patents pending.



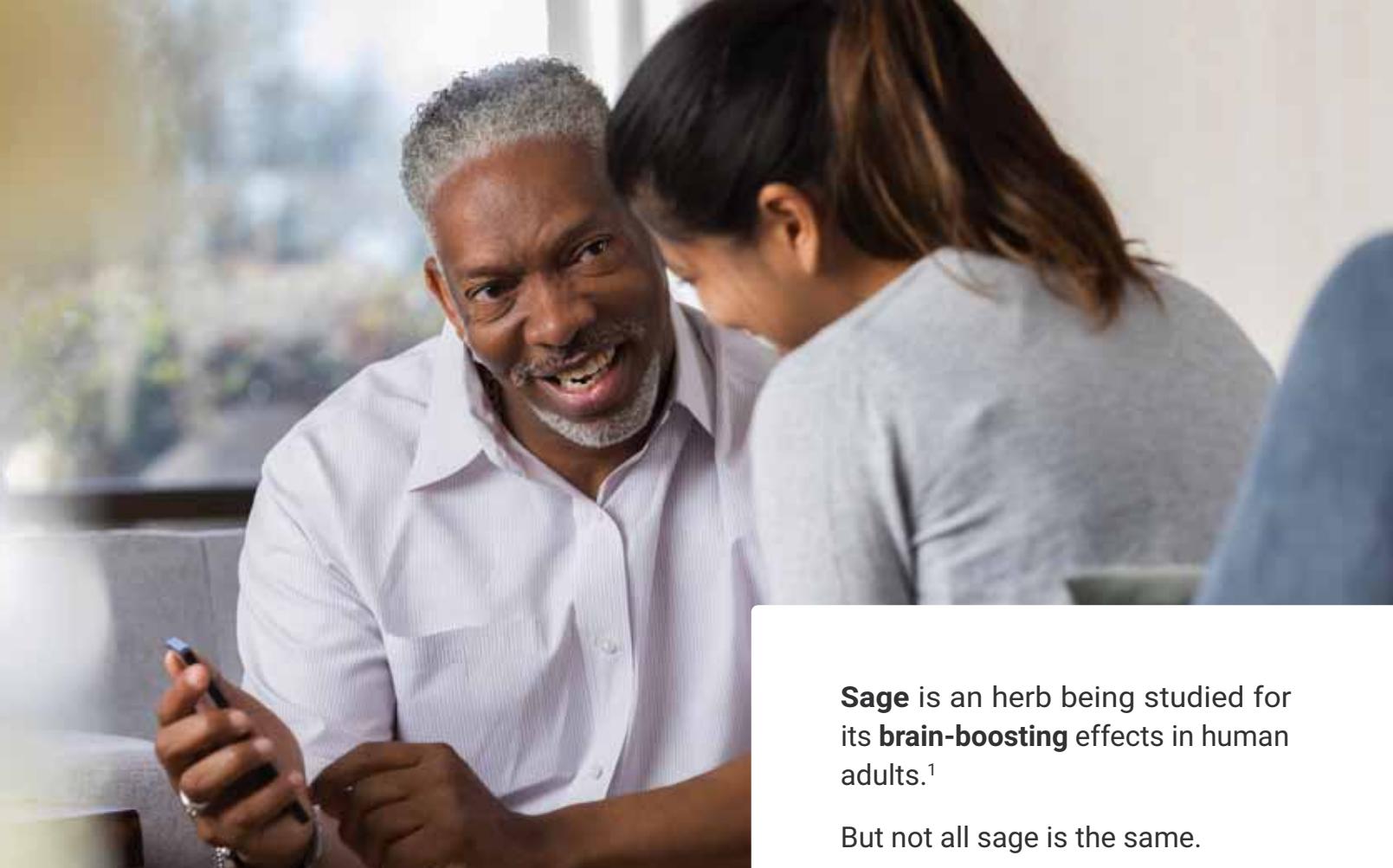
These statements have not been evaluated by the Food and Drug Administration. This product is not intended to diagnose, treat, cure, or prevent any disease.



SAGE

Boosts Memory and More

BY CHANCELLOR FALOON



Sage is an herb being studied for its **brain-boosting** effects in human adults.¹

But not all sage is the same.

European scientists have identified a form of sage with benefits that go beyond traditional sage extracts.

In one clinical study, healthy, older adults taking this sage extract had an approximate **60%** better performance in a composite measure of **memory**, compared to those who received **placebo**.

This study also demonstrated an approximate **2.5-fold** enhanced performance in a composite measure of **attention**.²

These improvements were noted *within hours* of taking the extract.²

Fighting Alzheimer's Disease

Sage *inhibits* an enzyme in the brain called **acetylcholinesterase**.² This enzyme breaks down **acetylcholine**, which is a neurotransmitter responsible for **memory** and motor control.

Sage can also act on proteins used in the creation and **repair** of brain cells called **neurotrophins**.³⁻⁵

Circulating levels of one neurotrophin, **brain-derived neurotrophic factor**, are *reduced* in those with Alzheimer's disease. An active component of sage (rosmarinic acid), *prevented* reductions in **brain-derived neurotrophic factor** in animal studies.⁶

Lab experiments have shown that rosmarinic acid *increases* **brain-derived neurotrophic factor** levels in crucial non-neuronal cells in the brain and spinal cord.⁶

In a clinical trial, patients with mild-to-moderate **Alzheimer's disease** were randomized to receive either sage extract or a placebo. Patients were assessed by a neurologist at baseline and throughout the study.⁷

After four months of treatment, those who received **sage** had significantly better scores than the placebo group on two scales used to assess **cognitive function**.

Brain Benefits for Adults

As we age, our **cognitive function** tends to decline, even without having dementia.

A clinical study enlisted healthy, **older adults** to study the effects of sage on their cognitive function. Compared to a placebo, those taking the sage extract had an approximate **60%** better performance in a composite measure of **memory** and an approximate **2.5-fold** better performance in a composite measure of **attention**.²

That improvement was noted just hours after taking the sage extract.

Anti-Aging Potential

Sage has demonstrated impressive results in recent preclinical studies that suggest it could **increase lifespan** and delay symptoms of **aging** in humans.

C. elegans is a type of roundworm used to study longevity due to its relative short lifespan.

In one study, worms exposed to a sage extract had an average **12% increase in lifespan**.⁸





Summary

Sage has demonstrated an impressive ability to improve measures of **memory** and **attention** in older adults.

Preclinical research suggests that it also has potential to boost **longevity** and delay symptoms of aging.

Taken with other neuroprotective nutrients, such as phosphatidylserine, blueberry, vinpocetine, pregnenolone, and ashwagandha, it can be part of a comprehensive approach to cognitive and brain health. •

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

WHAT YOU NEED TO KNOW

Sage's Impact on the Brain

- Sage has been recognized for its numerous health benefits for centuries.
- European researchers have identified a unique form of sage that improves cognitive function. One clinical trial showed that healthy older adults taking sage extract had an approximate **60%** better performance in a composite measure of **memory** and an approximate **2.5-fold** better performance in a composite measure of **attention**, compared to placebo.²
- Preclinical studies show that sage may **increase lifespan**.⁸
- Sage extract can help support brain health, especially if taken with other supplements with proven brain benefits.

OTHER NUTRIENTS FOR BRAIN HEALTH

Sage extract is just one of several nutrients known to protect and enhance **brain health**. Taking it with others that complement its activity may maximize cognitive benefits.

PHOSPHATIDYLSERINE

Phosphatidylserine is a phospholipid component of nerve cell membranes and the myelin sheath that covers and protects nerve cells, including brain cells. The **myelin sheath** supports the conduction of nerve impulses throughout the nervous system.¹¹⁻¹³

Taking phosphatidylserine can help **preserve cognitive function** and may reduce the structural deterioration in the nervous system that occurs with age. In studies, people who took it scored higher on short-term **memory** and **concentration** tests.¹³

BLUEBERRY

Blueberries are packed with **anthocyanins**, powerful compounds present in a variety of fruits and vegetables. Anthocyanins exert a broad range of health-promoting effects, including defense against **oxidative stress**, as well as modulation of gene expression and cell-signaling pathways.¹⁴



Recent human trials have demonstrated that blueberries improve **memory** and other aspects of cognitive performance in older subjects, and boost **mood** and **cognition** in children and young adults.¹⁵⁻¹⁹

VINPOCETINE

Vinpocetine, a compound derived from the periwinkle plant, has been reported to have benefits for cognition and degenerative disorders of the brain, such as Alzheimer's and Parkinson's diseases.

Vinpocetine helps to **dilate** (widen) blood vessels to the brain, improving blood flow and stimulating brain metabolism.²⁰

PREGNENOLONE

Studies in animals and humans have shown that **pregnenolone**, a hormone produced by the adrenal gland, appears to be a **neuro-protectant**, defending the brain from various forms of injury.^{21,22}

It has also been found to have positive effects on **mood**, **memory**, and other aspects of cognition.²³

ASHWAGANDHA

Ashwagandha is an Indian herb, also referred to as "Indian ginseng." It has been used in traditional Indian medicine as a nerve tonic for thousands of years.

In modern research, ashwagandha has demonstrated **neuroprotective** effects and supplementation has resulted in improvements in mood and cognition.^{24,25} One study in patients suffering from **mild cognitive impairment** found that ashwagandha intake led to improvements in memory, attention, and decision making.²⁴

References

1. Lopresti AL. Salvia (Sage): A Review of its Potential Cognitive-Enhancing and Protective Effects. *Drugs in R&D.* 2017;17(1):53-64.
2. Scholey AB, Tildesley NT, Ballard CG, et al. An extract of Salvia (sage) with anticholinesterase properties improves memory and attention in healthy older volunteers. *Psychopharmacology (Berl).* 2008 May;198(1):127-39.
3. Huang EJ, Reichardt LF. Neurotrophins: roles in neuronal development and function. *Annu Rev Neurosci.* 2001;24:677-736.
4. Erickson Kl, Prakash RS, Voss MW, et al. Brain-derived neurotrophic factor is associated with age-related decline in hippocampal volume. *J Neurosci.* 2010 Apr 14;30(15):5368-75.
5. Hasanein P, Felehgari Z, Emamjomeh A. Preventive effects of Salvia officinalis L. against learning and memory deficit induced by diabetes in rats: Possible hypoglycaemic and antioxidant mechanisms. *Neurosci Lett.* 2016 May 27;622:72-7.
6. Lopresti AL. Salvia (Sage): A Review of its Potential Cognitive-Enhancing and Protective Effects. *Drugs R D.* 2017 Mar;17(1):53-64.
7. Akhondzadeh S, Noroozian M, Mohammadi M, et al. Salvia officinalis extract in the treatment of patients with mild to moderate Alzheimer's disease: a double blind, randomized and placebo-controlled trial. *J Clin Pharm Ther.* 2003 Feb;28(1):53-9.
8. Confidential S. Chronoscreen. 2016.
9. Confidential S. Sibelius cognition enhancement product presentation. 2018.
10. Confidential S. Sage Gene Expression Analysis. 2018.
11. Available at: <https://www.ncbi.nlm.nih.gov/books/NBK27954/>. Accessed April 1, 2021.
12. Available at: <https://www.drugbank.ca/drugs/DB00144>. Accessed April 1, 2021.
13. Glade MJ, Smith K. Phosphatidylserine and the human brain. *Nutrition.* 2015 Jun;31(6):781-6.
14. Burton-Freeman B, Sandhu A, Edirisinghe I. Anthocyanins. In: Gupta RC, ed. *Nutraceuticals.* Boston: Academic Press; 2016:489-500.
15. Khalid S, Barfoot KL, May G, et al. Effects of Acute Blueberry Flavonoids on Mood in Children and Young Adults. *Nutrients.* 2017 Feb 20;9(2).
16. Whyte AR, Schafer G, Williams CM. Cognitive effects following acute wild blueberry supplementation in 7- to 10-year-old children. *Eur J Nutr.* 2016 Sep;55(6):2151-62.
17. Miller MG, Hamilton DA, Joseph JA, et al. Dietary blueberry improves cognition among older adults in a randomized, double-blind, placebo-controlled trial. *Eur J Nutr.* 2018 Apr;57(3):1169-80.
18. McNamara RK, Kalt W, Shidler MD, et al. Cognitive response to fish oil, blueberry, and combined supplementation in older adults with subjective cognitive impairment. *Neurobiol Aging.* 2018 Apr;64:147-56.
19. Whyte AR, Cheng N, Fromentin E, et al. A Randomized, Double-Blinded, Placebo-Controlled Study to Compare the Safety and Efficacy of Low Dose Enhanced Wild Blueberry Powder and Wild Blueberry Extract (ThinkBlue) in Maintenance of Episodic and Working Memory in Older Adults. *Nutrients.* 2018 May 23;10(6).
20. Zhang YS, Li JD, Yan C. An update on vinpocetine: New discoveries and clinical implications. *Eur J Pharmacol.* 2018 Jan 15;819:30-4.
21. Veiga S, Garcia-Segura LM, Azcoitia I. Neuroprotection by the steroids pregnenolone and dehydroepiandrosterone is mediated by the enzyme aromatase. *J Neurobiol.* 2003 Sep 15;56(4):398-406.
22. Borowicz KK, Piskorska B, Banach M, et al. Neuroprotective actions of neurosteroids. *Front Endocrinol (Lausanne).* 2011;2:50.
23. Vallee M. Neurosteroids and potential therapeutics: Focus on pregnenolone. *J Steroid Biochem Mol Biol.* 2016 Jun;160:78-87.
24. Choudhary D, Bhattacharyya S, Bose S. Efficacy and Safety of Ashwagandha (*Withania somnifera* (L.) Dunal) Root Extract in Improving Memory and Cognitive Functions. *J Diet Suppl.* 2017 Nov 2;14(6):599-612.
25. Singh N, Bhalla M, de Jager P, et al. An overview on ashwagandha: a Rasayana (rejuvenator) of Ayurveda. *Afr J Tradit Complement Altern Med.* 2011;8(5 Suppl):208-13.



Unique Form of Sage

A group of European scientists has identified a specific **form of sage** with benefits that go beyond traditional sage extracts.

This sage extract has a unique chemical fingerprint,⁹ one distinctively suited to support **brain function**.

In a preclinical analytic study, this proprietary sage extract showed superior effects to other sage and cognitive drugs.^{8,10}

In addition, this proprietary sage extract increased the expression of genes associated with insulin signaling and lipid metabolism, which are both associated with enhanced longevity.^{8,10}

RESTORE BALANCE DURING STRESS

Stress disrupts multiple biochemical pathways.

Adrenal Energy Formula contains **four botanical adaptogens**, shown to modulate different stress-related changes.

- **Ashwagandha** supports muscle strength¹ and increases oxygen consumption.²
- **Bacopa** enhances cognitive performance and mood.³
- **Cordyceps** promotes endurance⁴ and enhanced immune function.⁵
- **Holy basil** supports balanced levels of neurotransmitters⁶ and enhances mood.⁷

Item # 01630 • 120 vegetarian capsules

1 bottle \$34.50 • 4 bottles \$31.50 each



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

References

1. J Int Soc Sports Nutr. 2015;12:43.
2. Ayu. 2015 Jan-Mar;36(1):63-8.
3. Phytother Res. 2014 Apr;28(4):551-9.
4. Pharm Biol. 2014;52(2):157-61.
5. Evid Based Complement Alternat Med. 2014;2014:438506.
6. Indian J Med Res. 2012 Apr;135(4):548-54.
7. Nepal Med Coll J. 2008 Sep;10(3):176-9.

BACOGNIZE® ULTRA is a registered trademark of Verdure Sciences, Inc. **OciBest®** is a registered trademark of Natural Remedies Private Limited. **Sensoril®** is protected under US Patent Nos. 6,153,198 and 6,713,092 and is a registered trademark of Natreon, Inc.



Better Together

The duo
that improves
the picture



Curcumin helps to promote a healthy inflammatory response.

This complementary combo promotes a healthy inflammatory response.



Pro-Resolving Mediators help remove cellular debris and build new, healthy tissue.

Curcumin Elite™

Item #02407 • 60 500 mg vegetarian capsules
1 bottle \$24.00 | 4 bottles \$22 each



Pro-Resolving Mediators

Item #02223 • 30 softgels
1 bottle \$21 | 4 bottles \$19 each

Want to Save More? Buy together for lowest possible price!

For full product description and to order **Curcumin Elite™** and **Pro-Resolving Mediators**, call 1-800-544-4440 or visit www.LifeExtension.com

Natural killer cell activity declines with normal aging, which can affect immune function.

NK Cell Activator™ supports healthy natural killer cell activity to promote a robust immune response.¹⁻³

Functional NK cells also recognize and eliminate **senescent cells** that accumulate in aged tissues.

The plant extract in **NK Cell Activator™** supports the activity of **natural killer** (NK) cells.

The suggested single serving of one or two vegetarian tablets of **NK Cell Activator™** provides:

Proprietary Enzymatically Modified Rice Bran 500 mg

References

1. *Curr Opin Virol.* 2011 Dec;1(6):497-512.
2. *Clin Exp Immunol.* 1987 May;68(2):340-7.
3. *Immunology.* 2009 Oct;128(2):151-63.

Contains wheat.

Boost Natural Killer Cells for **IMMUNE HEALTH**



Item #01903 • 30 vegetarian tablets

1 bottle \$33.75

4 bottles \$31.50 each



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



FEED YOUR BRAIN



Item #02397 • 60 vegetarian tablets
(with pregnenolone)
1 bottle \$43.50

4 bottles \$40 each

OR



Item #02396 • 60 vegetarian tablets
(without pregnenolone)
1 bottle \$42

4 bottles \$38 each

For full product description and to order **Cognitex® Elite**
or **Cognitex® Elite Pregnenolone**,
call 1-800-544-4440 or visit www.LifeExtension.com



FOR OPTIMAL BRAIN HEALTH

Cognitex® Elite contains clinically studied brain-boosting nutrients.

Sage Extract by itself demonstrated improvement in attention and memory performance in healthy, older volunteers.

Cognitex® Elite provides **all** of these ingredients:

Sage extract (leaf) (SIBELIUS™)	333 mg
AuroraBlue® Wildcrafted	200 mg
Blueberry Complex	
Sensoril® Ashwagandha extract	125 mg
Phosphatidylserine	100 mg
Uridine-5'-monophosphate	50 mg
Vinpocetine	20 mg

Cognitex® Elite Pregnenolone contains these same powerful ingredients but with **50 mg** of pregnenolone added.

Do not use if you are of childbearing age, pregnant or planning to become pregnant.

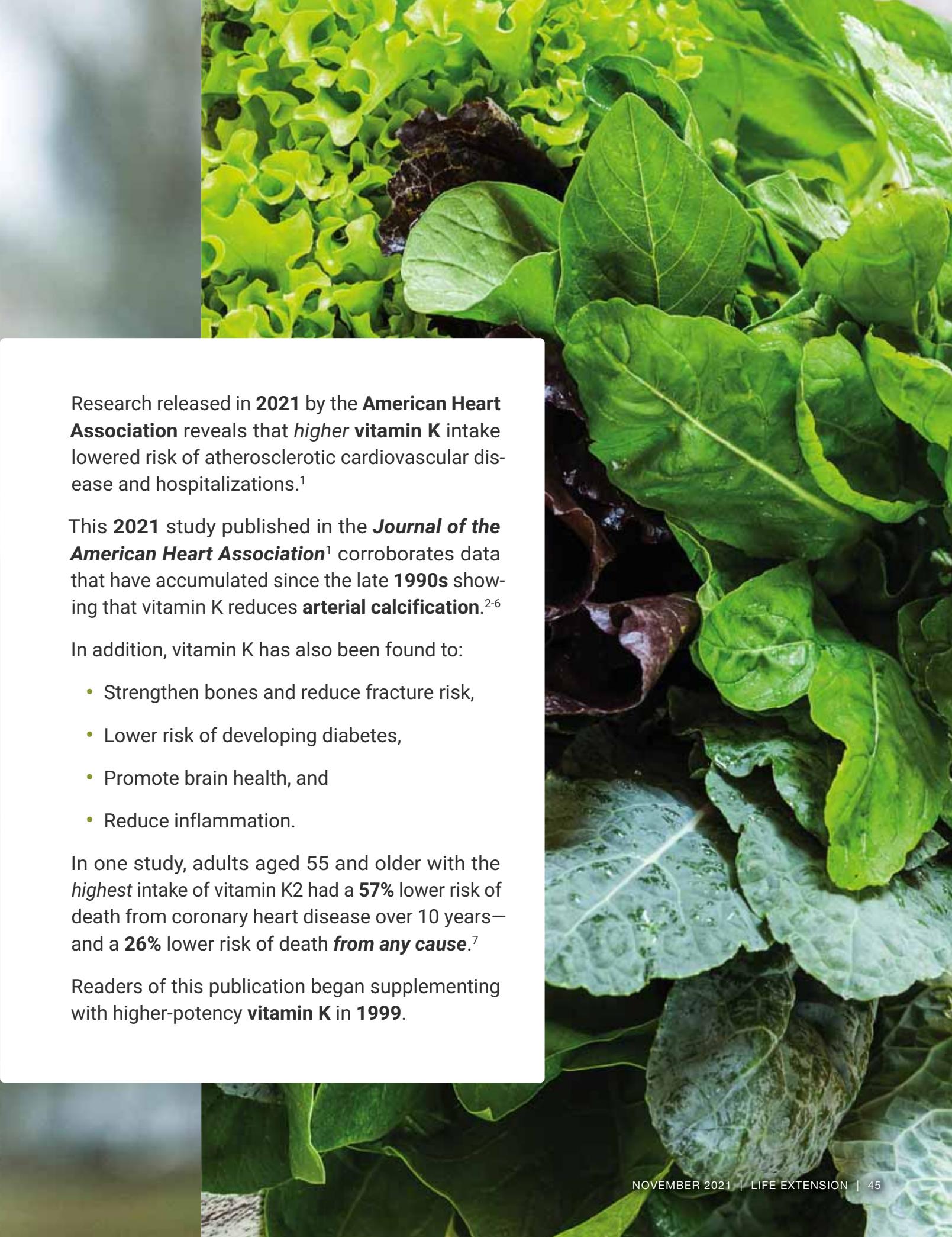
SIBELIUS™ is a trademark of Sibelius Limited. CHRONOSCREEN™ is a trademark of Chronos Therapeutics Limited.
Sensoril® is protected under US Patent Nos. 6,153,198 and 6,173,092 and is a registered trademark of Natreon, Inc.

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



The Whole-Body Benefits of **VITAMIN K**

BY PAZ ETCHEVERRY, MS, PhD



Research released in **2021** by the **American Heart Association** reveals that *higher vitamin K* intake lowered risk of atherosclerotic cardiovascular disease and hospitalizations.¹

This **2021** study published in the ***Journal of the American Heart Association***¹ corroborates data that have accumulated since the late **1990s** showing that vitamin K reduces **arterial calcification**.²⁻⁶

In addition, vitamin K has also been found to:

- Strengthen bones and reduce fracture risk,
- Lower risk of developing diabetes,
- Promote brain health, and
- Reduce inflammation.

In one study, adults aged 55 and older with the *highest* intake of vitamin K2 had a **57%** lower risk of death from coronary heart disease over 10 years—and a **26%** lower risk of death **from any cause**.⁷

Readers of this publication began supplementing with higher-potency **vitamin K** in **1999**.

What is Vitamin K?

Vitamin K is a fat-soluble vitamin that is *required* to activate many proteins in the body, known as **vitamin K-dependent proteins**.

There are two main types of vitamin K.

Vitamin K1 is present in green leafy vegetables.^{8,9}

It is best known for its ability to promote healthy **blood clotting** and prevent abnormal bleeding.^{10,11} It works by activating vitamin K-dependent coagulation proteins.

In the U.S., the American Academy of Pediatrics recommends that all newborns receive a vitamin K1 injection shortly after birth to prevent potentially lethal **vitamin K deficiency bleeding**.¹²

Vitamin K2 is known as **menaquinone** and has several subtypes. It plays vital roles in the health of bones, the heart, the brain, the immune system, and more.¹³

Types of Vitamin K2

Vitamin K2 exists in several forms.^{14,15} Among these, **menaquinone-4 (MK-4)** and **menaquinone-7 (MK-7)** have received the most attention.

MK-4 is found mainly in dairy foods like butter, milk, and cheese, and can also be formed by conversion of dietary **vitamin K1** (phylloquinone).^{16,17}

MK-7 is primarily present in fermented foods, such as some cheeses, kefir (fermented milk), sauerkraut, and natto (fermented soy). MK-7 can also be produced by bacteria in the intestinal tract.^{16,17}

Building Stronger Bones

Vitamin K2 improves **bone** quality and strength, which may reduce the risk of **fractures** and hospitalizations.

It does this mainly by activating a vitamin K-dependent protein known as **osteocalcin**,¹³ which binds to **calcium** and promotes **bone formation**.^{18,19}

In **2020**, Chinese researchers evaluated the effects of vitamin K2 intake on bone mass. The study showed that taking **90 mcg** of **vitamin K2** daily in the form of MK-7 for one year significantly reduced **bone loss** in postmenopausal women.²⁰

In another study, healthy Japanese women receiving **1,500 mcg** per day of vitamin K2 in the form of **MK-4** for four weeks had *higher* **osteocalcin** levels than those who received a placebo. The researchers concluded that MK-4 may help maintain bone health in postmenopausal women.²¹

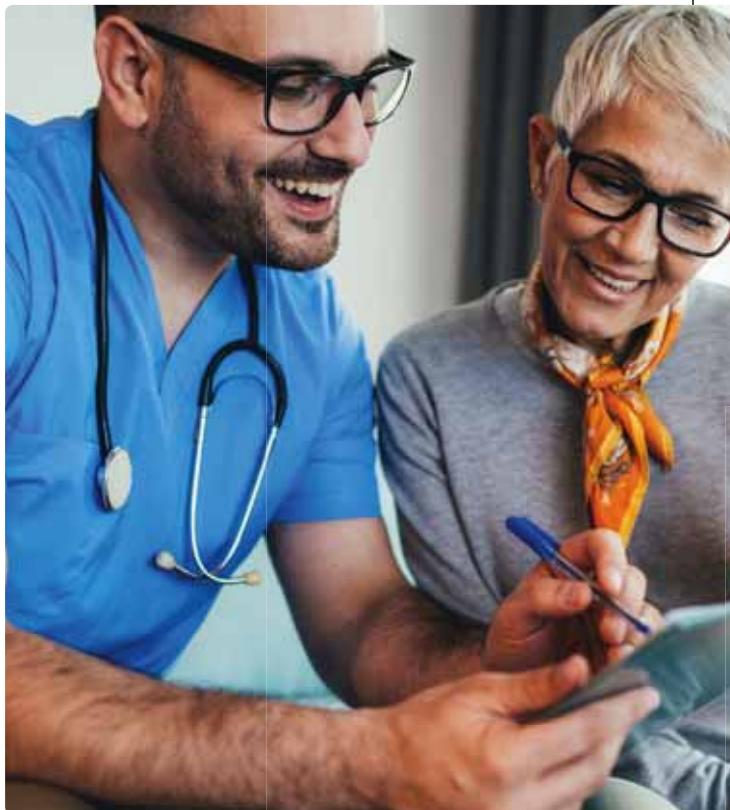
The combined effects of **vitamin D** and **vitamin K2** on bone health may be greater than either vitamin alone.

That's because vitamin D is essential in the **expression** of vitamin K-dependent proteins such as osteocalcin, while vitamin K2 **activates** them. Vitamin D also increases the intestinal absorption of **calcium**, which is then used in bone mineralization by osteocalcin.^{22,23}

A clinical study of postmenopausal women confirmed that high dose MK-4 (**45,000 mcg**) plus vitamin D was more effective at increasing **bone mineral density** than either MK-4 or vitamin D on its own.²⁴

The use of both vitamins together represents a viable approach to adjunctive **osteoporosis** treatment.⁹





WHAT YOU NEED TO KNOW

The Protective Effects of Vitamin K2

- There are two forms of vitamin K: **vitamin K1** and **vitamin K2**.
- **Vitamin K1** has been used to safely promote healthy **blood clotting** for nearly 100 years.
- **Vitamin K2** is a multifunctional vitamin that helps build stronger bones and may help prevent diabetes, reduce inflammation, lower body fat, and promote brain health.
- Vitamin K2 has shown particularly strong protective effects against **heart disease**. In one study, adults with the *highest* intake of vitamin K2 had a **57%** lower risk of death from coronary heart disease—and a **26%** lower risk of death **from any cause**.
- Vitamin K2 appears to work **synergistically** with **vitamin D**. Together, they may have greater benefits for bone and heart health, for example, than either does alone.
- **MK-4** and **MK-7** have been the most frequently studied forms of vitamin K2. Oral intake of both forms, along with vitamin K1, is ideal for optimal health.

Protecting the Heart

Vitamin K2 also protects against **cardiovascular disease**. It activates **matrix Gla protein**, a vitamin K-dependent protein that helps inhibit **calcium** from entering soft tissues like arterial walls and forming calcified plaques.^{13,25}

A study focusing on vitamin K intake in 564 post-menopausal women found that *higher* dietary intake of vitamin K2 was associated with protection against dangerous **calcification** of coronary arteries.²⁶ Those with the highest intake had a **20% lower** rate of calcification than those with the lowest intake.

And in a study that followed more than 4,800 adults over age 55 for up to **10 years**, those with the *highest* intake of vitamin K2 had a **57%** lower rate of death due to **coronary heart disease**—and a **26%** lower rate of **death from any cause**.⁷

The **synergy** between vitamin K2 and vitamin D also appears to have benefits for cardiovascular health.²³

A 2015 study evaluated the effects of vitamin K2 on the progression of **atherosclerosis** in patients with chronic kidney disease. After approximately nine months, those who received **90 mcg** of MK-7 plus **400 IU** (**10 mcg**) of **vitamin D** daily had less progression of atherosclerosis than those who received *only* vitamin D.²⁷

Help for Diabetics

Vitamin K2 intake may be associated with lower risk of developing **type II diabetes** and may potentially be helpful for people living with the disease.²⁸

The vitamin's effects on glucose homeostasis may be due in part to the activation of **osteocalcin**. In addition to its role in bone mineralization, osteocalcin *stimulates* healthy insulin and adiponectin expression.²⁹

In healthy young men, taking **30,000 mcg** per day of vitamin K2 (MK-4) for four weeks increased **insulin sensitivity**. Researchers believe that these benefits are in part due to osteocalcin's actions.³⁰

By improving glucose and lipid metabolism, vitamin K2 may also help reduce **body weight**.^{13,31}

Researchers gave postmenopausal women either **180 mcg** per day of **MK-7** or a placebo. After three years, those who took vitamin K2 and experienced increased circulating levels of activated osteocalcin also had *higher* levels of adiponectin and *decreased abdominal fat mass*.³²

In another study, researchers gave vitamin D-deficient women with the hormonal disorder **polycystic ovary syndrome** either a placebo or a combination of **calcium (1,000 mg per day)**, **vitamin D (400 IU per day)**, and **vitamin K (180 mcg per day)**.³³

After eight weeks, the women who received the combination had *higher* insulin sensitivity and *lower* insulin resistance than those who took the placebo—in addition, the combination led to a decrease in triglycerides and VLDL cholesterol.³³

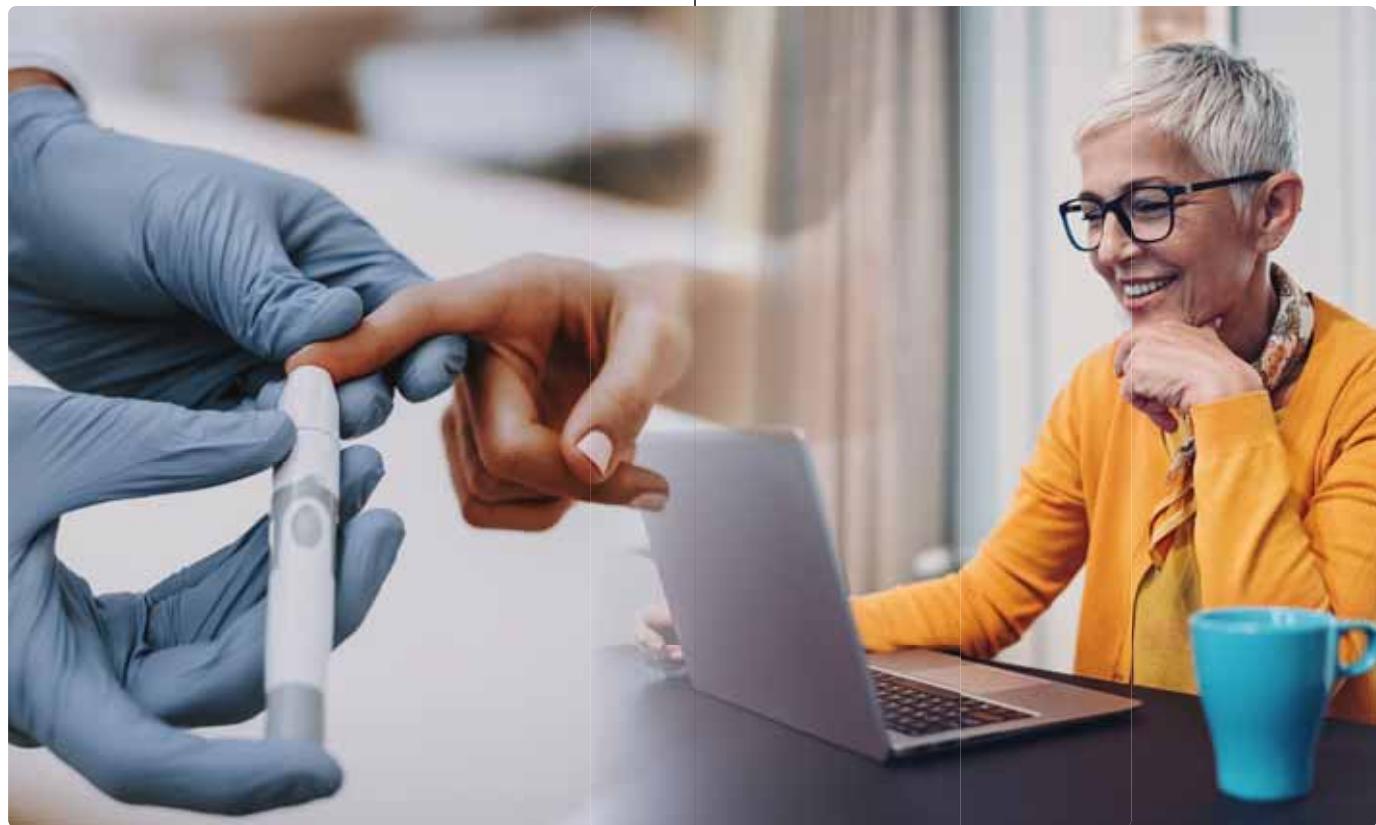
Researchers have argued that the dual intake of vitamins D and K might benefit **diabetics** by regulating insulin secretion from the pancreas and upregulating insulin receptor genes in the body.²³

Brain Benefits

Vitamin K2 may play a role in helping to prevent **neurological diseases**.¹³

MK-4 is the predominant form of vitamin K present in the brain. It appears to be involved in the production of **sphingolipids**, a group of complex fat molecules that are components of cell membranes and present in the central and peripheral nervous system. These molecules are central to cell growth, structure, and signaling.³⁴

Studies have found that people with **Alzheimer's** or **Parkinson's disease** have *reduced* levels of vitamin K2^{35,36} and potentially harmful changes in sphingolipid metabolism.³⁴





Vitamin K Reduces Atherosclerotic Cardiovascular Disease Risk, Hospitalization

Research published in **2021** in the *Journal of the American Heart Association*¹ found that people whose diets were *higher* in vitamins **K1** and **K2** had significantly *lower* risk of atherosclerotic **cardiovascular disease** (ASCVD), and hospitalizations.

Data from 53,372 participants with a median age of 52-60, and no prior ASCVD, were studied for more than two decades.

The individuals completed a food-frequency questionnaire at baseline, from which intakes of vitamins K1 and K2 were estimated, and they were followed up for hospital admissions for ASCVD: ischemic heart disease, ischemic stroke, or peripheral artery disease.

Those people with the *highest* intakes of vitamin K1 had a **21%** *lower* risk of an ASCVD-related hospitalization compared to those with the *lowest* intakes. Similarly, for participants with the *highest* intakes of vitamin **K2** the risk was **14%** *lower* than for those who had the *lowest* intakes.

This lower risk was seen for all types of heart disease related to atherosclerosis. For **peripheral artery disease** the risk was reduced by **34%** for those with the *highest* intake of vitamin K1.

The authors of the study concluded that these results:

“...highlight the potential importance of vitamin K for atherosclerotic cardiovascular disease prevention.”

The **anti-inflammatory** properties of **vitamin K1** may also benefit brain health. A study published in **2020** in *Nutritional Neuroscience* concluded that *higher* dietary vitamin K1 intake among Irish adults was associated with *reduced* inflammation and **improved cognition**.³⁷

Reducing Damaging Inflammation

Vitamin K2 has been shown to beneficially modulate the **immune system**. It inhibits several pathways involved in **inflammation** and in the release of pro-inflammatory **cytokines**.^{38,39}

A clinical study of women with polycystic ovary syndrome showed that oral intake of calcium, vitamin D, and vitamin K2 (MK-7) reduced markers of **oxidative stress** and **inflammation**.⁴⁰

Summary

Vitamin K has been shown to provide whole-body health benefits.

MK-4 and **MK-7**, the two main forms of **vitamin K2**, play crucial roles in preventing bone loss, protecting the heart, and potentially reducing type II diabetic risk.

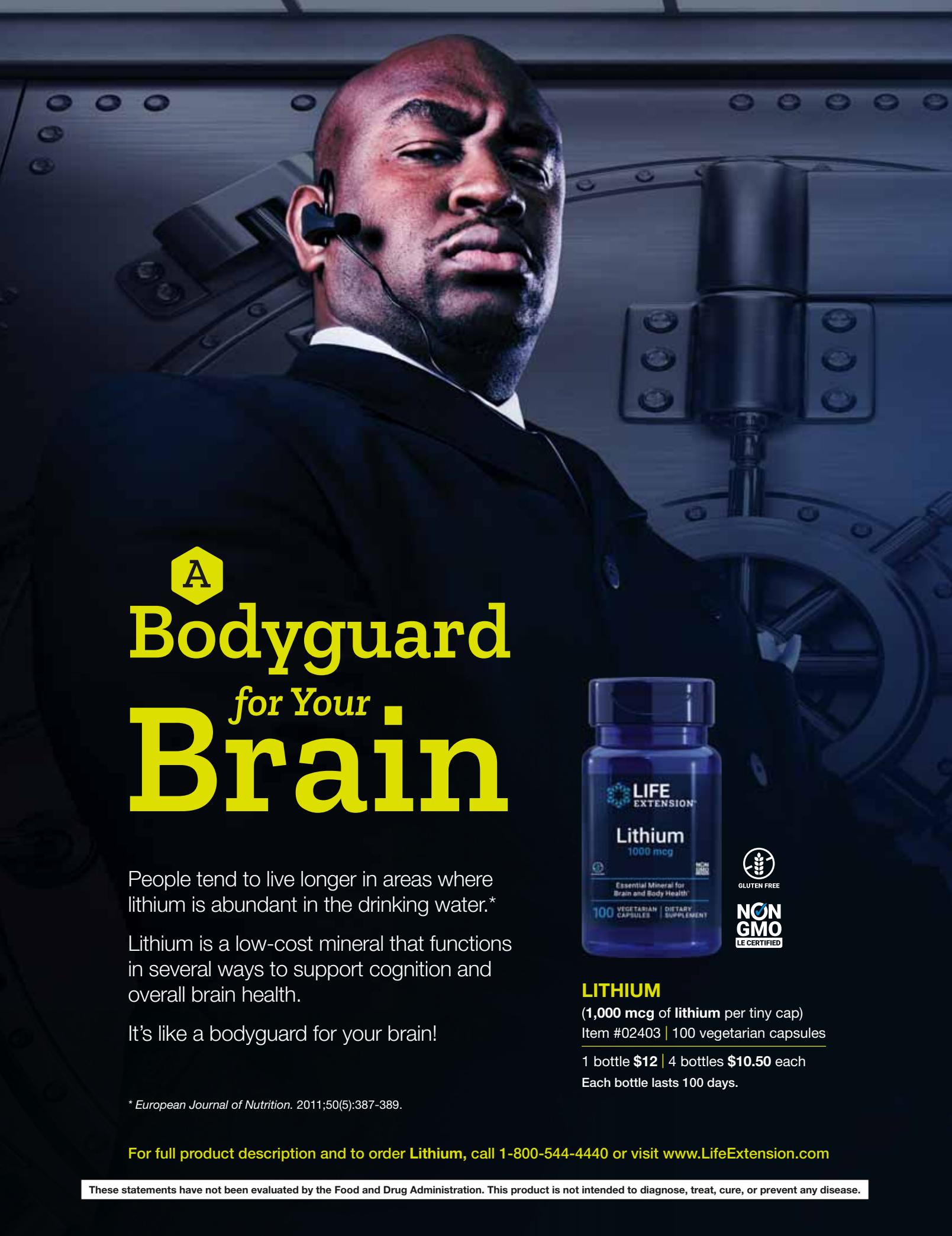
These two forms of **vitamin K2** (MK-4 and MK-7) may also promote healthy brain function, reduce inflammation, and help reduce **vascular calcification**.

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

References

- Bellinge JW, Dalgaard F, Murray K, et al. Vitamin K Intake and Atherosclerotic Cardiovascular Disease in the Danish Diet Cancer and Health Study. *J Am Heart Assoc.* 2021 Aug 17;10(16):e020551.
- Maresz K. Proper Calcium Use: Vitamin K2 as a Promoter of Bone and Cardiovascular Health. *Integr Med (Encinitas).* 2015 Feb;14(1):34-9.
- Jie KS, Bots ML, Vermeer C, et al. Vitamin K intake and osteocalcin levels in women with and without aortic atherosclerosis: a population-based study. *Atherosclerosis.* 1995 Jul;116(1):117-23.
- Shearer MJ. Role of vitamin K and Gla proteins in the pathophysiology of osteoporosis and vascular calcification. *Curr Opin Clin Nutr Metab Care.* 2000 Nov;3(6):433-8.
- Jie KG, Bots ML, Vermeer C, et al. Vitamin K status and bone mass in women with and without aortic atherosclerosis: a population-based study. *Calcif Tissue Int.* 1996 Nov;59(5):352-6.
- Shanahan CM, Proudfit D, Farzaneh-Far A, et al. The role of Gla proteins in vascular calcification. *Crit Rev Eukaryot Gene Expr.* 1998;8(3-4):357-75.
- Geleijnse JM, Vermeer C, Grobbee DE, et al. Dietary intake of menaquinone is associated with a reduced risk of coronary heart disease: the Rotterdam Study. *J Nutr.* 2004 Nov;134(11):3100-5.
- Imbrescia K MZVK. Vitamin K. StatPearls [Internet]. 2021.
- Schwarzberg GK. Vitamins K1 and K2: The Emerging Group of Vitamins Required for Human Health. *J Nutr Metab.* 2017;2017:6254836.
- Ferland G. The discovery of vitamin K and its clinical applications. *Ann Nutr Metab.* 2012;61(3):213-8.
- van Balleijooien AJ, Beulens JW. The Role of Vitamin K Status in Cardiovascular Health: Evidence from Observational and Clinical Studies. *Curr Nutr Rep.* 2017;6(3):197-205.
- Ardell S, Offringa M, Ovelman C, et al. Prophylactic vitamin K for the prevention of vitamin K deficiency bleeding in preterm neonates. *Cochrane Database Syst Rev.* 2018 Feb 5;2(2):CD008342.
- Halder M, Petsophonsakul P, Akbulut AC, et al. Vitamin K: Double Bonds beyond Coagulation Insights into Differences between Vitamin K1 and K2 in Health and Disease. *Int J Mol Sci.* 2019 Feb 19;20(4):896.
- Walther B, Karl JP, Booth SL, et al. Menaquinones, bacteria, and the food supply: the relevance of dairy and fermented food products to vitamin K requirements. *Adv Nutr.* 2013 Jul 1;4(4):463-73.
- Marles RJ, Roe AL, Oketch-Rabah HA. US Pharmacopeial Convention safety evaluation of menaquinone-7, a form of vitamin K. *Nutr Rev.* 2017 Jul 1;75(7):553-78.
- Available at: <http://lpi.oregonstate.edu/mic/vitamins/vitamin-K>. Accessed 05/14/2019.
- Booth SL. Vitamin K: food composition and dietary intakes. *Food & nutrition research.* 2012;56:10.3402/fnr.v56i0.5505.
- Zoch ML, Clemens TL, Riddle RC. New insights into the biology of osteocalcin. *Bone.* 2016 Jan;82:42-9.
- Vitamin K2. Monograph. *Altern Med Rev.* 2009 Sep;14(3):284-93.
- Zhang Y, Liu Z, Duan L, et al. Effect of Low-Dose Vitamin K2 Supplementation on Bone Mineral Density in Middle-Aged and Elderly Chinese: A Randomized Controlled Study. *Calcif Tissue Int.* 2020 May;106(5):476-85.
- Koitaya N, Ezaki J, Nishimuta M, et al. Effect of low dose vitamin K2 (MK-4) supplementation on bio-indices in postmenopausal Japanese women. *J Nutr Sci Vitaminol (Tokyo).* 2009 Feb;55(1):15-21.
- Kidd PM. Vitamins D and K as pleiotropic nutrients: clinical importance to the skeletal and cardiovascular systems and preliminary evidence for synergy. *Altern Med Rev.* 2010 Sep;15(3):199-222.
- van Balleijooien AJ, Pilz S, Tomaschitz A, et al. The Synergistic Interplay between Vitamins D and K for Bone and Cardiovascular Health: A Narrative Review. *Int J Endocrinol.* 2017;2017:7454376.
- Ushiroyama T, Ikeda A, Ueki M. Effect of continuous combined therapy with vitamin K(2) and vitamin D(3) on bone mineral density and coagulofibrinolysis function in postmenopausal women. *Maturitas.* 2002 Mar 25;41(3):211-21.
- Machado-Fragua MD, Hoogendoijk EO, Struijk EA, et al. High dephospho-uncarboxylated matrix Gla protein concentrations, a plasma biomarker of vitamin K, in relation to frailty: the Longitudinal Aging Study Amsterdam. *Eur J Nutr.* 2020 Apr;59(3):1243-51.
- Beulens JW, Bots ML, Atsma F, et al. High dietary menaquinone intake is associated with reduced coronary calcification. *Atherosclerosis.* 2009 Apr;203(2):489-93.
- Kurnatowska I, Grzelak P, Masajtis-Zagajewska A, et al. Effect of vitamin K2 on progression of atherosclerosis and vascular calcification in nondialyzed patients with chronic kidney disease stages 3-5. *Pol Arch Med Wewn.* 2015;125(9):631-40.
- Jakubowski P. Current View on Vitamin K2 Role in Diseases Based on Clinical Trials. *Farmacia.* 2019;67(4):551-6.
- Kanazawa I. Osteocalcin as a hormone regulating glucose metabolism. *World J Diabetes.* 2015 Dec 25;6(18):1345-54.
- Choi HJ, Yu J, Choi H, et al. Vitamin K2 supplementation improves insulin sensitivity via osteocalcin metabolism: a placebo-controlled trial. *Diabetes Care.* 2011 Sep;34(9):e147.
- Li Y, Chen JP, Duan L, et al. Effect of vitamin K2 on type 2 diabetes mellitus: A review. *Diabetes Res Clin Pract.* 2018 Feb;136:39-51.
- Knapen MHJ, Jardon KM, Vermeer C. Vitamin K-induced effects on body fat and weight: results from a 3-year vitamin K2 intervention study. *Eur J Clin Nutr.* 2018 Jan;72(1):136-41.
- Karamali M, Ashrafi M, Razavi M, et al. The Effects of Calcium, Vitamins D and K co-Supplementation on Markers of Insulin Metabolism and Lipid Profiles in Vitamin D-Deficient Women with Polycystic Ovary Syndrome. *Exp Clin Endocrinol Diabetes.* 2017 May;125(5):316-21.
- Ferland G. Vitamin K and the nervous system: an overview of its actions. *Adv Nutr.* 2012 Mar 1;3(2):204-12.
- Yu YX, Yu XD, Cheng QZ, et al. The association of serum vitamin K2 levels with Parkinson's disease: from basic case-control study to big data mining analysis. *Aging (Albany NY).* 2020 Aug 29;12(16):16410-9.
- Allison AC. The possible role of vitamin K deficiency in the pathogenesis of Alzheimer's disease and in augmenting brain damage associated with cardiovascular disease. *Med Hypotheses.* 2001 Aug;57(2):151-5.
- Kiely A, Ferland G, Ouliass B, et al. Vitamin K status and inflammation are associated with cognition in older Irish adults. *Nutr Neurosci.* 2020 Aug;23(8):591-9.
- Myneni VD, Mézey E. Immunomodulatory effect of vitamin K2: Implications for bone health. *Oral Dis.* 2018 Mar;24(1-2):67-71.
- Reddi K, Henderson B, Meghji S, et al. Interleukin 6 production by lipopolysaccharide-stimulated human fibroblasts is potently inhibited by naphthoquinone (vitamin K) compounds. *Cytokine.* 1995 Apr;7(3):287-90.
- Razavi M, Jamilian M, Karamali M, et al. The Effects of Vitamin D-K-Calcium Co-Supplementation on Endocrine, Inflammation, and Oxidative Stress Biomarkers in Vitamin D-Deficient Women with Polycystic Ovary Syndrome: A Randomized, Double-Blind, Placebo-Controlled Trial. *Horm Metab Res.* 2016 Jul;48(7):446-51.





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.

It's like a bodyguard for your brain!



LITHIUM

(1,000 mcg of lithium per tiny cap)
Item #02403 | 100 vegetarian capsules

1 bottle \$12 | 4 bottles \$10.50 each
Each bottle lasts 100 days.

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

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



ADVANCED MILK THISTLE

ULTIMATE PROTECTION
FOR YOUR LIVER



Advanced Milk Thistle contains standardized, top-grade potencies of **silymarin**, **silybin**, **isosilybin A**, and **isosilybin B**, providing a full spectrum of liver-supportive compounds.

The **silymarin** contained in **Advanced Milk Thistle** is absorbed nearly **5 times** better than silymarin alone, and its bioavailability to the liver is **10 times** better.

Item #01922 • 60 softgels

1 bottle \$21 • 4 bottles \$18.75 each

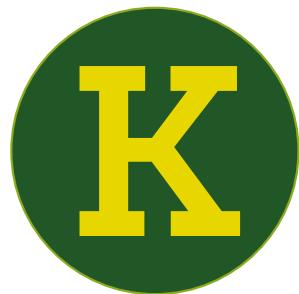


For full product description and to order **Advanced Milk Thistle**,
call 1-800-544-4440 or visit www.LifeExtension.com

SILIPHOS® is a registered trademark
of Indena S.p.A., Italy.



THREE WAYS TO GET VITAMIN K



SUPER K

SUPER K is the best-selling vitamin K formula for bone and heart health. It costs only **25 cents** a day and provides in one softgel:

Vitamin K1 1,500 mcg
(converts to K2 in some people)

Vitamin K2 (MK-4) 1,000 mcg
(for bone & vascular health)

Vitamin K2 (MK-7) 100 mcg
(long-acting protection)



SUPER K Item #02334 • 90 softgels
1 bottle **\$22.50** • 4 bottles \$20.25 each

SUPER K ELITE

Super K Elite provides 2 additional forms of vitamin K and even **higher** potencies of K1, MK4, and MK7.

Super K Elite costs **60 cents** a day and provides in one softgel:

Vitamin K1 2,000 mcg
(converts to K2 in some people)

Vitamin K2 (MK-4) 1,500 mcg
(for bone & vascular health)

Vitamin K2 (MK-7) 181 mcg
(long-acting protection)

Vitamin K2 (MK-9) 43 mcg
(added cardiovascular support)

Vitamin K2 (MK-6) 11 mcg
(added cardiovascular support)



SUPER K ELITE Item #02335 • 30 softgels
1 bottle **\$18** • 4 bottles \$16 each

MEGA VITAMIN K2

Japanese physicians use **high-dose** **vitamin K2** for those with challenges in maintaining healthy bone density.

Mega Vitamin K2 costs **95 cents** a day and provides in one daily capsule:

Vitamin K2 (MK-4) 45,000 mcg
(for bone & vascular health)

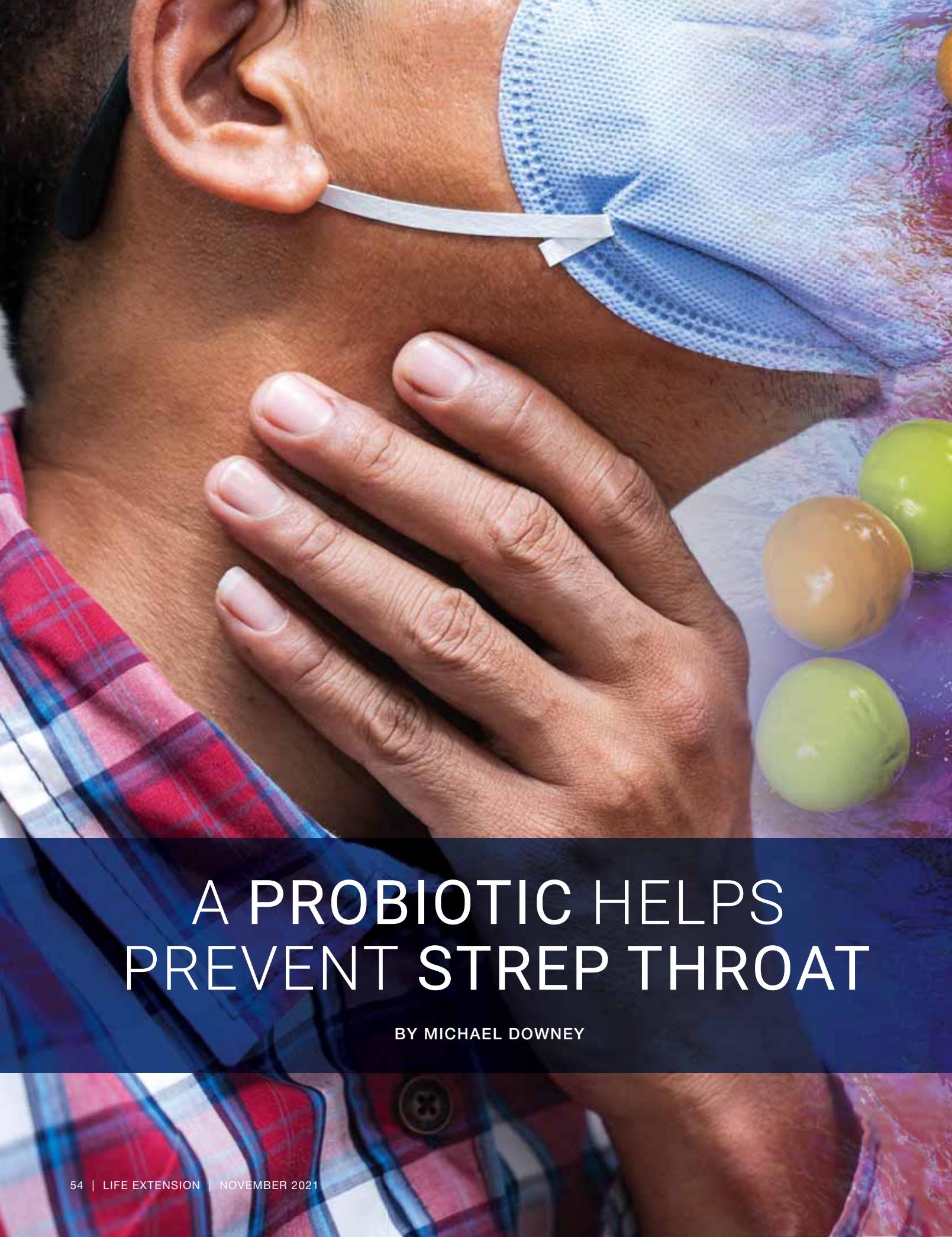


MEGA VITAMIN K2 Item #02417 • 30 capsules
1 bottle **\$28.50** • 4 bottles \$26 each

For full product description and to order these **VITAMIN K** formulas
call 1-800-544-4440 or visit www.LifeExtension.com

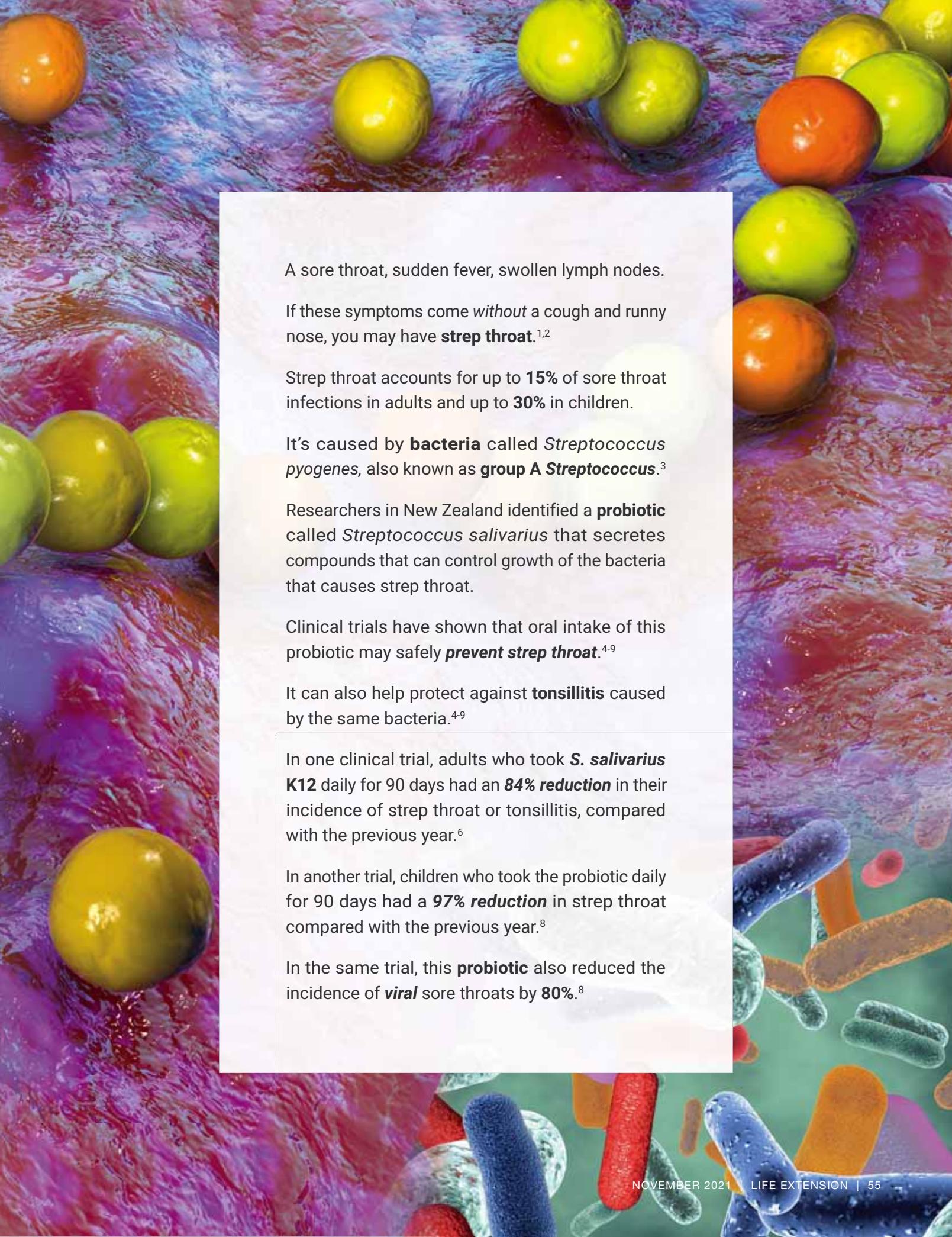


CAUTION: If you are taking a vitamin K antagonist (e.g. warfarin), consult your healthcare practitioner before taking this product.



A PROBIOTIC HELPS PREVENT STREP THROAT

BY MICHAEL DOWNEY



A sore throat, sudden fever, swollen lymph nodes.

If these symptoms come *without* a cough and runny nose, you may have **strep throat**.^{1,2}

Strep throat accounts for up to **15%** of sore throat infections in adults and up to **30%** in children.

It's caused by **bacteria** called *Streptococcus pyogenes*, also known as **group A Streptococcus**.³

Researchers in New Zealand identified a **probiotic** called *Streptococcus salivarius* that secretes compounds that can control growth of the bacteria that causes strep throat.

Clinical trials have shown that oral intake of this probiotic may safely **prevent strep throat**.⁴⁻⁹

It can also help protect against **tonsillitis** caused by the same bacteria.⁴⁻⁹

In one clinical trial, adults who took *S. salivarius* K12 daily for 90 days had an **84% reduction** in their incidence of strep throat or tonsillitis, compared with the previous year.⁶

In another trial, children who took the probiotic daily for 90 days had a **97% reduction** in strep throat compared with the previous year.⁸

In the same trial, this **probiotic** also reduced the incidence of **viral** sore throats by **80%**.⁸

Strep is Serious

Strep throat is marked by a painful **sore throat**, swollen lymph nodes, and the sudden onset of **fever**.^{1,2}

Most sore throats, like those associated with a cold, are caused by a **virus**.¹⁰ These cases seldom have dangerous complications and are generally left to run their course.

Strep throat is different. It gets its name from the bacteria that cause it—**group A Streptococcus** (or *S. pyogenes*).

Strep throat can lead to serious consequences if not treated properly. It may:¹¹

- Spread to surrounding tissues, causing **sinus** or **ear infections**,
- Produce a toxin that causes a **scarlet fever rash**,
- Lead to **rheumatic fever**, inflaming joints and potentially **damaging valves of the heart**, and
- Cause kidney inflammation (glomerulonephritis), that can trigger **chronic kidney problems**.

To avoid these complications, and because strep throat is highly **contagious**, it may be best to promptly treat it with **antibiotics**.

But it would be far better to **prevent strep throat** in the first place.

Scientists have now shown that there is a safe and effective way to help block strep-causing bacteria from taking hold and causing infection.

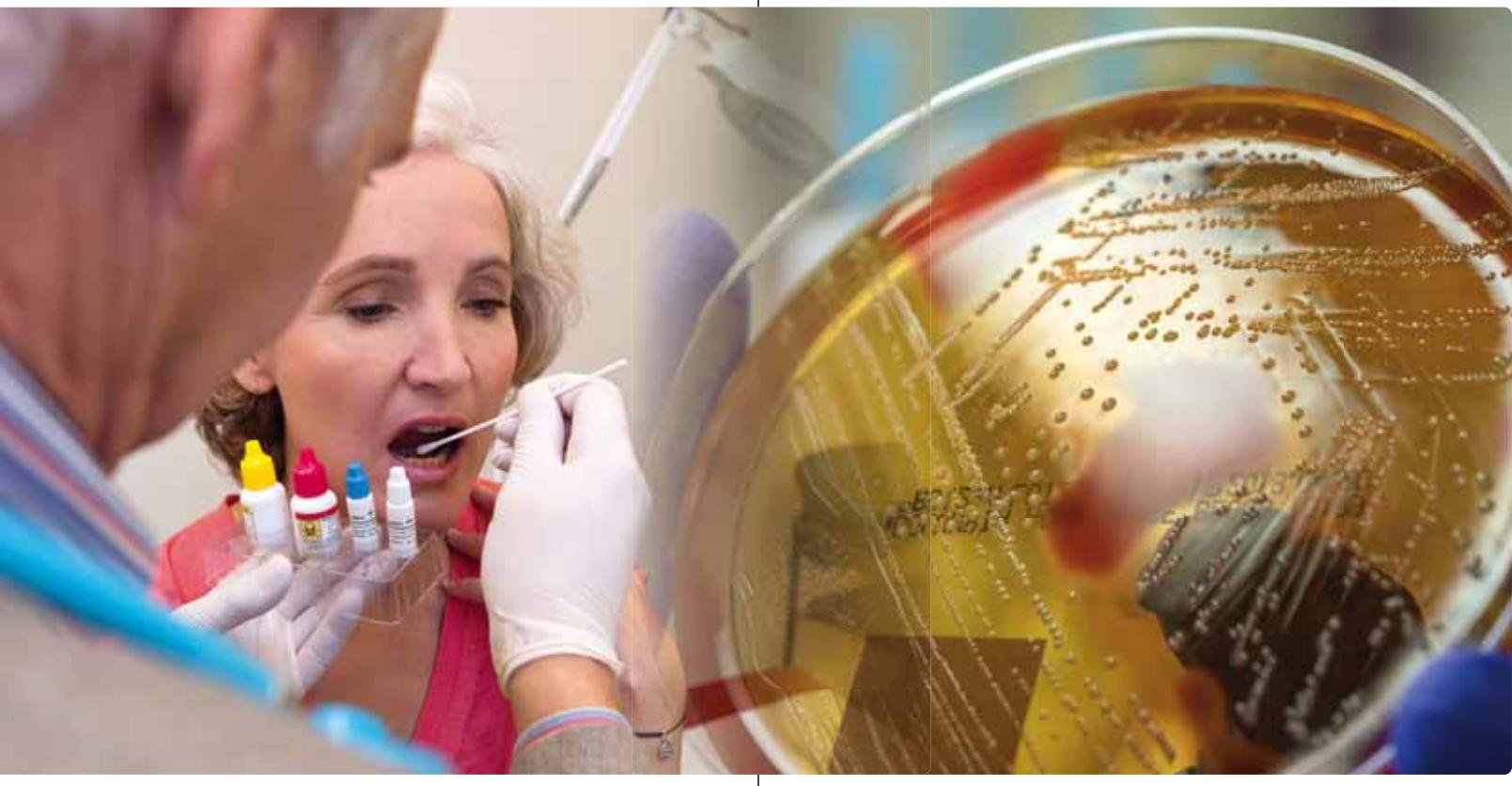
A Novel Probiotic

A strain of *Streptococcus salivarius* has the ability to inhibit the growth of **bacteria** that causes strep throat.

Scientists analyzing *S. salivarius* K12 found that it produces compounds called **lantibiotics**.¹²

These peptides (strings of amino acids) inhibit strains of disease-producing bacteria, including **group A Streptococcus**.¹²

***S. salivarius* K12** produces a specific peptide called **salivaricin A2** that targets group A *Streptococcus* to inhibit growth.¹³⁻¹⁵ This lantibiotic works like a drill, forming holes in the cell walls of the targeted bacteria, causing them to break apart and die.¹⁶⁻¹⁸





WHAT YOU NEED TO KNOW

Prevent Strep Throat

- **Strep throat** is a bacterial infection that causes a painful sore throat and fever. It can also lead to serious complications, including heart and kidney damage.
- A strain of *Streptococcus salivarius* obstructs the growth of bacteria that causes strep throat.
- Lozenges containing the probiotic ***S. salivarius K12*** have been clinically shown to **protect against strep throat** in both adults and children.
- In two clinical trials, ***S. salivarius K12*** reduced the incidence of strep throat by as much as **84% in adults** and **97% in children**.

Effective in Adults

Researchers enlisted adult volunteers with a history of **recurrent strep throat or bacterial tonsillitis** (caused by the same bacteria) for a clinical trial.

All participants were symptom-free at enrollment. They were given either no treatment or a daily lozenge containing probiotic ***S. salivarius K12*** organisms for 90 days.

The results found:⁶

- Adults who took *S. salivarius* had an **84% reduction** in their incidence of strep throat or tonsillitis, compared with the previous year.
- During a six-month, *no-treatment* follow-up, patients who had taken *S. salivarius K12* still had a **62% reduction** in episodes of strep throat or tonsillitis, compared with the untreated group.

This study demonstrated that *preventive* probiotic use with *S. salivarius K12* successfully and significantly reduced the rate of recurrent strep.

Effective in Children

Scientists were eager to determine whether this probiotic afforded the same protection to **children**, who tend to suffer from strep throat more often than adults.

A study was conducted on children ages **3-13 years** with recurrent strep throat. They were given either a lozenge containing no fewer than **one billion** colony-forming units of ***S. salivarius K12*** or no therapy for 90 days.⁸

Children who took the probiotic had a **97% reduction in strep throat**, from an average baseline of **3.1 infections per child** in the previous year to just **0.1 per child** on average. No significant change was seen in the untreated group.⁸

In addition, children who took *S. salivarius* had an **80% decrease** in the incidence of **viral** throat infections.⁸ This reduction may be related to the ability of *S. salivarius K12* to reduce inflammation and increase levels of **antiviral** compounds.⁸

Summary

Strep throat is a bacterial infection that afflicts children and adults. It can have dangerous complications, including rheumatic heart disease and kidney damage.

The probiotic strain *S. salivarius* K12 helps control the growth of bacteria that cause strep throat and may reduce the incidence of the condition itself.

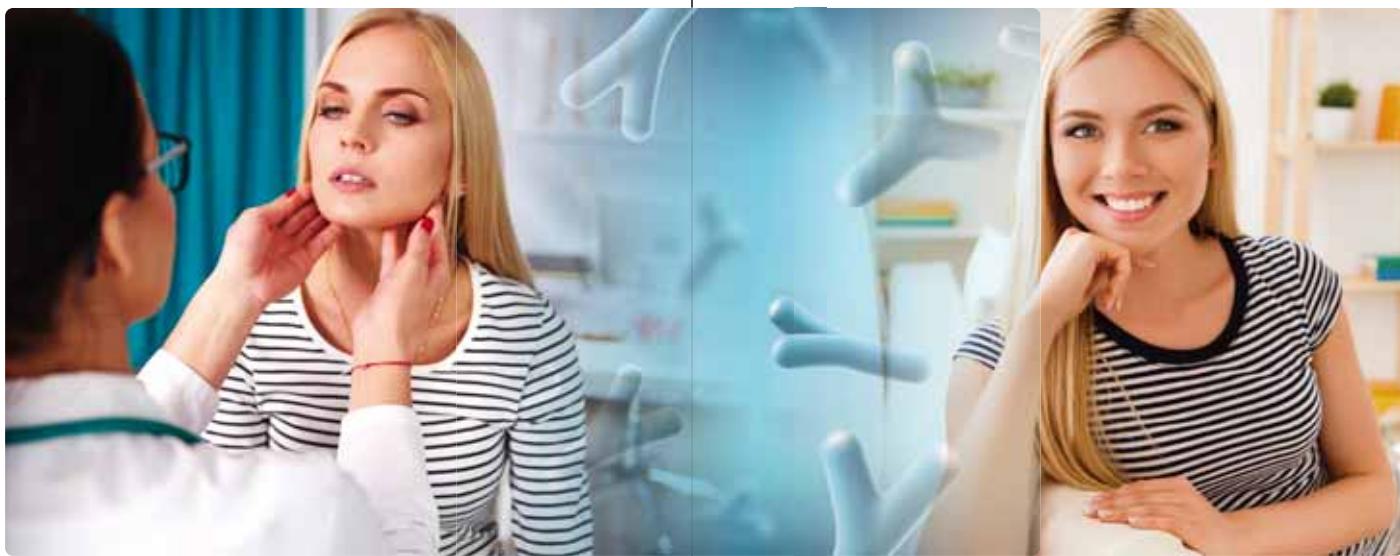
Clinical studies have demonstrated that oral intake of *S. salivarius* K12 helped **prevent strep infections** in adults and children.

This **probiotic** has also shown an ability to confer protection against viral throat infections. ●

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

References

- Available at: <https://www.cdc.gov/groupastrep/diseases-public/strep-throat.html>. Accessed August 26, 2021.
- Shulman ST, Bisno AL, Clegg HW, et al. Clinical practice guideline for the diagnosis and management of group A streptococcal pharyngitis: 2012 update by the Infectious Diseases Society of America. *Clin Infect Dis.* 2012 Nov 15;55(10):e86-102.
- Ashurst JV E-GL. Streptococcal Pharyngitis. *StatPearls Publishing.* 2021.
- Di Pierro F, Rissi P, Poggi E, et al. Use of *Streptococcus salivarius* K12 to reduce the incidence of pharyngo-tonsillitis and acute otitis media in children: a retrospective analysis in not-recurrent pediatric subjects. *Minerva Pediatr.* 2018 Jun;70(3):240-5.
- Di Pierro F, Colombo M, Giuliani MG, et al. Effect of administration of *Streptococcus salivarius* K12 on the occurrence of streptococcal pharyngo-tonsillitis, scarlet fever and acute otitis media in 3 years old children. *Eur Rev Med Pharmacol Sci.* 2016 Nov;20(21):4601-6.
- Di Pierro F, Adami T, Rapacioli G, et al. Clinical evaluation of the oral probiotic *Streptococcus salivarius* K12 in the prevention of recurrent pharyngitis and/or tonsillitis caused by *Streptococcus pyogenes* in adults. *Expert Opin Biol Ther.* 2013 Mar;13(3):339-43.
- Di Pierro F, Donato G, Fomia F, et al. Preliminary pediatric clinical evaluation of the oral probiotic *Streptococcus salivarius* K12 in preventing recurrent pharyngitis and/or tonsillitis caused by *Streptococcus pyogenes* and recurrent acute otitis media. *Int J Gen Med.* 2012;5:991-7.
- Di Pierro F, Colombo M, Zanvit A, et al. Use of *Streptococcus salivarius* K12 in the prevention of streptococcal and viral pharyngo-tonsillitis in children. *Drug Healthc Patient Saf.* 2014;6:15-20.
- Gregori G, Righi O, Rissi P, et al. Reduction of group A beta-hemolytic streptococcus pharyngo-tonsillar infections associated with use of the oral probiotic *Streptococcus salivarius* K12: a retrospective observational study. *Ther Clin Risk Manag.* 2016;12:87-92.
- Available at: <https://www.mayoclinic.org/diseases-conditions/sore-throat/symptoms-causes/syc-20351635>. Accessed August 31, 2021.
- Available at: <https://www.ncbi.nlm.nih.gov/books/NBK554528/>. Accessed August 26, 2021.
- Barbour A, Wescombe P, Smith L. Evolution of Lantibiotic Salivaricins: New Weapons to Fight Infectious Diseases. *Trends Microbiol.* 2020 Jul;28(7):578-93.
- Hyink O, Wescombe PA, Upton M, et al. Salivaricin A2 and the novel lantibiotic salivaricin B are encoded at adjacent loci on a 190-kilobase transmissible megaplasmid in the oral probiotic strain *Streptococcus salivarius* K12. *Appl Environ Microbiol.* 2007 Feb;73(4):1107-13.
- Wescombe PA, Upton M, Dierksen KP, et al. Production of the lantibiotic salivaricin A and its variants by oral streptococci and use of a specific induction assay to detect their presence in human saliva. *Appl Environ Microbiol.* 2006 Feb;72(2):1459-66.
- Walls T, Power D, Tagg J. Bacteriocin-like inhibitory substance (BLIS) production by the normal flora of the nasopharynx: potential to protect against otitis media? *J Med Microbiol.* 2003 Sep;52(Pt 9):829-33.
- Negash AW, Tsehai BA. Current Applications of Bacteriocin. *Int J Microbiol.* 2020 2020/11/03;2020:4374891.
- Geng M, Austin F, Shin R, et al. Covalent Structure and Bioactivity of the Type Aii Lantibiotic Salivaricin A2. *Appl Environ Microbiol.* 2018 Mar 1;84(5):e02528-17.
- Simons A, Alhanout K, Duval RE. Bacteriocins, Antimicrobial Peptides from Bacterial Origin: Overview of Their Biology and Their Impact against Multidrug-Resistant Bacteria. *Microorganisms.* 2020 Apr 27;8(5):639.



DEFEND YOUR HEALTH

VITAMIN D3

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



Item #01713 • 5,000 IU • 60 softgels

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

For full product description and to order **Vitamin D3**, 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. 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.

STRESSED OUT AND ANXIOUS?

Experience Tranquility with Enhanced **STRESS** Relief

Daily stress disrupts our sense of well-being.

Maintaining healthy stress response and physiological health are important.

Enhanced Stress Relief capsules provide **lemon balm** and **L-theanine**, which are clinically known to promote reduced stress levels and support healthy relaxation.¹⁻³



Item #00987 • 30 vegetarian capsules

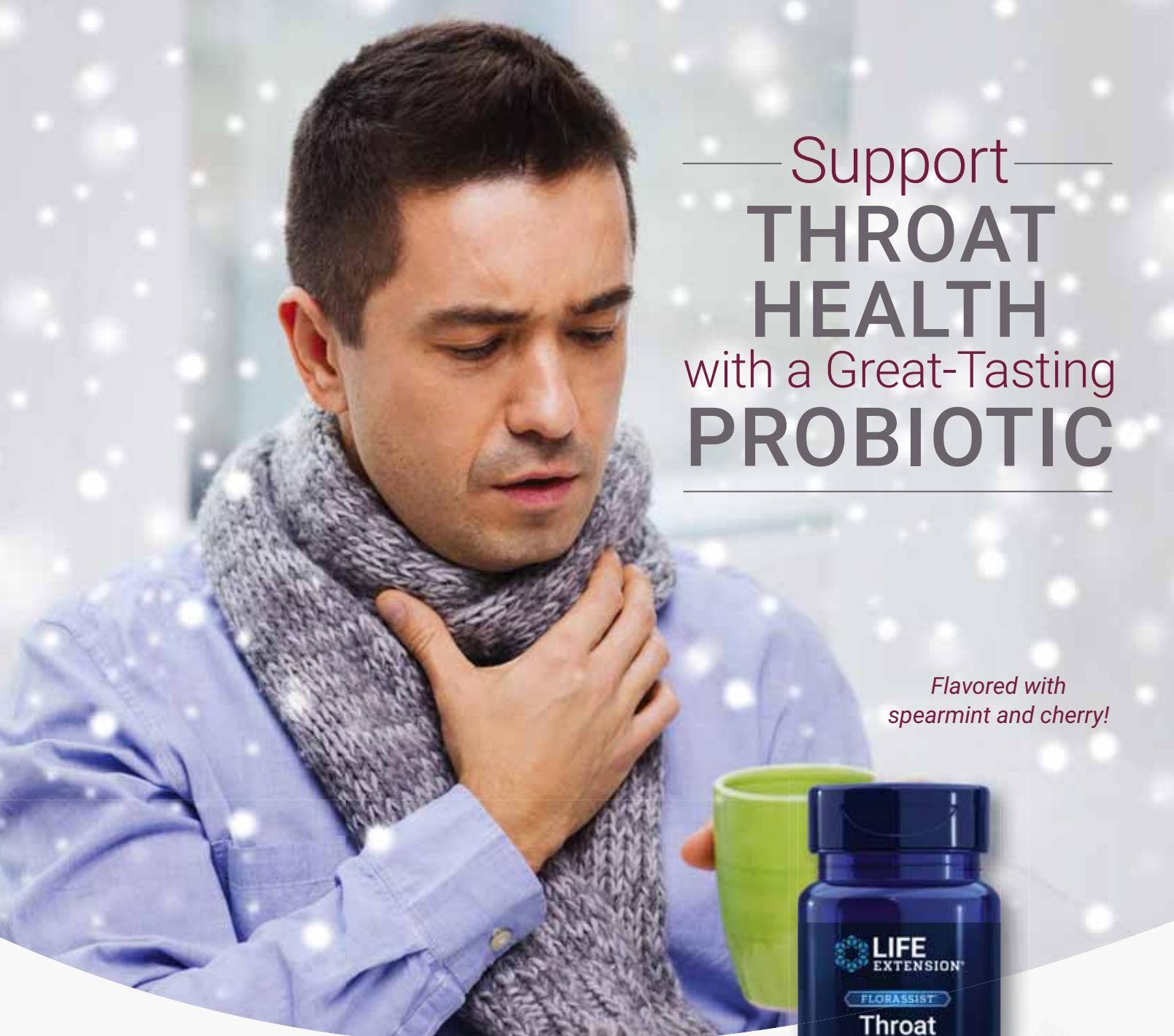
1 bottle \$21 • 4 bottles \$18 each



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

References

1. *Journal of Functional Foods.* 2011;3(3):171-8.
2. *Asia Pac J Clin Nutr.* 2008;17 Suppl 1:167-8.
3. *Nutrients.* 2014 Oct 30;6(11):4805-21.



— Support —
**THROAT
HEALTH**
with a Great-Tasting
PROBIOTIC

*Flavored with
spearmint and cherry!*



Beneficial bacteria called *S. salivarius* K12 sustain throat health. Each **FLORASSIST® Throat Health** lozenge has **2 billion** colony-forming units of *S. salivarius* K12 that:

- Maintain a healthy inflammatory response
- Help provide probiotic balance for throat health
- Maintain overall good health

BLIS K12® is the registered trademark of BLIS Technologies Limited.

Item #01920 • 30 vegetarian lozenges

1 bottle \$15 • 4 bottles \$13.50 each



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

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

Whole Body Support

Everything good takes time.

Magnesium is essential for a healthy heart and sturdy bones; it's even great for your mood. But, most of us don't get enough from our diets.

Our innovative formula delivers both immediate and extended-release magnesium, so you get the maximum benefits—for the long haul.



Item #02107

60 250 mg vegetarian capsules

1 bottle \$9.75 • 4 bottles \$8.75 each

CAUTION: If taken in high doses, magnesium may have a laxative effect. If this occurs, divide dosing, reduce intake, or discontinue product.

ZümXR® is a registered trademark and protected by patents. See www.ZumXR.com

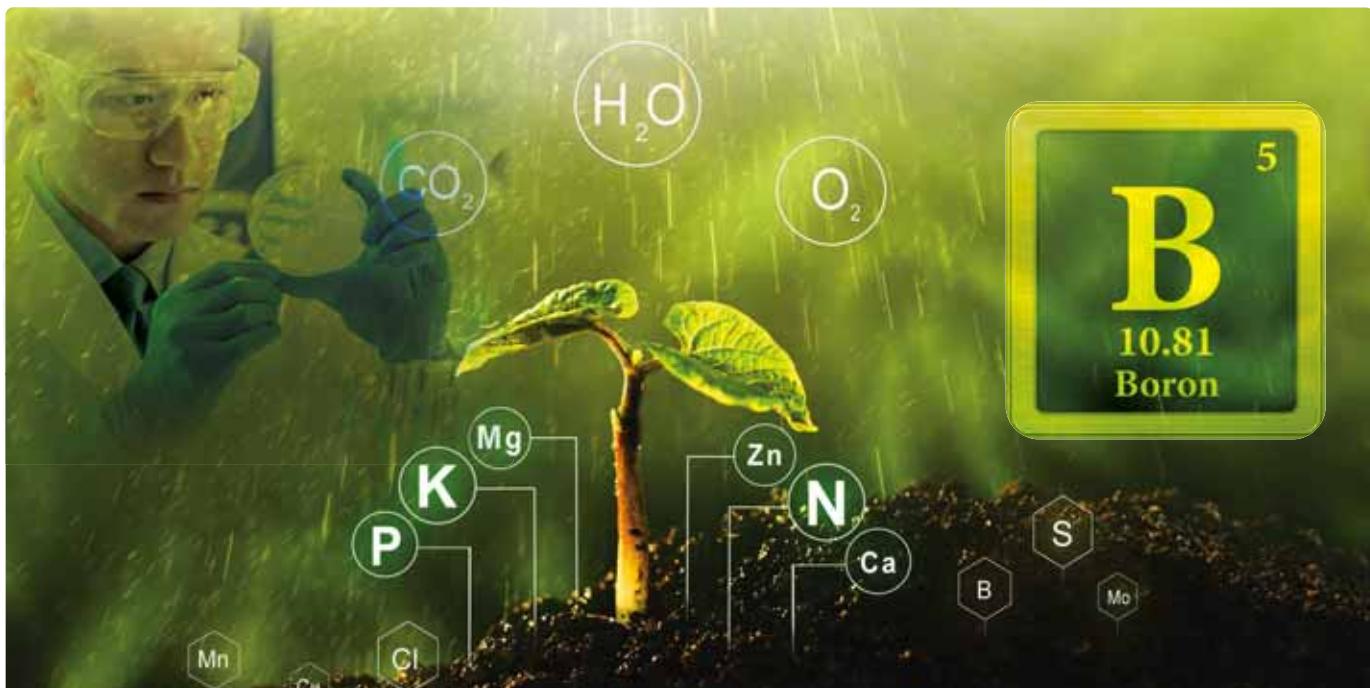
For full product description and to order **Extend-Release Magnesium**, call 1-800-544-4440 or visit www.LifeExtension.com



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

What is Boron?

BY LAURIE MATHENA



Boron is a trace mineral found in the earth's crust and in water. Its importance in human health has been underestimated.

Boron has been shown to have actions against specific types of malignancies, such as:

- **CERVICAL CANCER:** The country Turkey has an extremely low incidence of cervical cancer, and scientists partially attribute this to its **boron-rich** soil.¹ When comparing women who live in boron-rich regions versus boron-poor regions of Turkey, **not a single woman** living in the boron-rich regions had any indication of cervical cancer.² (The mean dietary intake of boron for women in this group was **8.41 mg/day**.)

Boron interferes with the life cycle of the *human papillomavirus* (HPV), which is a contributing factor in approximately **95%** of all cervical cancers.¹

Considering that HPV viruses are increasingly implicated in **head and neck cancers**,^{3,4} supplementation with this ultra-low-cost mineral could have significant benefits in protecting against this malignancy that is increasing in prevalence.

- **LUNG CANCER:** A study conducted at the University of Texas MD Anderson Cancer Center between 1995 and 2005 found that increased **boron intake** was associated with a **lower risk of lung cancer** in postmenopausal women who were taking hormone replacement therapy.⁵
- **PROSTATE CANCER:** Studies point to boron's ability to inhibit the growth and spread of prostate cancer cells.

In one study, when mice were exposed to boric acid, their tumors shrank by as much as **38%.**⁶ One analysis found that increased dietary boron intake was associated with a decreased risk of prostate cancer.⁷

Several human and animal studies have confirmed the important connection between boron and bone health.

Boron prevents calcium loss,⁸ while also alleviating the bone problems associated with magnesium and vitamin D deficiency.⁹ All of these nutrients help maintain bone density.

A study in female rats revealed the harmful effects a *deficiency* in boron has on bones, including:¹⁰

- Decreased bone volume fraction, a measure of bone strength,
- Decreased thickness of the bone's spongy inner layer, and
- Decreased maximum force needed to break the femur.

And in a study of post-menopausal women, supplementation with **3 mg** of boron per day prevented calcium loss and bone *demineralization* by reducing urinary excretion of both calcium and magnesium.⁸

In addition to its bone and anti-cancer benefits, there are nine additional reasons boron is an important trace mineral vital for health and longevity. It has been shown to:¹

- 1.** Greatly improve wound healing,
- 2.** Beneficially impact the body's use of estrogen, testosterone, and vitamin D,
- 3.** Boost magnesium absorption,
- 4.** Reduce levels of inflammatory biomarkers, such as high-sensitivity C-reactive protein (hs-CRP) and tumor necrosis factor α (TNF- α),
- 5.** Raise levels of antioxidant enzymes, such as superoxide dismutase (SOD), catalase, and glutathione peroxidase,
- 6.** Protect against pesticide-induced oxidative stress and heavy-metal toxicity,

7. Improve the brain's electrical activity, which may explain its benefits for cognitive performance, and short-term memory in the elderly,

8. Influence the formation and activity of key biomolecules, such as S-adenosyl methionine (SAM-e) and nicotinamide adenine dinucleotide (NAD $^+$), and

9. Potentially help ameliorate the adverse effects of traditional chemotherapeutic agents.

Because the amount of boron varies in the soil, based on geographical location, obtaining enough boron through diet alone can be difficult.

Supplementing with low-cost boron is an effective way to maintain adequate levels of this overlooked micronutrient.

Most **Life Extension®** supporters obtain **3 mg to 6 mg** of boron in their multi-nutrient supplements.

Those who want to supplement with additional boron can affordably do so because the cost is so low (around four pennies a day). •

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

References

1. Pizzorno L. Nothing Boring About Boron. *Integr Med (Encinitas)*. 2015 Aug;14(4):35-48.
2. Korkmaz M, Uzgoren E, Bakirdere S, et al. Effects of dietary boron on cervical cytopathology and on micronucleus frequency in exfoliated buccal cells. *Environ Toxicol*. 2007 Feb;22(1):17-25.
3. Zandberg DP, Bhargava R, Badin S, et al. The role of human papillomavirus in non-genital cancers. *CA Cancer J Clin*. 2013 Jan;63(1):57-81.
4. Available at: https://www.cdc.gov/cancer/hpv/basic_info/hpv_opharyngeal.htm. Accessed January 23, 2018.
5. Mahabir S, Spitz MR, Barrera SL, et al. Dietary boron and hormone replacement therapy as risk factors for lung cancer in women. *Am J Epidemiol*. 2008 May 1;167(9):1070-80.
6. Gallardo-Williams MT, Chapin RE, King PE, et al. Boron supplementation inhibits the growth and local expression of IGF-1 in human prostate adenocarcinoma (LNCaP) tumors in nude mice. *Toxicol Pathol*. 2004 Jan-Feb;32(1):73-8.
7. Cui Y, Winton MI, Zhang ZF, et al. Dietary boron intake and prostate cancer risk. *Oncol Rep*. 2004 Apr;11(4):887-92.
8. Nielsen FH, Hunt CD, Mullen LM, et al. Effect of dietary boron on mineral, estrogen, and testosterone metabolism in postmenopausal women. *FASEB J*. 1987 Nov;1(5):394-7.
9. Nielsen FH. Studies on the relationship between boron and magnesium which possibly affects the formation and maintenance of bones. *Magnes Trace Elem*. 1990;9(2):61-9.
10. Nielsen FH, Stoecker BJ. Boron and fish oil have different beneficial effects on strength and trabecular microarchitecture of bone. *J Trace Elem Med Biol*. 2009;23(3):195-203.



BROAD-SPECTRUM IMMUNE SUPPORT

Lactoferrin is a component of **whey protein** best known for its **immune benefits**.

An array of published studies describes how **lactoferrin** up-regulates innate and adaptive immune responses to a variety of antigens.



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

Item #01681 • 300 mg, 60 vegetarian capsules

1 bottle \$45 • 2 bottles \$40 each

(Two-Month Supply)

Contains milk.

Bioferrin® is a registered trademark of Glanbia.



ULTIMATE eye HYDRATION

Moisturize Your Aging Eyes



Brite Eyes III provides a well-established lubricant in every drop, soothing eye discomfort without irritation.

N-acetylcarnosine is used as a stabilizing agent.

Item #00893 • 2 containers
(5 mL each)

1 box \$25.50

4 boxes \$24 each

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

BORON

Promotes Healthy Prostate Function and Healthy Bones



Each capsule provides **3 mg** of boron divided into three bioavailable different forms:

- Boron citrate
- Boron aspartate
- Boron glycinate

There are **3 mg** of boron in the daily dose of each of the following **Life Extension®** formulas:

- Two-Per-Day
- Bone Restore
- Ultra Prostate Formula
- Life Extension Mix™

The suggested daily dose for most adults is **6-9 mg** of boron.^{1,2} If you are already obtaining this potency in your multi-nutrient formulas, you may not need additional boron.

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

Item #01661 • 100 vegetarian capsules

1 bottle **\$4.46**

4 bottles \$3.94 each

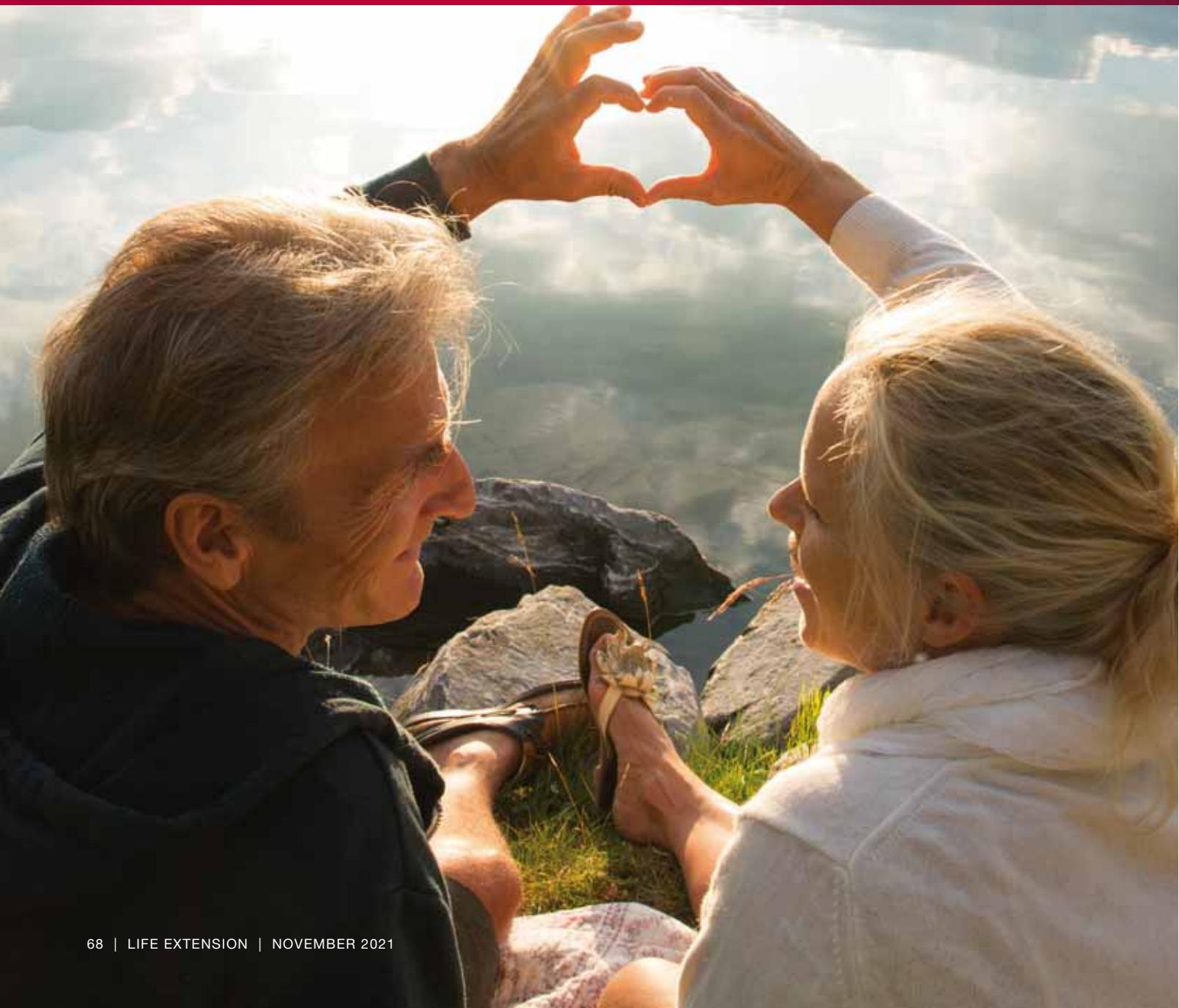
References

1. *Open Orthop J.* 2012;6:143-9.
2. *Altern Med Rev.* 2004 Dec;9(4):434-7.



REDUCE ATHEROSCLEROTIC RISK

BY MICHAEL CORTEZ





Gotu Kola (*Centella asiatica*)

Normal aging, along with cardiovascular risk factors, cause a buildup of **plaque** inside **arteries** called **atherosclerosis**.

As these plaques grow, they choke off blood flow.

If they rupture and/or cause a blood clot, a **heart attack** or **stroke** may result.

New **human** data corroborate that two **plant extracts** help control the progression of atherosclerosis and reduce risk of adverse cardiovascular events.¹⁻⁴

In a three-year study, **22%** of control subjects had a major cardiovascular event like a **heart attack** or **stroke**.

In the group taking the **plant extracts** plus low-dose aspirin, less than **4%** suffered a major cardiovascular event.¹

Human studies published in **2020** corroborate these findings.



French maritime pine bark

Atherosclerosis and Cardiovascular Disease

Every year, about **660,000** Americans die from **heart disease**.⁵

Most cardiovascular disease is driven by **atherosclerosis**, that causes arteries to narrow and reduce blood flow.⁶

Atherosclerotic plaque in the **coronary arteries** can lead to chest pain, need for stenting or bypass procedures, and/or heart attack.

Atherosclerosis can also cause abnormal **blood clots** to form inside of arteries.

When a clot blocks a coronary artery, a **heart attack** results. When an artery supplying blood to the **brain** is blocked by a clot, it leads to a **stroke**.

Risk factors for the development of atherosclerosis and cardiovascular disease include:^{6,7}

- Advancing age,
- High blood pressure,
- Abnormal blood lipid levels, including elevated LDL cholesterol, high triglycerides, and low HDL cholesterol,
- Elevated blood glucose,
- Obesity and sedentary lifestyle,
- Poor diet,
- Smoking, and
- Family history of cardiovascular disease.

Two Plant Extracts That Help

Centella asiatica (also known as **Gotu Kola**) is an herbaceous flowering plant native to Asia. It has been used in traditional medicine for various disorders and to treat wounds.⁸

Extracts from the **Centella** plant contain compounds which have anti-inflammatory properties called **triterpenes**.⁹

French maritime pine bark extract was first studied more than **50 years** ago. Like **Centella**, it contains antioxidant and anti-inflammatory compounds that promote arterial health.

Fighting Atherosclerosis

Two clinical trials were conducted using **Centella asiatica** and **French maritime pine bark** on people with **atherosclerosis** but no symptoms.^{3,4}

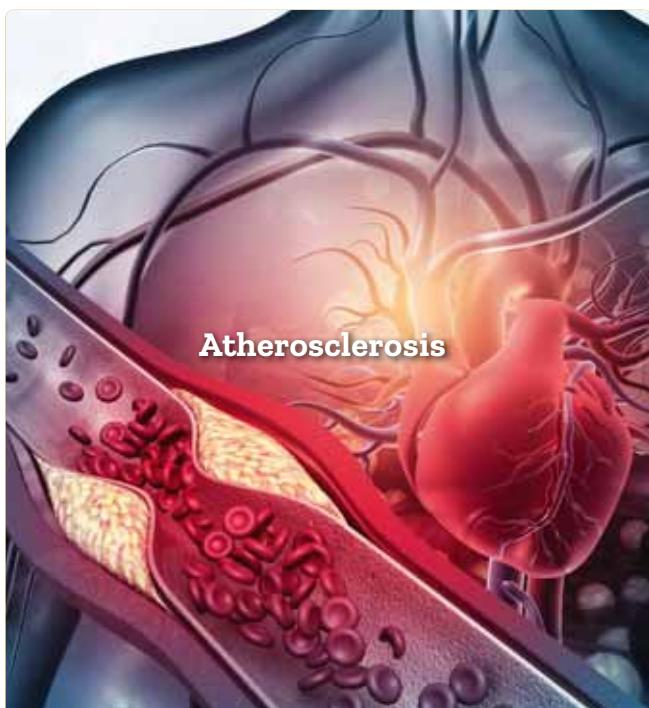
In both studies, researchers separated subjects into a number of groups. Each group received a different treatment including aspirin *alone* (or a similar medication if aspirin-intolerant), varying doses of French maritime pine bark *alone*, French maritime pine bark *with* aspirin, or French maritime pine bark *and* **Centella** (**100 mg** of each daily).

All patients also received **standard management** care, which included being advised on exercise and diet.

In one of these studies, the patients started with relatively small plaques. Atherosclerotic plaque buildup significantly worsened in the standard management group, the *low dose* (**50 mg** daily) of French maritime pine bark group, and aspirin *alone* group.³

In the groups that received **100 mg** of **French maritime pine bark** each day, alone or with aspirin, there was significantly *less* progression of plaque buildup than in those with only standard management or aspirin alone.

The greatest response was seen with the **combination** of pine bark *and* **Centella**. While **21.3%** of plaques of those in the standard management group worsened to a more severe Class V, only **1.1%** of plaques worsened in individuals receiving the **Centella** *and* **French maritime pine bark**.



The second trial evaluated **advanced Class V plaques** that were blocking at least **50%** of the diameter of the artery.⁴

In the standard management group, nearly **50%** of subjects progressed to the point of having symptoms during **42 months** of follow-up. The rate of progression was **7.4 times lower** in the group receiving **French maritime pine bark and Centella**.

What's more, **16%** of those receiving standard care had a significant **cardiovascular event** (such as hospitalization for chest pain, heart attack, or stroke), compared to only **4.4%** of the combination (**French maritime pine bark and Centella**) group.

Stabilizing Plaques

A number of other studies have demonstrated the benefits for atherosclerosis of these plant extracts.^{1,2,10-13}

In one study, scientists prescribed **150 mg** of **French maritime pine bark** and **450 mg** of **Centella** daily for patients with asymptomatic complex atherosclerotic plaques and **atherosclerosis risk factors** (mildly high blood pressure and elevated cholesterol).¹¹

They used a type of **ultrasound** to evaluate atherosclerotic plaque structure.¹¹ This allowed them to identify which plaques were more **stable** and less likely to progress or rupture and lead to acute heart attacks.

In patients who received standard management, plaque structure and stability did not change significantly over six months. In those taking the plant extracts, the index of plaque stability **doubled**, meaning the atherosclerotic plaques were *more stable*, *less likely* to form arterial clots, and *less likely* to acutely rupture.

Plaque thickness, length, and overall number of plaques also *decreased* significantly in the treatment group. This indicates that French maritime pine bark and *Centella* can slow the progression of atherosclerosis, even in the presence of risk factors.

Protecting Stented Arteries

Patients with a narrowed or blocked coronary artery often undergo **angioplasty** and **stenting**. In this technique, a balloon is used to expand the artery and a metal stent holds it open.

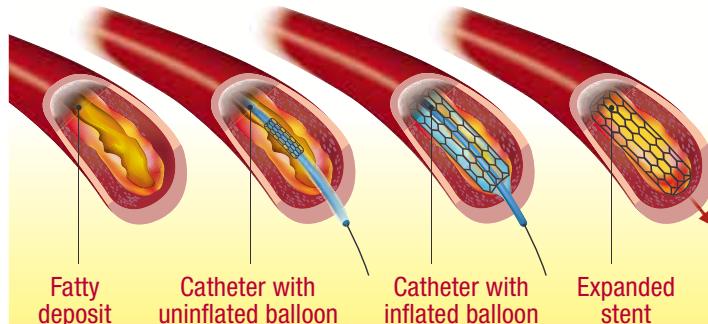
But the diseased artery can continue to progress, and plaque can redevelop over time.

In a year-long study, researchers evaluated whether atherosclerotic plaque progression in stented arteries

could be prevented with a French maritime pine bark-*Centella* blend.¹⁰

Subjects with **standard management** had their plaques progress in almost **60%** of cases, but only **9%** progressed in people treated with the **French maritime pine bark + Centella** blend.

Arterial Balloon Angioplasty



WHAT YOU NEED TO KNOW

Fighting Atherosclerosis and Heart Disease

- An extract of ***Centella asiatica***, an herb native to Asia, has long been used in traditional medicine. An extract of bark from the **French maritime pine tree** also has many established health benefits.
- Together, these two extracts work **synergistically**, making their benefit greater than either nutrient alone.
- Clinical studies show that the combination of *Centella* and French maritime pine bark can slow or even reverse **atherosclerosis**. This buildup of plaque in arteries is responsible for most **cardiovascular disease**.
- In studies, this combination significantly reduces the rate of hospitalizations from **heart attacks** or **strokes** compared to standard management.

New Studies Published in 2020

In **2020**, the results of two more trials were published. Both used a combination of **150 mg** of French maritime pine bark and **450 mg** of **Centella** daily plus **100 mg** of low-dose aspirin.^{1,2}

One study followed asymptomatic patients with atherosclerotic plaque over a period of **three years**.¹

All subjects received standard management, which included diet, exercise, and lifestyle counseling. One group received no additional treatment, a second took **100 mg/day** of aspirin, and a third received the **aspirin + French maritime pine bark + Centella** extracts.

In subjects who only received standard management, **22%** had major cardiovascular events like a **heart attack or stroke**, requiring hospitalization. Fewer than **4%** of those taking the **plant extracts + aspirin** did.¹

The **progression of plaques** was **halted** in the group receiving the **plant extracts**, while the plaques in the other two groups worsened.

In the second study, researchers looked at the presence of **calcification**—calcium deposits that can be associated with more high-risk plaques—in the coronary arteries of asymptomatic individuals.^{2,14}

For this study, all subjects received standard diet, exercise, and lifestyle counseling and took **100 mg/a day** of aspirin.

Calcification increased by **35%** over 12 months in those with **standard management**. Those taking the **French pine bark + Centella** extracts had a **10% reduction** in number of calcifications.

Summary

Cardiovascular disease is the leading cause of death in the U.S. It is most often the result of **atherosclerosis**.

Clinical evidence has found that a combination of **French maritime pine bark + Centella asiatica** extracts (alone or with aspirin) can significantly slow the development and progression of atherosclerotic plaque.

This combination also reduces **heart attacks, strokes**, and other cardiovascular events associated with atherosclerosis 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.



References

1. Belcaro G, Cesarone MR, Scipione C, et al. Delayed progression of atherosclerosis and cardiovascular events in asymptomatic patients with atherosclerotic plaques: 3-year prevention with the supplementation with Pycnogenol(R)+Centellicum(R). *Minerva Cardioangiologica*. 2020 Feb;68(1):15-21.
2. Hu S, Belcaro G, Cesarone MR, et al. Central cardiovascular calcifications: supplementation with Pycnogenol(R) and Centellicum(R): variations over 12 months. *Minerva Cardioangiologica*. 2020 Feb;68(1):22-6.
3. Belcaro G, Dugall M, Hosoi M, et al. Pycnogenol(R) and Centella Asiatica for asymptomatic atherosclerosis progression. *Int Angiol*. 2014 Feb;33(1):20-6.
4. Belcaro G, Ippolito E, Dugall M, et al. Pycnogenol(R) and Centella asiatica in the management of asymptomatic atherosclerosis progression. *Int Angiol*. 2015 Apr;34(2):150-7.
5. Available at: <https://www.cdc.gov/nchs/fastats/leading-causes-of-death.htm>. Accessed August 25, 2021.
6. Available at: <https://www.ncbi.nlm.nih.gov/books/NBK535419/>. Accessed August 25, 2021.
7. Ruan Y, Guo Y, Zheng Y, et al. Cardiovascular disease (CVD) and associated risk factors among older adults in six low-and middle-income countries: results from SAGE Wave 1. *BMC public health*. 2018;18(1):778.
8. Gohil KJ, Patel JA, Gajjar AK. Pharmacological Review on Centella asiatica: A Potential Herbal Cure-all. *Indian J Pharm Sci*. 2010 Sep;72(5):546-56.
9. Sun B, Wu L, Wu Y, et al. Therapeutic Potential of Centella asiatica and Its Triterpenes: A Review. *Front Pharmacol*. 2020 2020-September-04;11(1373):568032.
10. Belcaro G, Cesarone MR, Scipione C, et al. Pycnogenol(R)+Centellicum(R), post-stent evaluation: prevention of neointima and plaque re-growth. *Minerva Cardioangiologica*. 2019 Dec;67(6):450-5.
11. Belcaro G, Cornelli U. Variations in Echogenicity in Carotid and Femoral Atherosclerotic Plaques with Pycnogenol + Centella Asiatica Supplementation. *Int J Angiol*. 2017 Jun;26(2):95-101.
12. Belcaro G, Dugall M, Ippolito E, et al. Pycnogenol(R) and Centella asiatica to prevent asymptomatic atherosclerosis progression in clinical events. *Minerva Cardioangiologica*. 2017 Feb;65(1):24-31.
13. Luzzi R, Belcaro G, Ippolito E. Carotid plaque stabilization induced by the supplement association Pycnogenol(R) and centella asiatica (Centellicum(R)). *Minerva Cardioangiologica*. 2016 Dec;64(6):603-9.
14. Shi X, Gao J, Lv Q, et al. Calcification in Atherosclerotic Plaque Vulnerability: Friend or Foe? *Front Physiol*. 2020;11:56.

Senolytic

A C T I V A T O R ® with BIO-FISETIN



Item #02301

36 vegetarian capsules

1 bottle \$19.50 • 4 bottles \$18 each
(Each bottle lasts 3 months)

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



With age, our body accumulates **senescent cells** that affect the day-to-day function of the healthy cells around them.

Senolytics are compounds that selectively remove senescent cells.

Senolytic Activator® contains nutrients designed to target senescent cells for normal elimination.

The new formula contains a patented **fisetin** that is more bioavailable than regular fisetin.

The fisetin dose in **Senolytic Activator®** provides the potency of **7 capsules of Bio-Fisetin**. (Some people take Bio-Fisetin daily for its other health benefits.)

COMPREHENSIVE SENOLYTIC SUPPORT

The **Senolytic Activator®** formula provides the following nutrients:

- **THEAFLAVINS** (polyphenols from black tea)
- **BIO-QUERCETIN** (ultra-absorbable form)
- **APIGENIN** (a natural flavonoid)
- **BIO-FISETIN** (up to **25 times** greater bioavailability)

The suggested dose of the **Senolytic Activator®** is **3 capsules** once a week. Each bottle lasts 3 months and costs very little.



Find SUGAR *Balance*

NEXT-GENERATION
Glucose-A1c
Management

Glycemic Guard™ contains 250 mg of polyphenol-rich **clove extract** and 200 mg of **maqui berry** extract. These plant extracts help maintain healthy *after-meal* blood glucose and **A1c** levels.

Suggested dose is one capsule a day or as recommended by a healthcare practitioner.

If you are taking blood glucose lowering medication, consult your healthcare provider before taking this product.

Delphinol® is a registered trademark of MNL.
Clovinol® is a registered trademark of Akay USA LLC.

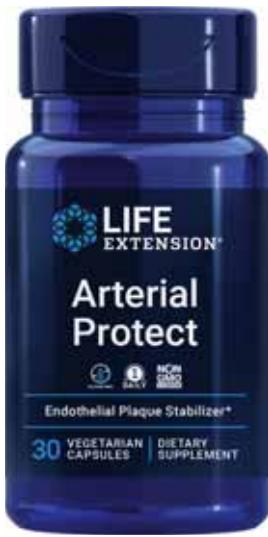


Item #02122 • 30 vegetarian capsules
1 bottle \$31.50 • 4 bottles \$28 each

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



Maintain Endothelial
Plaque Stability with
**Arterial
Protect**



Arterial Protect can help stabilize endothelial plaque and promote healthy blood flow throughout the body.*

Just one capsule a day provides the patented French Maritime **pine bark extract** along with standardized **Centella asiatica** extract.

Item #02004 • 30 vegetarian capsules

1 bottle \$33 • 4 bottles \$29 each



Reference

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

Pycnogenol® and Centellicum® are registered trademarks of Horphag Research and the use of this product is protected by international patents.

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



Kids

Hate Broccoli...
But You Don't Have To

Your mom told you to eat your greens. And she was right. If you didn't listen, we have good news.

Just one daily Optimized Broccoli and Cruciferous Blend tablet provides health-promoting benefits of fresh, young vegetables. For maximum *absorption* each **enteric coated** tablet contains three layers:

- **Glucoraphanin** (sulforaphane precursor) from broccoli, watercress, cabbage and rosemary.
- **Myrosinase** to release **sulforaphane** in the small intestine.
- **DIM** (3, 3-diindolymethane) to promote healthy estrogen balance.



TrueBroc® Produced under US patents 5,725,895; 5,968,505; 5,968,567; 6,177,122; and 6,242,018 licensed from Brassica Protection Products LLC; TrueBroc® is a trademark of Brassica Protection Products LLC. BroccoVital® Myrosinase is a registered trademark of Berg Imports, LLC.

Item #02368 • 30 enteric coated vegetarian tablets

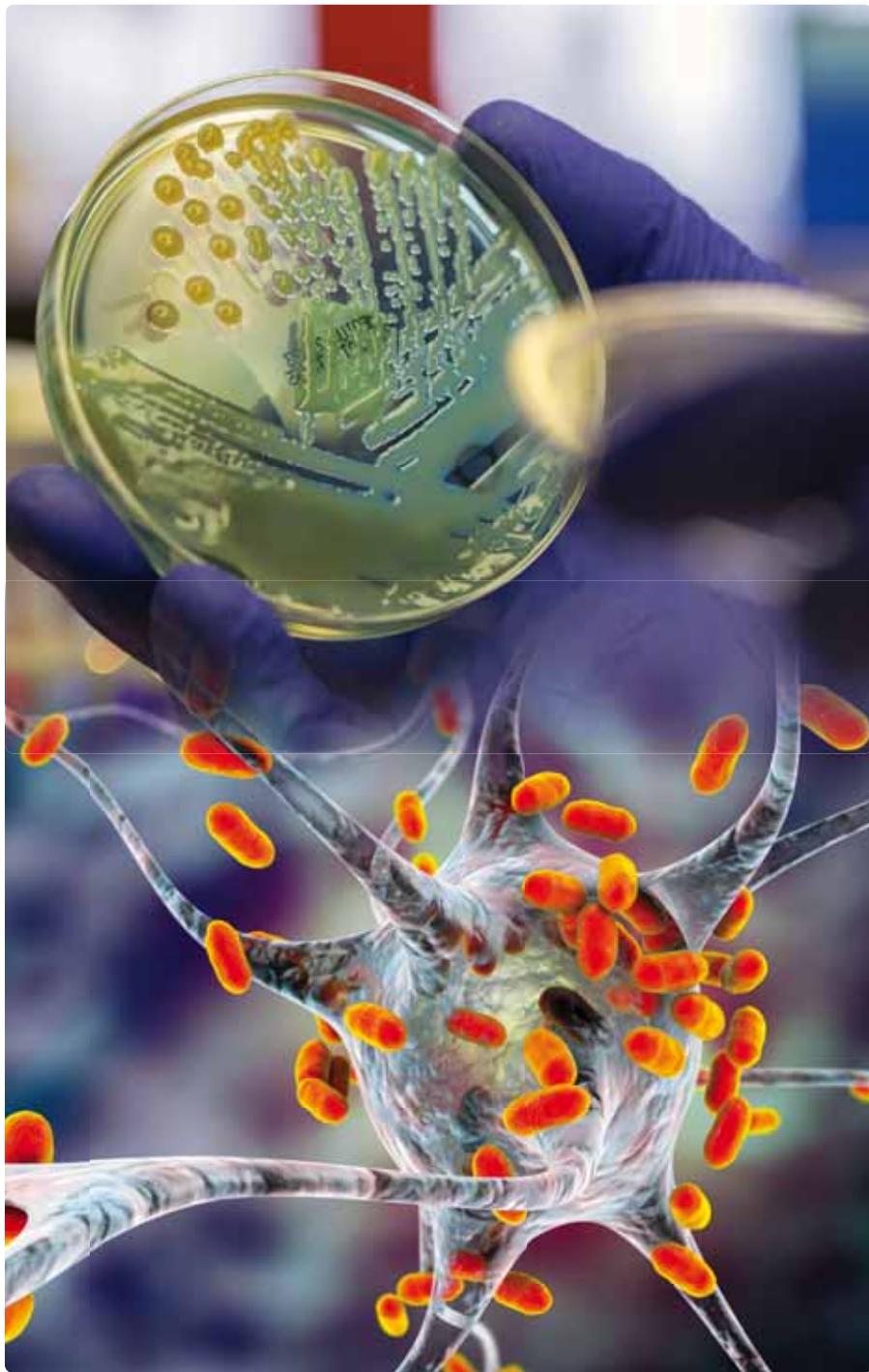
1 bottle \$28.50 • 4 bottles \$26.50 each

For full product description and to order **Optimized Broccoli and Cruciferous Blend**,
call 1-800-544-4440 or visit www.LifeExtension.com

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

Taurine's Role in Resisting Infections

BY JAN NEWTON



Our **gut microbiota** plays an important role in fighting off **infection**.¹

A new study in the journal *Cell* reveals that **taurine** helps create resistance to **infection** in mice.

It does this by releasing **sulfur** compounds in the gut that are *harmful* to dangerous bacteria. This may help defend the body from infectious invasion.

The Gut Microbiota

The intestines are home to **trillions** of bacteria and other microorganisms.² These organisms are known as the **gut microbiota**, and are critical to optimal digestive and whole-body health.³

Researchers recently discovered in a **preclinical study** that, after ingestion of a potential pathogen, the microbiota built up **resistance** to future exposure and infection.

Colonization Resistance

An article published in **2021** described research done at the **National Institutes of Health** (NIH) in Bethesda, MD.¹ For their study, scientists introduced a bacterium known as ***Klebsiella pneumoniae*** (*K. pneumonia*) to mice.

This type of bacteria is a common pathogen in humans. It can cause pneumonia, meningitis, and other infections.⁴

When mice were given *K. pneumonia* by mouth, the bacteria colonized their gut as expected.

But when mice were first exposed to a different pathogenic bacterium, ***Yersinia pseudotuberculosis***, several weeks before being given *K. pneumonia*, the pre-exposure bolstered their defenses. The ***K. pneumonia*** were not able to colonize the gut of these mice and did *not* cause infection.

This is known as **colonization resistance**. It means that previous exposure of the microbiota to harmful bacteria builds up a form of immunity against future exposures to disease-causing bacteria.⁵

To confirm that the **microbiota** played a major role in this resistance to infection, scientists transferred bacteria and the other types of microorganisms that comprise the microbiota of exposed mice to pathogen-free mice. These mice also gained resistance to *K. pneumonia* colonization in the intestines.

The Role Taurine Plays

The scientists next set out to investigate exactly *what* led to resistance to infection.

They discovered that it had to do with the amino acid **taurine**.

Here's what they found:

A minor group of **beneficial bacteria**, called the ***Deltaproteobacteria***, increased following exposure to the first pathogenic bacteria, ***Yersinia***.

These ***Deltaproteobacteria*** and various other members of a healthy microbiome thrive by feeding on the sulfur-containing amino acid **taurine**. As they metabolize taurine, sulfur compounds are released that are *harmful* to dangerous bacteria like ***K. pneumonia***.

After further research, the scientists made an extraordinary discovery: Simply adding **taurine** to the mice's drinking water had the same effect.

In other words, there was no need to expose the mice to a first, harmful pathogen. Taurine *alone* made the mouse microbiome **resistant to colonization** by *K. pneumonia*.



Other Benefits of Taurine

While small amounts of **taurine** are made in the body, levels decrease with age.^{6,7} The best way to maintain healthy levels of taurine is through diet or oral intake.

Taurine has been found to have numerous other health benefits.

For example, studies show that taurine is needed for the optimal functioning of **mitochondria**, the cellular “powerhouses” that supply the energy needed for cells to run smoothly.⁸⁻¹⁰

Taurine has also been found to have **anti-aging** benefits, particularly for maintaining brain health.^{6,11-13}

Thanks to the work of researchers at the **NIH**, we now know taurine may be vital in maintaining a healthy **gut microbiome**.

Summary

A recent mouse study found that after introduction to disease-causing bacteria, the **gut microbiota** is better able to resist colonization by other harmful bacteria in the future.

The first pathogenic bacteria spur the growth of *healthy* bacteria that consume the amino acid **taurine**. Byproducts of this taurine metabolism inhibit the growth of other potentially dangerous bacteria.

The researchers went on to demonstrate that **taurine alone** was sufficient to protect the mice against colonization by harmful bacteria.

Taurine is one of the most abundant amino acids in the body. It is important for protecting and maintaining cells.

We look forward to further research on the benefits of taurine in improving gut and overall health. •



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

References

1. Stacy A, Andrade-Oliveira V, McCulloch JA, et al. Infection trains the host for microbiota-enhanced resistance to pathogens. *Cell*. 2021 Feb 4;184(3):615-27 e17.
2. Sender R, Fuchs S, Milo R. Revised Estimates for the Number of Human and Bacteria Cells in the Body. *PLoS Biol*. 2016 Aug;14(8):e1002533.
3. Das B, Nair GB. Homeostasis and dysbiosis of the gut microbiome in health and disease. *J Biosci*. 2019 Oct;44(5).
4. Available at: <https://www.cdc.gov/hai/organisms/klebsiella/klebsiella.html>. Accessed July 23, 2021.
5. Sorbara MT, Pamer EG. Interbacterial mechanisms of colonization resistance and the strategies pathogens use to overcome them. *Mucosal Immunol*. 2019 Jan;12(1):1-9.
6. Wojcik OP, Koenig KL, Zelenich-Jacquotte A, et al. The potential protective effects of taurine on coronary heart disease. *Atherosclerosis*. 2010 Jan;208(1):19-25.
7. Scicchitano BM, Sica G. The Beneficial Effects of Taurine to Counteract Sarcopenia. *Curr Protein Pept Sci*. 2018;19(7):673-80.
8. Hansen SH, Andersen ML, Cornett C, et al. A role for taurine in mitochondrial function. *J Biomed Sci*. 2010 Aug 24;17 Suppl 1:S23.
9. Jong CJ, Azuma J, Schaffer S. Mechanism underlying the antioxidant activity of taurine: prevention of mitochondrial oxidant production. *Amino Acids*. 2012 Jun;42(6):2223-32.
10. Suzuki T, Nagao A, Suzuki T. Human mitochondrial diseases caused by lack of taurine modification in mitochondrial tRNAs. *Wiley Interdiscip Rev RNA*. 2011 May-Jun;2(3):376-86.
11. Bae MA, Gao R, Kim SH, et al. Past Taurine Intake Has a Positive Effect on Present Cognitive Function in the Elderly. *Adv Exp Med Biol*. 2017;975 Pt 1:67-77.
12. Barbiera A, Sorrentino S, Lepore E, et al. Taurine Attenuates Catabolic Processes Related to the Onset of Sarcopenia. *Int J Mol Sci*. 2020 Nov 23;21(22):8865.
13. Ji H, Zhao G, Luo J, et al. Taurine postponed the replicative senescence of rat bone marrow-derived multipotent stromal cells in vitro. *Mol Cell Biochem*. 2012 Jul;366(1-2):259-67.



Jump-Start Your Longevity Strategy

Fisetin has a range of benefits that may increase lifespan. Most impressively, it's better than other plant compounds at clearing out senescent cells that are no longer functioning effectively.

Our **Bio-Fisetin** formula is up to 25 times more bioavailable than other fisetin formulas—another reason to jump for joy!*



Item #02414 • 30 vegetarian capsules

1 bottle \$11.25 • 4 bottles \$10 each

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

* Manufacturer's study (in press for future publication) 2020.

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.

Spinach

BY LAURIE MATHENA



References

1. *Neurology*. 2018 Jan 16;90(3):e214-e22.
2. *J Nutr*. 2016 May;146(5):986-93.
3. *Nutrients*. 2017;9(2):120.

Spinach is a leafy green vegetable with health benefits as rich as its history.

Known as the “Persian vegetable,” spinach originated in Persia and was sent to China as a gift in the seventh century. By the time it was introduced to Europe in the 12th century, it was dubbed “the chieftain of the leafy greens.”

Its nutrient profile and health benefits make it worthy of this nickname.

Spinach contains just seven calories per cup, but is a good food source of calcium, magnesium, iron, and vitamin K.

One study found that consumption of green leafy vegetables was associated with slower cognitive decline.¹

Spinach also contains plant-derived nitrates, which are compounds known to help dilate blood vessels and improve blood flow.

In a study published in *The Journal of Nutrition*, people who consumed nitrate-rich drinks—including a spinach drink—saw an **increase** in blood nitrate levels and **lower** blood pressure.² Their diastolic blood pressure remained lower for **five hours** after consuming the drink.

And because spinach contains lutein, it could be beneficial for anyone at risk of age-related macular degeneration, the leading cause of blindness in older adults.³

Spinach can be eaten raw or cooked, and is available fresh, frozen, or canned. It can be used in soups, casseroles, or omelets, added to sandwiches or wraps, sautéed with olive oil and garlic, or added to smoothies.

Anyone taking warfarin should be aware that spinach contains vitamin K, which plays a role in blood clotting.

The anticoagulant Coumadin® (warfarin) is a vitamin K antagonist; ingesting vitamin K from food or supplements can interfere with the treatment effect of this drug, but newer anti-coagulant drugs like Eliquis®, Pradaxa®, or Xarelto® do not antagonize vitamin K, and therefore vitamin K from food and diet does not interfere with the treatment effect of these drugs.

ONCE-DAILY HEALTH BOOSTER

WITH TOCOTRIENOLS!

- **Mixed tocotrienols** to support arterial health, cellular apoptosis, and normal lipid profiles.
- **Broad-spectrum Vitamin K** with four vitamin **K2** subtypes (MK-4, MK-6, MK-7, MK-9) plus **vitamin K1** to keep **calcium** in **bones** and out of **arteries**.
- **Macuguard®** including **zeaxanthin**, **lutein**, and **meso-zeaxanthin** to support **macular** density.
- **Lycopene** to maintain healthy cell division.
- **Chlorophyllin** to protect against environmental **DNA damage**.
- **Saffron** to support visual health.



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

Item #02291 • 60 softgels

1 bottle \$45

4 bottles \$40 each

(Two-month supply)

The same nutrients sold separately would cost 2-3 times more money!



Caution: If you are taking warfarin (Coumadin®) or related medications, consult with your healthcare provider before taking this product.

Lyc-O-Mato® is a registered trademark of Lycored, Corp. LuteinPlus® and Mz® are registered trademarks of NutriProducts LTD., UK, licensed under U.S. patent 8,623,428.



Keep Your Heart Healthy & Your Brain Sharp



Taurine is one of the most abundant amino acids in your body, but levels decline over time. Be proactive and give your heart and brain powerful support with high-quality Taurine from Life Extension®!



Item #01827

1000 mg

90 vegetarian capsules*

1 bottle \$9.75

4 bottles \$9 each



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

*Also available in an unflavored powder that mixes easily into your favorite healthy beverage.

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

Restore Youthful
Cellular Energy with

PQQ

PQQ (*pyrroloquinoline quinone*) activates genes involved in the production of cellular energy.¹⁻⁵

Studies show **PQQ** supports heart health and cognitive function, complementing CoQ10.^{6,7}

In fact, just **20 mg** per day of **PQQ** plus **CoQ10** promotes memory and attention in aging individuals.⁸

This formulation contains **20 mg** of **PQQ** per capsule, which is the recommended daily dose.

For full product description and to order **PQQ** or any other **PQQ-containing formulas**, call 1-800-544-4440 or visit www.LifeExtension.com



Item #01647 • 30 vegetarian capsules

1 bottle \$24 • 4 bottles \$18 each



Also available are **10 mg PQQ caps** (Item #01500) and **100 mg Super Ubiquinol CoQ10 with PQQ** (Item #01733).

References

1. *Alt Med Rev.* 2009; 14(3):268-77.
2. *J Nutr.* 2006 Feb;136(2):390-6.

3. *Exp Biol Med (Maywood).* 2003 Feb;228(2):160-6.
4. *Biochim Biophys Acta.* 2006 Nov;1760(11):1741-8.

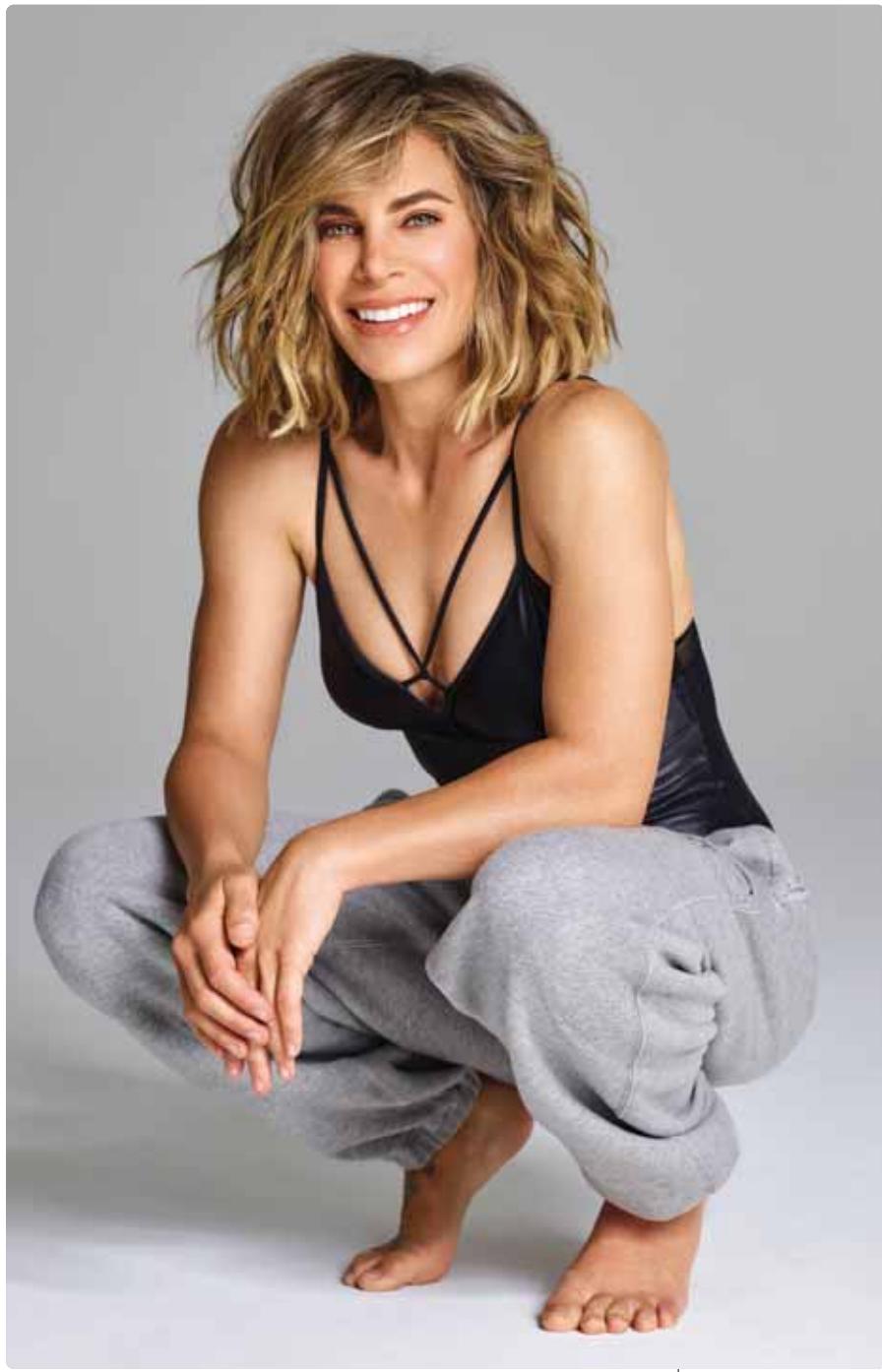
5. *J Biol Chem.* 2010 Jan 1;285:142-52.
6. *Cardiovasc Drugs Ther.* 2004 Nov;18(6):421-31.

7. *J Cardiovasc Pharmacol Ther.* 2006 Jun;11 (2):119-28.
8. *FOOD Style.* 2009;21:13(7)50-3.

Jillian Michaels

*World Renowned Fitness Expert Shares
Her Keys to Health and Longevity*

BY LAURIE MATHENA



Jillian Michaels is one of the world's foremost fitness experts, working with big-name celebrity clients like Julia Roberts, Pink, and Maria Shriver.

She starred on NBC's television show *The Biggest Loser* for more than 10 seasons as a personal trainer, has written eight *New York Times* best-selling books, and has released 20 fitness DVDs that have sold over 100 million copies.

Most recently, Michaels has become passionate about another critical wellness topic: ***anti-aging***.

Michaels promotes a balanced approach to health and longevity, stressing a combination of physical fitness, healthy diet, taking supplements, and intermittent fasting.

Here, Michaels shares her own personal health journey, her recommendations for a diet and exercise program, and key ways to age well.

Being Transformed Inside and Out

Michaels didn't always have the sleek, 5'3", 115-pound frame that she sports at 47 years old.

As a teenager, she was overweight, insecure, and a victim of bullying. That all changed when her mother introduced her to martial arts.

"Through martial arts I began to believe in my ability to achieve whatever I set my mind to," said Michaels. "I began to want to lose weight and started learning about 'diet' and nutrition. Over time, as I got more confident, I felt more capable. The more small successes I achieved, the more I began to set bigger goals for myself."

By 17 years old, Michaels had shed 60 pounds and was training for her black belt in martial arts—a practice that not only transformed her physical and mental attitude, but that ultimately launched her impressive career.

At 28 years old, Michaels opened her own sports medicine and personal training facility called Sky Sport and Spa in Beverly Hills, where she earned a reputation as a no-nonsense trainer who got results.

And by the time she was 30, Michaels became a household name when she became a trainer on NBC's hit show *The Biggest Loser*, a TV show where obese individuals competed to lose the most weight.

According to Michaels, *The Biggest Loser* "really helped give me an international platform to get out a bigger message of health and wellness."

Beyond Fitness

Since her time on *The Biggest Loser*, Michaels has continued to sound the alarm about the extreme dangers of obesity.

"Ultimately, in the US alone we lose roughly **30,000 people a month** to obesity. Seven out of

10 Americans are on medication because of an obesity-related health condition," said Michaels. "Obesity is the number one cause of bankruptcy in America due to the health issues it creates. It's been linked to cancer, heart disease, diabetes, Alzheimer's, erectile dysfunction, glaucoma...the list goes on."

Besides following a fitness routine, Michaels says that the best way to maintain a healthy weight is to follow three primary dietary rules: counting calories, eating all three macronutrients (protein, fat, and carb), and practicing moderation.

"It's simple science. Calories in our food equal energy. Fat is stored energy. If you eat more calories in a day than you are burning—no matter how many micronutrients that food may have—you will store that excess energy as fat."

But quality is as important as quantity, which is why she tells her clients to eat food in its most natural, whole form. She also encourages following an 80/20 rule, making sure healthy food makes up at least **80%** of your recommended calorie allowance.

The bottom line?

"Basically, don't overeat and use common sense with your food choices," said Michaels.

Michaels' Longevity Plan

In her most recent book, *The 6 Keys: Unlock Your Genetic Potential for Ageless Strength, Health, and Beauty*, Michaels details six body processes that determine how we age—and more importantly, how to combat them.

This includes taking steps to minimize damage to macromolecules like DNA and proteins, controlling



factors that affect your genes (epigenetics), preventing chronic inflammation (inflammaging), and delaying the shortening of your telomeres.

"Time has nothing to do with age, and genetics have very little to do with age," said Michaels. "Aging is a component of accumulated damage from daily living. So how we live our life is what determines how we age. Period."

One practical way to fight aging is to practice intermittent fasting, which Michaels incorporates into her personal life by leaving a 12-14-hour window between dinner and breakfast the next day.

"The benefits are really about overall health—not weight loss. When you give your body a window where it isn't focused on breaking down food, you free your system up to do housekeeping—clearing out dead and senescent tissue," said Michaels. "Plus, it helps with insulin-related health conditions, and it boosts longevity by how it affects metabolic pathways and their connection to our longevity genes (sirtuins)."

Michaels is also a self-proclaimed 'supplement nut.'

"Even though I try to eat the most balanced suite of foods when it comes to both macro nutrients (protein, fat, carbs) and micronutrients (vitamins and minerals), it's still difficult to get all the nutrients in their optimal amount for optimal health. I use supplements as a catch-all safety net to ensure I get the recommended daily allowance (RDA) of everything I need."

She says she also uses supplements to give her an "edge" when it comes to fitness, metabolism, and longevity.

As part of her personal regimen, Michaels takes a multi-collagen



peptide supplement with MSM, glucosamine and chondroitin, an organic green superfood blend with adaptogens, a red superfood blend, a blend of probiotics and prebiotics, krill oil, a precursor of NAD⁺, resveratrol, and a multivitamin.

"I think it's important to almost everyone to age well. Aging well means vitality coupled with longevity. Who doesn't want that?" said Michaels. "I want to live my best quality life for years to come, for myself and to be around for my family."

Personal Training with Jillian

Michaels' claim to fame is her intense fitness regimens, which include a blend of weight training, kickboxing, Pilates, yoga, and plyometrics.

Her workouts have gained a reputation for being tough, results-oriented programs—but they are not one-size-fits-all, and they are not designed for any specific age group.

In fact, Michaels cautions against basing a fitness program solely on age alone.

"Exercise programs are not built around age. It's about fitness level, fitness goals, and pre-existing injuries or conditions," said Michaels. "I strongly suggest consulting with your doctor and a fitness professional to tailor a program based on your personal needs. Maybe you need to focus on increasing mobility or boosting bone density. There simply is no one-size-fits-all here."

Over the years, people wanting to train with Michaels have turned to one of her 20 fitness DVDs, which have sold over 100 million copies worldwide.



More recently, Michaels has launched an app for smartphones and tablets called The Fitness App by Jillian Michaels—putting the decades of Michaels' expertise right at your fingertips.

"The Fitness App has personalized workout programs to help you meet any goal, satisfy any exercise preference, and suit any fitness level," said Michaels. "You can train at home, in the gym, or outside—no equipment needed."

The app also features an advanced meal planner that individualizes your meal plans.

Launching this app is yet another way that Michaels helps people achieve their goals—something she says gives her a sense of purpose.

"I love playing a role in someone's journey to a better life—giving them tools to become happier and healthier," said Michaels. "This brings so much meaning in my life. I can't imagine doing anything else." •

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

Jillian Michaels is an American personal trainer, businesswoman, and health and wellness expert. She starred on NBC's *The Biggest Loser*, has written eight *New York Times* best-selling books, and has sold over 100 million fitness DVDs.

She recently launched an app called The Fitness App by Jillian Michaels. You can download The Fitness by Jillian Michaels App on iphone or android by visiting www.jillianmichaels.com, and you can keep up with her on Instagram at [@jillianmichaels](https://www.instagram.com/jillianmichaels).

ABSORB MORE QUERCETIN

Quercetin has demonstrated significant health benefits, but **higher** doses are often required to achieve optimal results.

A novel **phytosome** delivery technology markedly *increases* absorption to deliver **more quercetin** throughout one's body.

For daily quercetin supplementation, take just one of the highly absorbable **Bio-Quercetin Phytosome** capsules.

One small 10 mg quercetin dose of **Bio-Quercetin** provides a **500 mg** equivalent dose of standard quercetin!*

Item #02302 • 30 vegetarian capsules

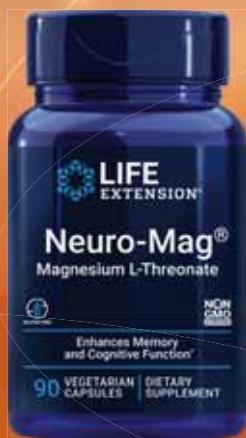
1 bottle \$9 • 4 bottles \$8 each



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

* Supplier Internal Study. Data on File. 2017

Restore Connections Between Your Neurons



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

The number of **synapses** that connect brain cells decline with aging.

Magnesium L-Threonate has been shown to improve **synaptic density** and other structural components of the brain.*



Item #01603 • 90 vegetarian capsules

1 bottle \$30 • 4 bottles \$27 each



Item #02032 • 93.35 grams of powder

1 jar \$28.50 • 4 jars \$26 each

For full product description and to order **Neuro-Mag® Magnesium L-Threonate** or **Neuro-Mag® Magnesium L-Threonate Powder**, call 1-800-544-4440 or visit www.LifeExtension.com

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

Magtein® is a registered trademark of Magceutics, Inc. and is distributed exclusively by AIDP, Inc. Magtein® is protected under U.S. patents 8,178,118; 8,142,803; 8,163,301 and other patents pending.

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

SUPPORT HEALTHY URIC ACID LEVELS

URIC ACID CONTROL

A tannin-rich extract derived from the edible fruit of the *Terminalia bellerica* tree helps keep uric acid levels within healthy range.

This patent-pending, standardized extract from *Terminalia bellerica* supports healthy expression of two critical enzymes involved in uric acid metabolism:

- **Xanthine oxidase**

The name of this standardized *Terminalia bellerica* extract is **Ayuric®**. The suggested dose is one capsule twice a day.

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



Item #01921 • 60 vegetarian capsules

1 bottle \$18

4 bottles \$16.50 each



Ayuric® is a registered trademark of Natreon, Inc. with patents pending.

ACTIVE LIFESTYLE & FITNESS

- 01529 Creatine Capsules
- 02318 Keto Brain and Body Boost
- 02020 Super Carnosine
- 02023 Tart Cherry with CherryPURE®
- 02146 Wellness Bar–Chocolate Brownie
- 02147 Wellness Bar–Cookie Dough
- 02246 Wellness Code® Advanced Whey Protein Isolate Vanilla
- 02221 Wellness Code® Muscle Strength & Restore Formula
- 02127 Wellness Code® Plant Protein Complete & Amino Acid Complex
- 02261 Wellness Code® Whey Protein Concentrate Chocolate
- 02260 Wellness Code® Whey Protein Concentrate Vanilla
- 02243 Wellness Code® Whey Protein Isolate Chocolate
- 02242 Wellness Code® Whey Protein Isolate Vanilla

AMINO ACIDS

- 01039 Arginine & Ornithine Capsules
- 00038 Arginine Ornithine Powder
- 01253 Branched Chain Amino Acids
- 01829 Carnosine
- 01671 D,L-Phenylalanine Capsules
- 01624 L-Arginine Caps
- 01532 L-Carnitine
- 00345 L-Glutamine
- 00141 L-Glutamine Powder
- 01678 L-Lysine
- 01827 Taurine
- 00133 Taurine Powder
- 00326 Tyrosine Tablets

BLOOD PRESSURE & VASCULAR SUPPORT

- 01824 Advanced Olive Leaf Vascular Support
- 02004 Arterial Protect
- 70000 Blood Pressure Monitor Arm Cuff
- 02497 Endothelial Defense™ Pomegranate Plus
- 02320 NitroVasc™ Boost
- 00984 Optimal BP Management
- 01953 Pomegranate Complete
- 00956 Pomegranate Fruit Extract
- 02024 Triple Action Blood Pressure AM/PM
- 02102 VenoFlow™

BONE HEALTH

- 01726 Bone Restore
- 02123 Bone Restore Chewable Tablet
- 02416 Bone Restore Elite with Super Potent K2
- 01727 Bone Restore with Vitamin K2
- 01725 Bone Strength Collagen Formula
- 00313 Bone-Up™
- 01963 Calcium Citrate with Vitamin D
- 01506 Dr. Strum's Intensive Bone Formula
- 02417 Mega Vitamin K2
- 01476 Strontium Caps
- 02422 Vegan Vitamin D3

BRAIN HEALTH

- 01524 Acetyl-L-Carnitine
- 01974 Acetyl-L-Carnitine Arginate
- 02419 B12 Elite
- 02321 Cognitex® Basics
- 02396 Cognitex® Elite
- 02397 Cognitex® Elite Pregnenolone
- 01540 DMAE Bitartrate
- 02006 Dopa-Mind™
- 02413 Dopamine Advantage
- 02212 Focus Tea™
- 01658 Ginkgo Biloba Certified Extract™
- 01527 Huperzine A
- 00020 Lecithin

- 02101 Memory Protect
- 00709 Migra-Eeze™
- 01603 Neuro-Mag® Magnesium L-Threonate Caps
- 02032 Neuro-Mag® Magnesium L-Threonate Powder
- 00888 Optimized Ashwagandha
- 01676 PS (Phosphatidylserine) Caps
- 02406 Quick Brain Nootropic
- 01327 Vinpocetine

CHOLESTEROL MANAGEMENT

- 01828 Advanced Lipid Control
- 01359 Cho-Less™
- 01910 CHOL-Support™
- 01030 Red Yeast Rice
- 01304 Theaflavins Standardized Extract
- 00372 Vitamin B3 Niacin Capsules

DIGESTION SUPPORT

- 53348 Betaine HCl
- 02412 Bloat Relief
- 30747 Digest RC®
- 07136 Effervescent Vitamin C - Magnesium Crystals
- 02021 Enhanced Super Digestive Enzymes
- 02022 Enhanced Super Digestive Enzymes and Probiotics
- 02033 Esophacool™
- 01737 Esophageal Guardian
- 01706 Extraordinary Enzymes
- 02100 Gastro-Ease™
- 01122 Ginger Force™
- 00605 Regimint
- 01386 TruFiber®

ENERGY MANAGEMENT

- 01628 Adrenal Energy Formula • 60 veg capsules
- 01630 Adrenal Energy Formula • 120 veg capsules
- 00972 D-Ribose Powder
- 01473 D-Ribose Tablets
- 01900 Energy Renew
- 01544 Forskolin
- 01805 Ginseng Energy Boost
- 00668 Metabolic Advantage Thyroid Formula™
- 01869 Mitochondrial Basics with PQQ
- 01868 Mitochondrial Energy Optimizer with PQQ
- 01904 NAD+ Cell Regenerator™ • 100 mg, 30 veg capsules
- 02344 NAD+ Cell Regenerator™ 300 mg, 30 veg capsules
- 02348 NAD+ Cell Regenerator™ and Resveratrol
- 01500 PQQ Caps • 10 mg, 30 vegetarian capsules
- 01647 PQQ Caps • 20 mg, 30 vegetarian capsules
- 00889 Rhodiola Extract
- 02003 Triple Action Thyroid

EYE HEALTH

- 01923 Astaxanthin with Phospholipids
- 00893 Brite Eyes III
- 02323 Digital Eye Support
- 01514 Eye Pressure Support with Mirtogenol®
- 01992 MacuGuard® Ocular Support with Saffron
- 01993 MacuGuard® Ocular Support with Saffron & Astaxanthin
- 01873 Standardized European Bilberry Extract
- 01918 Tear Support with MaquiBright®

FISH OIL & OMEGAS

- 02311 Clearly EPA/DHA Fish Oil
- 01937 Mega EPA/DHA
- 02218 Mega GLA Sesame Lignans
- 01983 Super Omega-3 EPA/DHA Fish Oil, Sesame Lignans & Olive Extract • 60 softgels
- 01988 Super Omega-3 Plus EPA/DHA Fish Oil, Sesame Lignans, Olive Extract, Krill & Astaxanthin

- 01982 Super Omega-3 EPA/DHA Fish Oil, Sesame Lignans & Olive Extract • 120 softgels
 01985 Super Omega-3 EPA/DHA Fish Oil, Sesame Lignans & Olive Extract • 60 enteric coated softgels
 01984 Super Omega-3 EPA/DHA Fish Oil, Sesame Lignans & Olive Extract • 120 enteric coated softgels
 01986 Super Omega-3 EPA/DHA Fish Oil, Sesame Lignans & Olive Extract • 240 softgels
 01812 Provinal® Purified Omega-7
 01640 Vegetarian DHA

FOOD

- 02008 California Estate Extra Virgin Olive Oil
 02170 Rainforest Blend Decaf Ground Coffee
 02169 Rainforest Blend Ground Coffee
 02171 Rainforest Blend Whole Bean Coffee
 00438 Stevia™ Organic Liquid Sweetner
 00432 Stevia™ Sweetener

GLUCOSE MANAGEMENT

- 01503 CinSulin® with InSea²⁰ and Crominex[®] 3+
 01620 CoffeeGenic[®] Green Coffee Extract
 02122 Glycemic Guard™
 00925 Mega Benfotiamine
 01803 Tri Sugar Shield[®]

HEART HEALTH

- 01066 Aspirin (Enteric Coated)
 01842 BioActive Folate & Vitamin B12 Caps
 01700 Cardio Peak™
 02121 Homocysteine Resist
 02018 Optimized Carnitine
 01949 Super-Absorbable CoQ10 Ubiquinone with d-Limonene • 50 mg, 60 softgels
 01951 Super-Absorbable CoQ10 Ubiquinone with d-Limonene • 100 mg, 60 softgels
 01929 Super Ubiquinol CoQ10
 01427 Super Ubiquinol CoQ10 with Enh Mitochondrial Support™ • 50 mg, 30 softgels
 01425 Super Ubiquinol CoQ10 with Enh Mitochondrial Support™ • 50 mg, 100 softgels
 01437 Super Ubiquinol CoQ10 with Enh Mitochondrial Support™ • 100 mg, 30 softgels
 01426 Super Ubiquinol CoQ10 with Enh Mitochondrial Support™ • 100 mg, 60 softgels
 01431 Super Ubiquinol CoQ10 with Enh Mitochondrial Support™ • 200 mg, 30 softgels
 01733 Super Ubiquinol CoQ10 with PQQ
 01859 TMG Liquid Capsules
 00349 TMG Powder

HORMONE BALANCE

- 00454 DHEA • 15 mg, 100 capsules
 00335 DHEA • 25 mg, 100 capsules
 00882 DHEA • 50 mg, 60 capsules
 00607 DHEA • 25 mg, 100 vegetarian dissolve in mouth tablets
 01689 DHEA • 100 mg, 60 veg capsules
 02368 Optimized Broccoli and Cruciferous Blend
 00302 Pregnenolone • 50 mg, 100 capsules
 00700 Pregnenolone • 100 mg, 100 capsules
 01468 Triple Action Cruciferous Vegetable Extract
 01469 Triple Action Cruciferous Vegetable Extract and Resveratrol

IMMUNE SUPPORT

- 02411 5 Day Elderberry Immune
 00681 AHCC[®]
 02302 Bio-Quercetin[®]
 02410 Black Elderberry + Vitamin C
 01961 Enhanced Zinc Lozenges
 01704 Immune Modulator with Tinofend[®]

- 02425 Immune Packs with Vitamin C & D, Zinc and Probiotic
 02005 Immune Senescence Protection Formula™
 00316 Kyolic[®] Garlic Formula 102
 00789 Kyolic[®] Reserve
 01681 Lactoferrin (Apolactoferrin) Caps
 02426 Mushroom Immune with Beta Glucans
 01903 NK Cell Activator™
 01394 Optimized Garlic
 01309 Optimized Quercetin
 01811 Peony Immune
 00525 ProBoost Thymic Protein A
 01708 Reishi Extract Mushroom Complex
 01906 Standardized Cistanche
 13685 Ten Mushroom Formula[®]
 01097 Ultra Soy Extract
 01561 Zinc Lozenges

INFLAMMATION MANAGEMENT

- 01639 5-LOX Inhibitor with AprèsFlex[®]
 02324 Advanced Curcumin Elite™ Turmeric Extract, Ginger & Turmerones
 01709 Black Cumin Seed Oil
 02310 Black Cumin Seed Oil and Curcumin Elite™
 00202 Boswella
 02467 Curcumin Elite™ Turmeric Extract • 30 veg capsules
 02407 Curcumin Elite™ Turmeric Extract • 60 veg capsules
 01804 Cytokine Suppress[®] with EGCG
 02223 Pro-Resolving Mediators
 00318 Serraflazyme
 01203 Specially-Coated Bromelain
 00407 Super Bio-Curcumin[®] Turmeric Extract
 01254 Zyflamend™ Whole Body

JOINT SUPPORT

- 02404 Arthro-Immune Joint Support
 02238 ArthroMax[®] Advanced NT2 Collagen™ & AprèsFlex[®]
 01617 ArthroMax[®] with Theaflavins & AprèsFlex[®]
 02138 ArthroMax[®] Elite
 00965 Fast-Acting Joint Formula
 00522 Glucosamine/Chondroitin Capsules
 02420 Glucosamine Sulfate
 02424 Joint Mobility
 01600 Krill Healthy Joint Formula
 01050 Krill Oil
 00451 MSM (Methylsulfonylmethane)
 02231 NT2 Collagen™

KIDNEY & BLADDER SUPPORT

- 00862 Cran-Max[®] Cranberry Whole Fruit Concentrate
 01424 Optimized Cran-Max[®] with Ellirose™
 01921 Uric Acid Control
 01209 Water-Soluble Pumpkin Seed Extract

LIVER HEALTH & DETOXIFICATION

- 01922 Advanced Milk Thistle • 60 softgels
 01925 Advanced Milk Thistle • 120 softgels
 02240 Anti-Alcohol Complex
 01651 Calcium D-Glucarate
 01571 Chlorophyllin
 01522 Milk Thistle • 60 veg capsules
 02402 FLORASSIST[®] Liver Restore™
 01541 Glutathione, Cysteine & C
 01393 HepatoPro
 01608 Liver Efficiency Formula
 01534 N-Acetyl-L-Cysteine
 00342 PectaSol-C[®] Modified Citrus Pectin Powder
 01080 PectaSol-C[®] Modified Citrus Pectin Capsules
 01884 Silymarin
 02361 SOD Booster

LONGEVITY & WELLNESS

- 00457 Alpha-Lipoic Acid
- 01625 AppleWise
- 02414 Bio-Fisetin
- 01214 Blueberry Extract
- 01438 Blueberry Extract and Pomegranate
- 02270 DNA Protection Formula
- 02405 Endocannabinoid System Booster
- 02119 GEROPROTECT® Ageless Cell™
- 02415 GEROPROTECT® Autophagy Renew
- 02133 GEROPROTECT® Longevity A.I.™
- 02401 GEROPROTECT® Stem Cell
- 02211 Grapeseed Extract
- 00954 Mega Green Tea Extract (decaffeinated)
- 00953 Mega Green Tea Extract (lightly caffeinated)
- 01513 Optimized Fucoidan with Maritech® 926
- 02230 Optimized Resveratrol
- 01637 Pycnogenol® French Maritime Pine Bark Extract
- 02210 Resveratrol
- 00070 RNA (Ribonucleic Acid)
- 02301 Senolytic Activator®
- 01208 Super R-Lipoic Acid
- 01919 X-R Shield

MEN'S HEALTH

- 02209 Male Vascular Sexual Support
- 00455 Mega Lycopene Extract
- 02306 Men's Bladder Control
- 01789 PalmettoGuard® Saw Palmetto and Beta-Sitosterol
- 01790 PalmettoGuard® Saw Palmetto/Nettle Root Formula and Beta-Sitosterol
- 01837 Pomi-T®
- 01373 Prelox® Enhanced Sex for Men
- 01940 Super MiraForte with Standardized Lignans
- 01909 Triple Strength ProstaPollen™
- 02029 Ultra Prostate Formula

MINERALS

- 01661 Boron
- 02107 Extend-Release Magnesium
- 01677 Iron Protein Plus
- 02403 Lithium
- 01459 Magnesium Caps
- 01682 Magnesium (Citrate)
- 01328 Only Trace Minerals
- 01504 Optimized Chromium with Crominex® 3+
- 02309 Potassium with Extend-Release Magnesium
- 01740 Sea-Iodine™
- 01879 Se-Methyl L-Selenocysteine
- 01778 Super Selenium Complex
- 00213 Vanadyl Sulfate
- 01813 Zinc Caps

MISCELLANEOUS

- 00577 Potassium Iodide
- 00657 Solarshield® Sunglasses

MOOD & STRESS MANAGEMENT

- 02312 Cortisol-Stress Balance
- 00987 Enhanced Stress Relief
- 01074 5 HTP
- 01683 L-Theanine
- 02175 SAMe (S-Adenosyl-Methionine)
200 mg, 30 enteric coated vegetarian tablets
- 02176 SAMe (S-Adenosyl-Methionine)
400 mg, 30 enteric coated vegetarian tablets
- 02174 SAMe (S-Adenosyl-Methionine)
400 mg, 60 enteric coated vegetarian tablets

MULTIVITAMINS

- 02199 Children's Formula Life Extension Mix™
- 02498 Comprehensive Nutrient Packs ADVANCED
- 02354 Life Extension Mix™ Capsules
- 02364 Life Extension Mix™ Capsules without Copper
- 02356 Life Extension Mix™ Powder
- 02355 Life Extension Mix™ Tablets
- 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
- 02428 Plant-Based Multivitamin
- 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

NERVE & COMFORT SUPPORT

- 02202 ComfortMAX™
- 02303 Discomfort Relief

PERSONAL CARE

- 01006 Biosil™ • 5 mg, 30 veg capsules
- 01007 Biosil™ • 1 fl oz
- 00321 Dr. Proctor's Advanced Hair Formula
- 00320 Dr. Proctor's Shampoo
- 02322 Hair, Skin & Nails Collagen Plus Formula
- 01278 Life Extension Toothpaste
- 00408 Venotone
- 00409 Xyliwhite Mouthwash
- 02304 Youthful Collagen
- 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
- 01920 FLORASSIST® Throat Health
- 02400 FLORASSIST® Winter Immune Support
- 52142 Jarro-Dophilus® for Women
- 00056 Jarro-Dophilus EPS® • 60 veg capsules
- 21201 Jarro-Dophilus EPS® • 120 veg capsules
- 01038 Theralac® Probiotics
- 01389 TruFlora® Probiotics

SKIN CARE

- 80157 Advanced Anti-Glycation Peptide Serum
- 80165 Advanced Growth Factor Serum
- 80170 Advanced Hyaluronic Acid Serum
- 80154 Advanced Lightening Cream
- 80155 Advanced Peptide Hand Therapy
- 80175 Advanced Probiotic-Fermented Eye Serum
- 80177 Advanced Retinol Serum
- 80152 Advanced Triple Peptide Serum
- 80140 Advanced Under Eye Serum with Stem Cells
- 80137 All-Purpose Soothing Relief Cream
- 80139 Amber Self MicroDermAbrasion
- 80118 Anti-Aging Mask

- 80151 Anti-Aging Rejuvenating Face Cream
 80153 Anti-Aging Rejuvenating Scalp Serum
 80179 Brightening Peptide Serum
 80176 Collagen Boosting Peptide Cream
 80156 Collagen Boosting Peptide Serum
 02408 Collagen Peptides for Skin & Joints
 80180 CoQ10 and Stem Cell Rejuvenation Cream
 80169 Cucumber Hydra Peptide Eye Cream
 02423 Daily Skin Defense
 80141 DNA Support Cream
 80163 Eye Lift Cream
 80123 Face Rejuvenating Anti-Oxidant Cream
 80109 Hyaluronic Facial Moisturizer
 80110 Hyaluronic Oil-Free Facial Moisturizer
 80138 Hydrating Anti-Oxidant Facial Mist
 00661 Hydroderm
 55495 Instensive Moisturizing Cream
 80103 Lifting & Tightening Complex
 80168 Melatonin Advanced Peptide Cream
 80114 Mild Facial Cleanser
 80172 Multi Stem Cell Hydration Cream
 80159 Multi Stem Cell Skin Tightening Complex
 80122 Neck Rejuvenating Anti-Oxidant Cream
 80174 Purifying Facial Mask
 80150 Renewing Eye Cream
 80142 Resveratrol Anti-Oxidant Serum
 01938 Shade Factor™
 02129 Skin Care Collection Anti-Aging Serum
 02130 Skin Care Collection Day Cream
 02131 Skin Care Collection Night Cream
 80166 Skin Firming Complex
 02096 Skin Restoring Ceramides
 80130 Skin Stem Cell Serum
 80164 Skin Tone Equalizer
 80143 Stem Cell Cream with Alpine Rose
 80148 Tightening & Firming Neck Cream
 80161 Triple-Action Vitamin C Cream
 80162 Ultimate MicroDermabrasion
 80173 Ultimate Peptide Serum
 80178 Ultimate Telomere Cream
 80160 Ultra Eyelash Booster
 80101 Ultra Wrinkle Relaxer
 80113 Under Eye Refining Serum
 80104 Under Eye Rescue Cream
 80171 Vitamin C Lip Rejuvenator
 80129 Vitamin C Serum
 80136 Vitamin D Lotion
 80102 Vitamin K Cream

SLEEP

- 01512 Bioactive Milk Peptides
 02300 Circadian Sleep
 01551 Enhanced Sleep with Melatonin
 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 tablets
 01721 Optimized Tryptophan Plus
 01444 Quiet Sleep
 01445 Quiet Sleep Melatonin

VITAMINS

- 01533 Ascorbyl Palmitate
 00920 Benfotiamine with Thiamine
 00664 Beta-Carotene
 01945 BioActive Complete B-Complex
 00102 Biotin
 00084 Buffered Vitamin C Powder
 02229 Fast-C® and Bio-Quercetin Phytosome
 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
 00065 MK-7
 00373 No Flush Niacin
 01939 Optimized Folate (L-Methylfolate)
 01217 Pyridoxal 5'-Phosphate Caps
 01400 Super Absorbable Tocotrienols
 02334 Super K
 02335 Super K Elite
 01863 Super Vitamin E
 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 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

- 00658 7-Keto® DHEA Metabolite • 25 mg, 100 capsules
 02479 7-Keto® DHEA Metabolite • 100 mg, 60 veg capsules
 01509 Advanced Anti-Adipocyte Formula
 01807 Advanced Appetite Suppress
 02207 AMPK Metabolic Activator
 02478 DHEA Complete
 01738 Garcinia HCA
 01292 Integra-Lean®
 01908 Mediterranean Trim with Sinetrol™ -XPur
 01432 Optimized Saffron
 00818 Super CLA Blend with Sesame Lignans
 01902 Waist-Line Control™

WOMEN'S HEALTH

- 01942 Breast Health Formula
 01626 Enhanced Sex for Women 50+
 01894 Estrogen for Women
 01064 Femmenessence MacaPause®
 02204 Menopause 731™
 02319 Prenatal Advantage
 01441 Progesta-Care®
 01649 Super-Absorbable Soy Isoflavones

Munch

Crunch Digest Your Lunch
(Or breakfast, or dinner...)

Uncomfortable after eating?

Digestive enzymes are specialized proteins that help you break down the foods you eat.

Enhanced Super Digestive Enzymes combines 10 vegetarian-friendly enzymes to help you break down hard-to-digest foods and encourage a healthy gastrointestinal balance...so you can feel good after you eat!

Item #02021 • 60 vegetarian capsules

1 bottle **\$16.50** • 2 bottles \$15.75 each



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



CoQ10

Fuel for Heart | Mind | Muscle



CoQ10 helps fuel energy production at the cellular level—and **ubiquinol** absorbs up to eight times better than standard CoQ10. This means you'll have the body energy you need to power your brain, liver, kidneys, and heart.

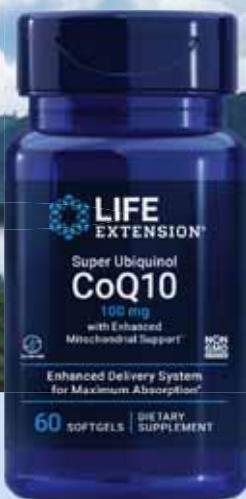
For full product description and to order **Super Ubiquinol CoQ10 with Enhanced Mitochondrial Support™**, call 1-800-544-4440 or visit www.LifeExtension.com

PrimaVie® is a registered trademark of Natreon, Inc. Q+, Kaneka Ubiquinol™, and the quality seal™ are registered or pending trademarks of Kaneka Corp.



Item #01426 • 100 mg, 60 softgels

1 bottle \$46.50 • 4 bottles \$39 each



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.



The Science of a Healthier Life®

PO BOX 407198
FORT LAUDERDALE, FLORIDA 33340-7198



IN THIS EDITION OF **LIFE EXTENSION® MAGAZINE**



7 MISCONCEPTIONS ABOUT VITAMIN C

Achieving steady-state vitamin C **blood levels** is challenging. A novel **liposomal** formula provides **24-hour** vitamin C protection with one daily dose.

24 IMPROVE JOINT MOBILITY AND REDUCE PAIN

Two **plant extracts** *improve* walking distance and speed, knee range-of-motion, and joint pain in non-arthritis men and women.

34 SAGE BOOSTS BRAIN FUNCTION

Older adults taking a **sage extract** had an approximate **60%** better performance in a composite measure of **memory** and about a **2.5-fold** increase in a measure of **attention**.

44 WHOLE-BODY BENEFITS OF VITAMIN K

Vitamin K builds stronger bones, promotes brain health, and lowers inflammation. An **American Heart Association study** shows that *higher* **vitamin K** intake lowered risk of cardiovascular disease and hospitalizations.

54 PROBIOTIC HELPS PREVENT STREP THROAT

In human trials, a novel **probiotic** *reduced* the incidence of **strep throat** by **84%** in adults and **97%** in children.

68 REDUCE ATHEROSCLEROTIC RISK

New human data further validate how **two plant extracts** can slow and reverse atherosclerosis.



VISIT US ONLINE AT LIFEEXTENSION.COM