



**LIFE
EXTENSION®**

The Science of a Healthier Life®

LifeExtension.com

March 2021

FEATURE ARTICLES

- 7 Internal Cellular Cleansing
- 34 Magnesium and Heart Health
- 44 Oral Probiotics Protect Gum Tissue
- 52 Brain-Protecting Effects of Green Tea
- 64 Hidden Dangers of Tattoos
- 71 Clinical Impact of CoQ10

RESTORE
Youthful
Cell Function
via
AUTOPHAGY



Matthew M^cCONAUGHEY'S

PERSONAL AGE-DELAY PROGRAM

GETTY IMAGES SUZI PRATT / STRINGER

\$5.99US \$5.99CAN



03>

0 71486 01139 2

**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**

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

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

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.

REPORTS

24 ON THE COVER

RESTORE YOUTHFUL CELLULAR FUNCTION

Scientists have identified methods to reduce toxic waste that accumulates inside cells by turning on a natural cleansing process called **autophagy**.



34 MAGNESIUM'S ROLE IN HEART HEALTH

Multiple studies reveal magnesium's cardio-protective effects. One found that those with the *highest* magnesium levels had a **44% lower** risk of **heart failure**. More than half of all Americans have *low* magnesium levels.



44 PROTECT GUM TISSUE WITH BENEFICIAL BACTERIA

Daily brushing and flossing may not be enough to prevent **gum disease**. Two **probiotics** *improve gum health* and *reduce oral plaque*.



52 BRAIN-PROTECTIVE EFFECTS OF GREEN TEA

Green tea polyphenols promote the formation of new brain cells and the ability of brain cells to create neural connections. In people who regularly drank green tea, **cognitive disorders** were found to be **35%** lower.



64 HIDDEN DANGERS OF TATTOOS

Tattoo inks are often derived from **toxic heavy metals** that raise the risk of DNA damage. A tattoo may have serious health consequences.

DEPARTMENTS

7 AS WE SEE IT: CELLULAR HOUSEKEEPING

Excess levels of **mTOR** interfere with a vital cell housecleaning process called **autophagy**. Fortunately, there are various strategies to suppress excess mTOR and restore more youthful autophagy.

17 IN THE NEWS

Glucosamine and chondroitin lower premature mortality risk; omega-3s help improve periodontitis; healthy diet decreases depression risk in adults over 45; ashwagandha enhances sleep, alertness, and quality of life in older adults.

71 ASK THE DOCTOR

Dr. Joel Kahn tells *Life Extension*® how **coenzyme Q10** helps cardiac patients prevent heart failure, heart attacks, and other cardiovascular issues.

79 WELLNESS PROFILE

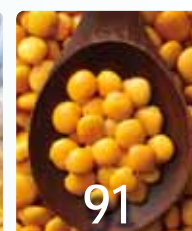
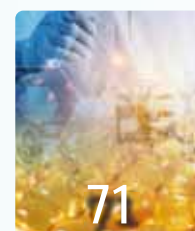
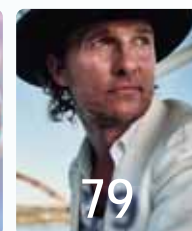
Actor Matthew McConaughey, author of *GREENLIGHTS*, prioritizes hard work, lifestyle choices, and physical, mental, and emotional health. From caloric restriction and exercise to supplements, his health protocols are still evolving.

85 AUTHOR INTERVIEW

In his book *Food Fix*, Mark Hyman, MD, provides practical solutions for creating healthier individuals, healthier farming practices, and ultimately a healthier planet.

91 SUPER FOODS

Lupini beans are packed with protein and digestible plant fiber but low in carbs. Replacing meat with lupini beans improves longevity, cardiovascular disease, and weight management.





Connect with Life Extension Online!



Facebook.com/LifeExtension



Twitter.com/LifeExtension

Customer care is available to take your calls
24 hours a day, 7 days a week: 1-800-678-8989

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



Nutrition Center of Florida, Inc., 5990 North Federal Highway,
Fort Lauderdale, FL 33308-2633 • 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—3-Time Winner

Ratings based on results of
the 2020 ConsumerLab.com survey
of supplement users. More information at
www.ConsumerLab.com/survey.

Editorial

Editor-in-Chief • Philip Smith
Executive Managing Editor • Renee Price
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

Steven Joyal, MD

Chief Scientific Officer

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

Sheldon Cannon • Michael Downey • Mark Hyman, MD
Joel Kahn, MD • Laurie Mathena • Gavin Logan • Celia Simmons

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, Fort Lauderdale, FL 33340
or email us: LEmagazine@LifeExtension.com

LIFE EXTENSION (ISSN 1524-198X) Vol. 27, No. 3 ©2021 is published monthly except bi-monthly in April by LE Publications, Inc. at 3600 West Commercial Blvd., Fort 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, Fort 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 Fort 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.

LITHIUM

The Brain & Body Element

In areas where **lithium** is naturally abundant in the drinking water, people tend to **live longer**, healthier lives.¹⁻³

Lithium is a *low-cost* mineral that supports **cognition**, **neural function**, and **healthy aging**.³⁻⁵

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

References

1. *Appl Physiol Nutr Metab*. 2018 Apr;43(4):412-4.
2. *J Clin Psychiatry*. 2015 Mar;76(3):319-26.
3. *Eur J Nutr*. 2011 Aug;50(5):387-9.
4. *J Alzheimers Dis*. 2015;48(2):403-10.
5. *JAMA Psychiatry*. 2017 Oct 1;74(10):1005-10.



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.



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 Bernaldes, 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 microsurgical 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 Montenaepoleone 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, FAAP, 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.



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 ground-breaking 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 South Florida Bone Marrow Stem Cell Transplant Institute 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.





Tap the Power of N-Acetyl-L-Cysteine

TO BOOST IMMUNE FUNCTION

N-Acetyl-L-Cysteine (NAC) has been shown to support healthy immunity and respiratory function.

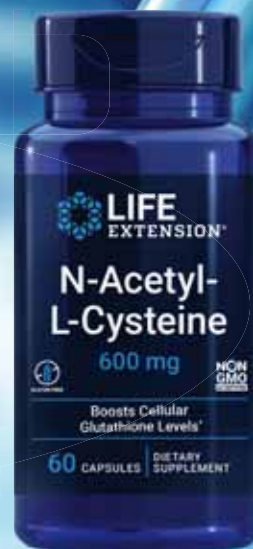
Item #01534 • 60 capsules

1 bottle **\$10.50**

4 bottles \$9.25 each

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.



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.

CELLULAR HOUSEKEEPING



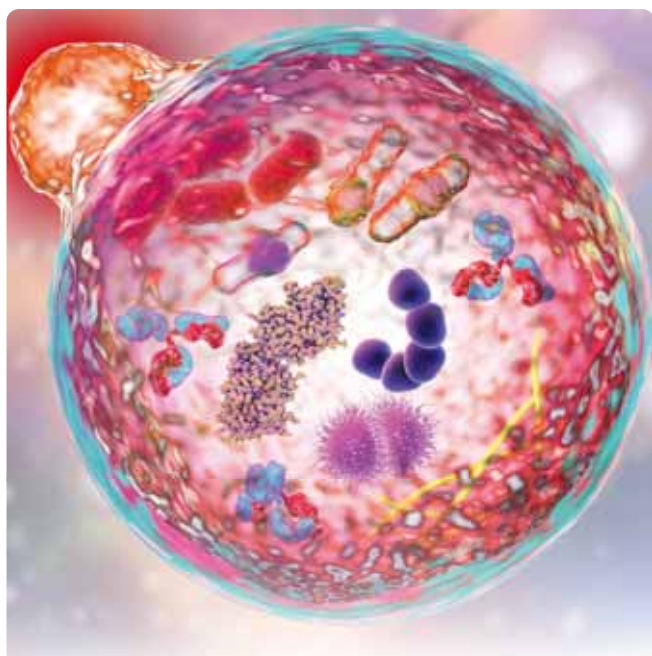
WILLIAM FALOON

Rapamycin is a drug that extends lifespan in virtually every animal tested.¹⁻⁴ It may also protect against age-related diseases.⁵⁻⁹

In 2016, **CNN** aired a broadcast showing an **old dog** behaving like a **young** dog after taking **rapamycin**.¹⁰

Animal studies show **50-60%** lifespan *increases* in response to rapamycin. This prompted the **National Institutes of Health** to fund a **\$23 million** study of **10,000** pet dogs.^{11,12} **Rapamycin** will be given to **500** of the dogs.

Scientists will then evaluate healthspans and conduct genetic testing to identify what



biological mechanisms are responsible for rapamycin's benefits. The pet dogs will stay at home and be cared for by their owners, which is more humane and realistic than keeping them in kennels.

Rapamycin's anti-aging properties include suppressing excess signaling of a cellular protein called **mTOR**.¹³

When **mTOR** activity is constantly elevated, it increases risk of degenerative disorders.¹⁴

A complication of excess **mTOR** signaling is inhibition of a cellular **housekeeping** process called **autophagy**.¹⁴

Autophagy is nature's way of clearing damaged proteins, stored fat, and other waste products inside our cells.^{15,16}

Almost **every** intervention shown to extend **healthy longevity** involves activation of **autophagy** (removing toxic cellular waste).^{17,18}

This article will describe how *everyone* can easily improve their cellular housekeeping.

Autophagy is the body's **self-cleaning** process that removes damaged byproducts from inside cells that accumulate from normal metabolic processes.

Insufficient **autophagy** is a driver of **aging** and degenerative illnesses.^{17,18}

Restoring balanced **autophagy** is a critical factor in **reversing** systemic degeneration.¹⁷

Most **Life Extension**® readers turn on beneficial **autophagy** by using **AMPK** activators, and **NAD⁺** precursors, and by cutting back on **excess calories**.

Those who engage in **intermittent fasting**, be it avoiding food for **16-18 hours** most days, or fasting two days a week, are **cleansing** their cells via activation of autophagy.¹⁹

People are participating in **clinical trials** evaluating the **autophagy-enhancing** effects of **rapamycin** and its potential to induce systemic **rejuvenation**.²⁰⁻²⁷

We eagerly look forward to the results of these **rapamycin** studies but people today need real-world solutions.

A novel approach has been developed to enhance more youthful **autophagy**. The objective is to enable aging individuals to cleanse their cells of toxic debris.

Autophagy Declines with Age

Young cells remove metabolic waste products so they can operate at optimal efficiency.

However, even in youth, chronic ingestion of **high calorie** diets (three large meals a day + snacking in between) may preclude effective **autophagy**. This might help explain why more younger people are developing metabolic disorders such as **obesity** and **type II diabetes**.

Incidences of **heart failure** in people under age 65 are rising.²⁸ This is largely a result of the **obesity** epidemic.

Accumulation of unwanted **body fat** is partially caused by excess **mTOR** that turns down autophagy's natural removal of cellular fat, damaged proteins, and other metabolic waste.²⁹

Normal aging results in **autophagy** decline unless interventions are initiated such as **intermittent fasting** and/or aggressive **exercise**.

Fortunately, there are natural ways to improve **autophagy** even in those who don't follow optimal dietary and physical-activity programs.



Effect of Luteolin On Autophagy

A plant flavonoid called **luteolin** was identified by **Life Extension®** in **1985** as a potential **anti-cancer** supplement.³⁰

Found in celery, broccoli, green pepper, parsley, and thyme, **luteolin** demonstrated **cancer prevention** properties in animal and cell studies.^{31,32}

Associations have been found between diets rich in flavonoid-containing plant foods and lower cancer rates.³³

The challenge in **1985** and in recent years was finding an affordable source of supplemental **luteolin**.

That roadblock has been resolved. And data indicate that using **luteolin** in **higher** doses has **autophagy-inducing** effects.

In animals with traumatic **brain injury** where efficient repair of cell structures is needed, **luteolin** activated a marker of **autophagy** by about **25%**, with a corresponding **25% reduction** in a marker of **inflammation**.³⁴

Brain injury and corresponding inflammation are causes of short- and long-term neurological impairments.³⁵

Luteolin has been shown to **activate** positive regulators of **autophagy** (such as AMPK and lysosome components) and **suppress** inhibitors of autophagy such as **mTOR** and **PI3K/Akt** signaling pathways.³⁶⁻³⁸

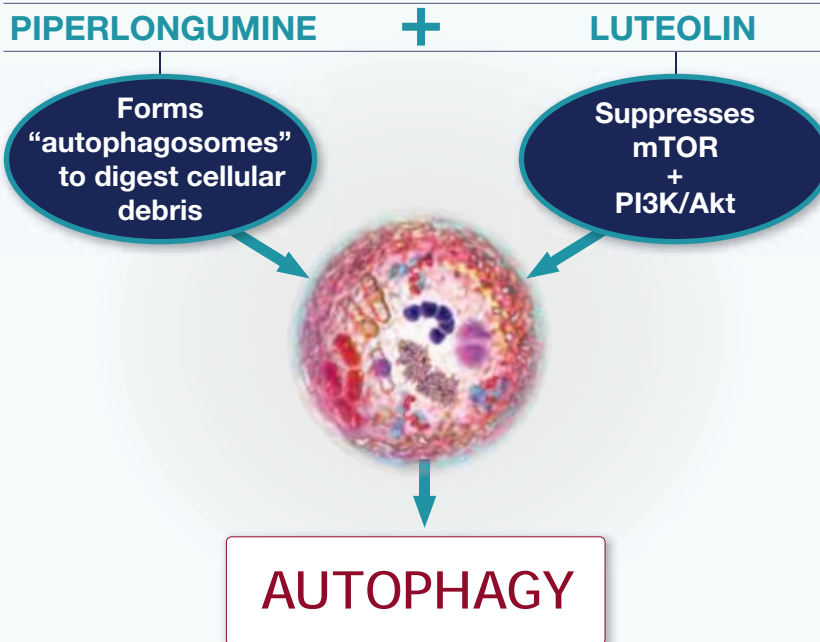
These **autophagy-inducing** effects also help protect cells against malignant propagation.³⁹

Fruit of the Pepper Plant

A biologically active alkaloid from the **pepper fruit** (piperlongumine) has demonstrated the ability to enable recovery of motor deficits in animals with brain cell damage and movement deficits.

A marker of **autophagy induction** nearly **doubled** in animals given this **pepper fruit** extract compared to controls.⁴⁰

Nutrients that Support Healthy Autophagy



Luteolin and piperlongumine enhance autophagy through several mechanisms that include suppressing mTOR and PI3K/Akt and promoting formation of autophagosomes.

Adapted from Bareja et al 2019, Pedro et al 2019, Maiuri & Kroemer 2019, Wang et al 2017, Choi et al 2013, Liao et al 2018, You et al 2019, Yang et al 2016

This **pepper extract** initiated a favorable cycle of cellular events that resulted in formation of "**autophagosomes**."

This is another mechanism that young, healthy cells naturally use to remove accumulated waste products.

In this month's issue...

The toxic effects of waste products that accumulate inside our aging cells were recognized long ago.

Only recently, however, have effective **autophagy-inducing** compounds and aggressive fasting regimens been identified.

An article on page 24 of this issue explores the various ways people can safely turn on **autophagy** to rid aging cells of debris that inhibits youthful function of their internal machinery.

On page 44 we discuss the systemic damage that occurs in response to poor **oral hygiene**.

Starting on page 71 there is an interview with a cardiologist who describes his clinical observations when prescribing **coenzyme Q10** to cardiac patients.

Commitment to Funding Research

In **1980**, **Life Extension®** began publishing a newsletter that described methods to reduce one's risk of degenerative disorders.

Back in those early days, we advocated controversial positions relating to cardiovascular disease prevention. These included lower reference ranges for **blood glucose**, **lipids**, and **blood pressure** that are now recognized by the medical establishment.

Compared to our first publication **41 years ago**, we are light-years ahead in our knowledge of what causes aging and how to partially forestall it.

I am actively engaged and donate monies to find ways to **reverse aging** in elderly persons.

Your support helps fund this clinical research aimed at benefiting all of humanity.

The accumulation of **cellular waste** products interferes with vital body functions needed to sustain life.

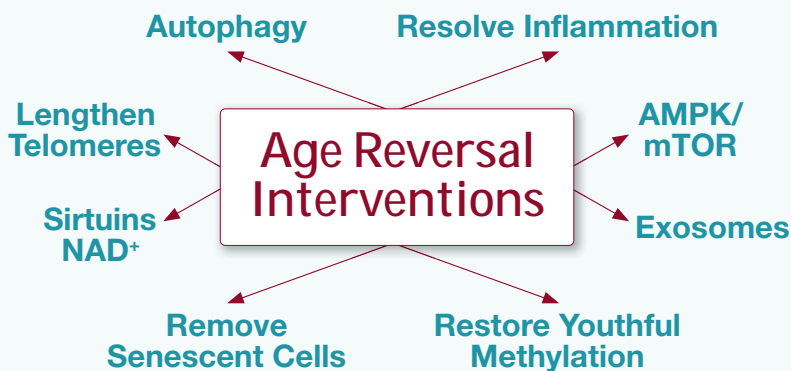
There are now ways to remove this toxic debris that clogs healthy cellular functions via a natural process called **autophagy**.

The boxes on the right are from live presentations I give to describe **age-reversal** research, including projects that relate to boosting cellular autophagy.

For longer life,



William Faloon, Co-Founder
Life Extension Buyers Club



Old Dogs, New Tricks

10,000 PETS NEEDED
for aging study

**NIH Funds \$23 Million Dog Study
that includes RAPAMYCIN**

Daniel Promislow, principal investigator of the Dog Aging Project

<https://www.heraldnet.com/northwest/old-dogs-new-tricks-10000-pets-needed-for-study/>

The Wall Street Journal

"Dog owners may soon be able to add years to their pets' lives, thanks to an experimental anti-aging pill."

In tests on mice, the medication rapamycin has been shown to lengthen lifespans up to 60%.

Scientists at the University of Washington's Dog Aging Project are studying whether it works in canines."

(September 17, 2017)



Excess mTOR and Abdominal Obesity



Excess mTOR causes insulin resistance, diabetes, inflammation, and obesity.

AMPK activators indirectly suppress mTOR.

Rapamycin directly inactivates mTOR pathways.

References

- Harrison DE, Strong R, Sharp ZD, et al. Rapamycin fed late in life extends lifespan in genetically heterogeneous mice. *Nature*. 2009 Jul 16;460(7253):392-5.
- Zhang Y, Bokov A, Gelfond J, et al. Rapamycin extends life and health in C57BL/6 mice. *J Gerontol A Biol Sci Med Sci*. 2014 Feb;69(2):119-30.
- Bjedov I, Toivonen JM, Kerr F, et al. Mechanisms of life span extension by rapamycin in the fruit fly *Drosophila melanogaster*. *Cell Metab*. 2010 Jan;11(1):35-46.
- Lind MI, Chen HY, Cortazar-Chinarro M, et al. Rapamycin additively extends lifespan in short- and long-lived lines of the nematode *Caenorhabditis remanei*. *Exp Gerontol*. 2017 Apr;90:79-82.
- Flynn JM, O'Leary MN, Zambataro CA, et al. Late-life rapamycin treatment reverses age-related heart dysfunction. *Aging Cell*. 2013 Oct;12(5):851-62.
- Hamano T. Klotho upregulation by rapamycin protects against vascular disease in CKD. *Kidney Int*. 2015 Oct;88(4):660-2.
- Anisimov VN, Zabezhinski MA, Popovich IG, et al. Rapamycin extends maximal lifespan in cancer-prone mice. *Am J Pathol*. 2010 May;176(5):2092-7.
- Spilman P, Podlutska N, Hart MJ, et al. Inhibition of mTOR by rapamycin abolishes cognitive deficits and reduces amyloid-beta levels in a mouse model of Alzheimer's disease. *PLoS One*. 2010 Apr 1;5(4):e9979.
- Johnson SC, Rabinovitch PS, Kaeberlein M. mTOR is a key modulator of ageing and age-related disease. *Nature*. 2013 Jan 17;493(7432):338-45.
- Available at: <https://www.cnn.com/2016/10/06/health/rapamycin-dog-live-longer/index.html>. Accessed December 18, 2020.
- Bitto A, Ito TK, Pineda VV, et al. Transient rapamycin treatment can increase lifespan and healthspan in middle-aged mice. *Elife*. 2016 Aug 23;5.
- Available at: <https://nypost.com/2019/11/14/scientists-looking-for-10000-dogs-to-study-aging/>. Accessed December 18, 2020.
- Evangelisti C, Cenni V, Lattanzi G. Potential therapeutic effects of the mTOR inhibitors for preventing ageing and progeria-related disorders. *Br J Clin Pharmacol*. 2016 Nov;82(5):1229-44.
- Bjedov I, Rallis C. The Target of Rapamycin Signalling Pathway in Ageing and Lifespan Regulation. *Genes (Basel)*. 2020 Sep 3;11(9):1043.
- Mizushima N, Levine B, Cuervo AM, et al. Autophagy fights disease through cellular self-digestion. *Nature*. 2008 Feb 28;451(7182):1069-75.
- Levine B, Kroemer G. Autophagy in the pathogenesis of disease. *Cell*. 2008 Jan 11;132(1):27-42.
- Madeo F, Zimmermann A, Maiuri MC, et al. Essential role for autophagy in life span extension. *J Clin Invest*. 2015 Jan;125(1):85-93.
- Rubinsztein DC, Marino G, Kroemer G. Autophagy and aging. *Cell*. 2011 Sep 2;146(5):682-95.
- Mattson MP, Longo VD, Harvie M. Impact of intermittent fasting on health and disease processes. *Ageing Res Rev*. 2017 Oct;39:46-58.
- Available at: <https://clinicaltrials.gov/ct2/show/NCT04608448>. Accessed December 18, 2020.
- Available at: <https://clinicaltrials.gov/ct2/show/NCT04488601>. Accessed December 18, 2020.
- Available at: <https://clinicaltrials.gov/ct2/show/NCT03103893>. Accessed December 18, 2020.
- Available at: <https://clinicaltrials.gov/ct2/show/NCT02874924>. Accessed December 18, 2020.
- Available at: <https://clinicaltrials.gov/ct2/show/NCT01649960>. Accessed December 18, 2020.
- Available at: <https://clinicaltrials.gov/ct2/show/NCT00891696>. Accessed December 18, 2020.
- Available at: <https://clinicaltrials.gov/ct2/show/NCT00304954>. Accessed December 18, 2020.
- Available at: <https://www.longevitytechnology/agelessrx-and-funding-an-irb-approved-rapamycin-trial/>. Accessed December 18, 2020.
- Glynn P, Lloyd-Jones DM, Feinstein MJ, et al. Disparities in Cardiovascular Mortality Related to Heart Failure in the United States. *J Am Coll Cardiol*. 2019 May 14;73(18):2354-5.
- Mao Z, Zhang W. Role of mTOR in Glucose and Lipid Metabolism. *Int J Mol Sci*. 2018 Jul 13;19(7).
- Available at: https://www.lifeextension.com/magazine/2000/11/report_lemix. Accessed December 18, 2020.
- Imran M, Rauf A, Abu-Izneid T, et al. Luteolin, a flavonoid, as an anti-cancer agent: A review. *Biomed Pharmacother*. 2019 Apr;112:108612.
- Lin Y, Shi R, Wang X, et al. Luteolin, a flavonoid with potential for cancer prevention and therapy. *Curr Cancer Drug Targets*. 2008 Nov;8(7):634-46.
- Available at: <https://lpi.oregonstate.edu/mic/dietary-factors/phytochemicals/flavonoids>. Accessed December 18, 2020.
- Xu J, Wang H, Lu X, et al. Posttraumatic administration of luteolin protects mice from traumatic brain injury: implication of autophagy and inflammation. *Brain Res*. 2014 Sep 25;1582:237-46.
- Bramlett HM, Dietrich WD. Long-Term Consequences of Traumatic Brain Injury: Current Status of Potential Mechanisms of Injury and Neurological Outcomes. *J Neurotrauma*. 2015 Dec 1;32(23):1834-48.
- Verschooten L, Barrette K, Van Kelst S, et al. Autophagy inhibitor chloroquine enhanced the cell death inducing effect of the flavonoid luteolin in metastatic squamous cell carcinoma cells. *PLoS One*. 2012;7(10):e48264.
- Insilico Medicine - Data on File. 2020.
- Zhang X, Zhang QX, Wang X, et al. Dietary luteolin activates browning and thermogenesis in mice through an AMPK/PGC1alpha pathway-mediated mechanism. *Int J Obes (Lond)*. 2016 Dec;40(12):1841-9.
- You Y, Wang R, Shao N, et al. Luteolin suppresses tumor proliferation through inducing apoptosis and autophagy via MAPK activation in glioma. *Onco Targets Ther*. 2019;12:2383-96.
- Liu J, Liu W, Lu Y, et al. Piperlongumine restores the balance of autophagy and apoptosis by increasing BCL2 phosphorylation in rotenone-induced Parkinson disease models. *Autophagy*. 2018;14(5):845-61.



FISETIN

The Longevity Flavonoid



Fisetin, a flavonoid found in strawberries and apples, is currently being studied for its effectiveness as a **senolytic** in humans.¹

In preclinical studies, fisetin:

- Mimics effects of **calorie reduction**²
- Targets longevity pathways²⁻⁶
- Extends lifespan of mice by about **10%**⁷
- Removes **senescent** cells through **senolytic** action⁷
- Suppresses excess **mTOR** activation⁸

Fisetin is poorly *absorbed* due to its breakdown in the small intestines.

Bio-Fisetin solves this problem by enclosing **fisetin** with a compound from the fenugreek herb.

A **human** trial showed **bioavailability** of this new **fisetin** compound increased up to **25 times** compared to fisetin by itself.⁹

Just one capsule daily of **Bio-Fisetin** helps manage **senescent cells** and may support overall longevity.

References

1. Available at: <https://www.mayo.edu/research/clinical-trials/cls-20438802>. Accessed June 22, 2020.
2. *Life Sci.* 2018 Jan 15;193:171-9.
3. *Mini Rev Med Chem.* 2018;18(13):1151-7.
4. *Nutr Res Pract.* 2017 Oct;11(5):430-4.
5. *Biochem Biophys Res Commun.* 2015 Nov 27;467(4):638-44.
6. *Int Immunopharmacol.* 2017 Apr;45:135-47.
7. *EBioMedicine.* 2018 Oct;36:18-28.
8. *J Nutr Biochem.* 2013 Aug;24(8):1547-54.
9. *Manufacturer's study (in press for future publication).* 2020.



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

45 Times Greater Bioavailability Curcumin



Patented turmeric extract (500 mg) results in **45 times** greater bio-availability of free curcuminoids.

Item #02407

500 mg, 60 vegetarian capsules

1 bottle **\$24** • 4 bottles \$22 each



Same 500 mg potency patented turmeric extract with added benefits of ginger and other turmeric actives.

Item #02324

500 mg curcumin + gingerol, 30 softgels

1 bottle **\$20** • 4 bottles \$18 each



For full product description and to order **Curcumin Elite™** or **Advanced Curcumin Elite™**, 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.

LEARN, RETAIN and Think FAST!

QUICK BRAIN



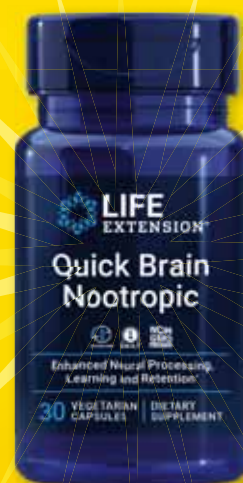
Nootropics speed up information processing in the brain, resulting in **faster thinking**.

Quick Brain Nootropic provides extracts from **bacopa**, **gotu kola**, and a **lutein-zeaxanthin** blend that have **clinical support** for:

- **Cognitive enhancement** and processing **speed**
- **Learning** function
- Healthy **memory**

Just one capsule daily to help stay "in the zone."

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



Item #02406 • 30 vegetarian capsules
1 bottle \$16.50 • 4 bottles \$15 each



BACOGNIZE® ULTRA is a registered trademark of Verdure Sciences, Inc. FloraGLO® is a registered trademark of Kemin Industries, 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.

ACTIVATE CELLULAR

Autophagy



Help Your Cells Remove
Internal Debris

GEROPROTECT® Autophagy Renew stimulates the body's natural "cellular cleanup" process essential to youthful cellular function and overall health.

This new longevity formula contains **luteolin** and **pipperlongumine** to:

- Promote ongoing cellular housekeeping
- Encourage healthy cell debris removal
- Inhibit mTOR signaling

Activating **autophagy** supports healthy cellular function and longevity.

Item #02415 • 30 vegetarian capsules

1 bottle **\$19.50** • 4 bottles \$17.50 each

† Developed in collaboration with Insilico Medicine, Inc.



For full product description and
to order **GEROPROTECT®**
Autophagy Renew,
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.

TRIPLE ACTION **SENOLYTIC** FORMULA

COMBAT SENESCENT CELLS AND AGING

SCIENCE OF SENOLYTICS!

Senolytic compounds selectively help target senescent cells in the body.

Laboratory studies show evidence of **systemic rejuvenation** when the **senescent cell** burden is reduced.*

ONCE-WEEKLY SENOLYTIC FORMULA

Senolytic Activator provides a highly **absorbable** form of **quercetin phytosome**, black tea **theaflavins**, and now with **apigenin** designed to enhance the body's ability to manage **senescent cells**.

The suggested dose is to take two capsules of **Senolytic Activator** just **once weekly**.

* Aging Cell. 2015 Aug;14(4):644-58.



Item #02301 • 24 vegetarian capsules

1 box **\$18** • 4 boxes **\$16**

(Each box lasts three months.)

For full product description and to order **Senolytic Activator**,
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.

In the News



Glucosamine and Chondroitin Intake Linked to Lower Risk of Premature Mortality

Regular supplementation with glucosamine and chondroitin is associated with a lower risk of mortality, according to the results of a study published in the *Journal of the American Board of Family Medicine*.*

The study included 16,686 participants in the National Health and Nutrition Examination Survey (NHANES) from 1999 to 2010. Participant interviews ascertained the use of dietary supplements during the previous month. Individuals who reported using glucosamine and chondroitin for a year or more were identified as glucosamine/chondroitin users in the current investigation.

During a median follow-up period of 107 months, 3,366 deaths occurred, of which 674 were caused by cardiovascular disease. Regular use of glucosamine/chondroitin was associated with a **58% lower** adjusted risk of dying from cardiovascular disease and a **27% lower** risk of dying from any cause during follow-up.

Editor's Note: Glucosamine and chondroitin are nutrients that are often consumed in combination to support joint health. Many individuals use glucosamine and/or chondroitin supplements on a regular basis to help maintain healthy joints or relieve some of the symptoms of arthritis.

* *J Am Board Fam Med*. Nov-Dec 2020;33(6): 842-847.

Omega-3 Fatty Acids as Add-On Therapy for Periodontitis

A review and meta-analysis included six studies that involved the use of the omega-3 fatty acids **EPA** and **DHA** in the treatment of periodontitis.¹ In four of the six studies, clinical attachment level and probing depth revealed significant improvement in association with omega-3 supplementation, compared to a placebo.

A randomized trial evaluated the effects of omega-3 supplementation in participants with chronic, moderate periodontitis.² Clinical attachment level improved at both one and three months among participants who received omega-3 in comparison with the control group, and compared to the beginning of the study.

In another trial, patients with periodontitis received scaling and root planing, while some of the subjects also received EPA and DHA.³ The study documented improvement in clinical attachment loss, bleeding on probing, and probing depth in the group that received omega-3.

Editor's Note: These studies provide growing evidence that omega-3 supplementation could be a promising adjunct to standard periodontitis therapy. As the authors of the review and meta-analysis noted, an alternative to antibiotics used in periodontal therapy could help solve, in part, the potential problem of antibiotic resistance in this group of patients.

References

1. *Lipids Health Dis.* 2020 May 21;19(1):100.
2. *Indian J Dent Res.* 2020 Mar-Apr;31(2): 229-35.
3. *Nutrients.* 2020 Aug 27;12(9).





Adults Over 45 with Healthy Diets are Less Prone to Depression

The intake of fruit, vegetables, and omega-3 fatty acids can help protect against the risk of depression in older adults, according to an article in *BMC Psychiatry*.*

The study included 27,162 men and women between the ages of 45 to 85 who participated in the Canadian Longitudinal Study on Aging. Demographic data, depression, physical health, dietary intake, and other factors were assessed upon enrollment.

For men, being in a relationship, having a high intake of omega-3 fatty acids, fruit and vegetables, calcium, and high vitamin D sources, as well as other factors, were protective against depression.

Among women, chronic pain, stage 1 hypertension, low intake of fruit and vegetables, and other factors were associated with a greater risk of depression.

Editor's Note: The authors note that fruit and vegetables contain magnesium, zinc, and selenium that may help reduce inflammation, which is associated with depression. Additionally, fruit and vegetables contain antioxidants that decrease the effects of oxidative stress on psychological health.

* *BMC Psychiatry*. 2019 Nov 6;19(1):329.

Ashwagandha Supplementation Associated with Improved Sleep, Alertness, Quality of Life

A randomized trial published in *Cureus* found improvement in sleep, alertness, and quality of life among older men and women treated with the herb ashwagandha.*

The trial included 50 men and women between the ages of 65 to 80. Half of the group received **ashwagandha root extract** twice daily and the remainder received a placebo for 12 weeks. Quality of life, daytime sleepiness, sleep quality, and mental alertness upon rising were evaluated at the beginning of the trial, at four and eight weeks, and at the end of the treatment period.

Quality of life, including global, physical, psychological, social, and environmental aspects, significantly improved from baseline levels among the group that received ashwagandha.

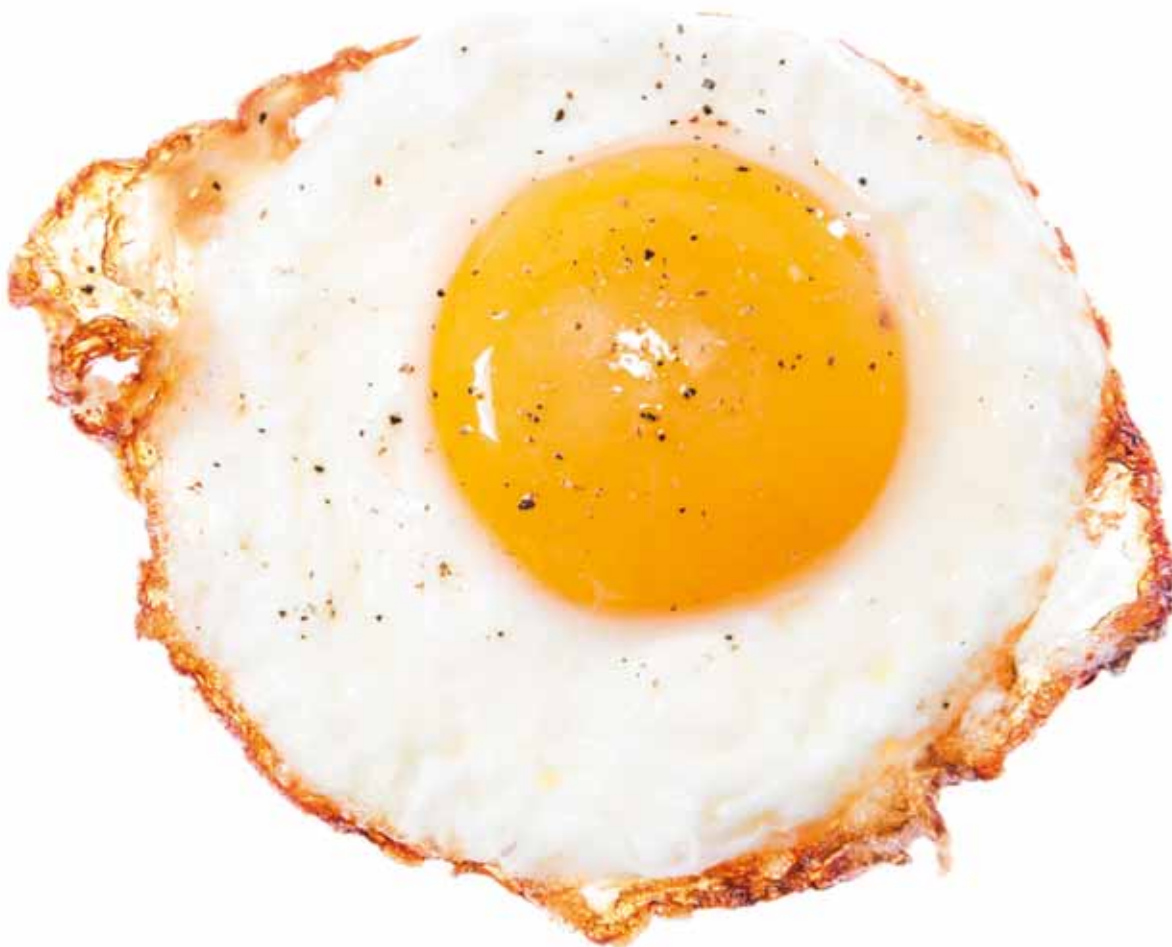
In comparison with the placebo, sleep quality and mental alertness improved in the ashwagandha-treated group.

Ashwagandha was well tolerated and reported as safe and beneficial by those who received it.

Editor's Note: Ashwagandha is one of the most important herbs used in Ayurveda. It has been found to increase testosterone levels and lower cortisol levels in humans, lengthen the life of roundworms, and increase the activity of telomerase, an enzyme that lengthens telomeres (protective genetic material that caps and protects the ends of chromosomes) in cell cultures.

* *Cureus*. 2020 Feb 23;12(2):e7083.





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.

NK

When 6 feet doesn't feel like enough...

We all agree social distancing is smart. But for some of us 6 feet still feels a little too close for comfort.

**Support your immune health
with NK Cell Activator™ from
Life Extension®.**

Encourage NK Cell activity and help to
protect against the immune challenges of
the changing seasons.



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

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.

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.

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.



Restore Youthful Cell Function via **AUTOPHAGY**

BY CELIA SIMMONS



With age, the insides of our cells accumulate damaged proteins and other debris that impair youthful function.

Humans are equipped with a built-in process that removes these toxic waste products to make room for healthy internal regeneration.

This natural, cell housekeeping process is called **autophagy**.

Autophagy *declines* with age and poor diet,¹ causing cells to be damaged at an increasing rate.²

Animal studies show that *stimulating autophagy* leads to improvements in healthspan and *increased longevity*.³⁻⁵

Scientists at **Life Extension®**, in collaboration with the **Insilico Medicine** research group, identified two plant extracts that stimulate **autophagy**.

What Is Autophagy?

Every cell in the body contains **proteins** and other components that serve vital metabolic purposes, from regulating cellular function to facilitating biochemical reactions.

When we are young, our internal cell machinery and its built-in cleaning process (autophagy) work at peak efficiency. This enables younger cells to clean up their metabolic waste.

The literal definition of autophagy is **self-eating**. In this process, the cell consumes and breaks down old cellular parts and debris.

This normal autophagy process supports healthy tissue function and **promotes overall health**.

But aging and poor diet contribute to *lower* rates of autophagy.^{1,4}

As autophagy slows down, metabolic waste products and toxins accumulate. This slowdown compromises optimal cellular function.

The result is that cell health and function rapidly *decline*. This autophagy decline has been linked to many diseases of older age.^{4,6-10}

Boosting Autophagy Extends Healthy Lifespan

In recent years, scientists investigating ways to maximize lifespan and reduce risk of chronic disease have increasingly focused on **autophagy**.^{4,6-9}

In several animal studies, *stimulating* autophagy led to **increased longevity**.³⁻⁵

One study activated **autophagy** in mice by altering gene expression. The **lifespan** of these mice was extended by an average of **17.2%**.⁵

This would be the equivalent of increasing the **average human lifespan** in the U.S. from **78.5 years** to **92 years**.

These animals didn't just live longer. They were also healthier.

They maintained **lower body weight** than normal mice well into older age. They had increased insulin sensitivity, indicating improved metabolic health. And they had better physical functioning.

When the scientists inhibited the **autophagy** process, all these beneficial effects disappeared. That indicates that autophagy stimulation was the factor responsible for the health and longevity improvements.





Ways to Stimulate Autophagy

Research has shown that during times of **intermittent fasting** or **caloric restriction**, when nutrients are scarce, cells activate **autophagy** on their own.^{11,12}

Physical **exercise** also stimulates autophagy.¹³

At a cellular level, two regulatory proteins play a key role in controlling autophagy: **mTOR** and **AMPK**.

The protein **mTOR** acts as a nutrient sensor. When **caloric intake** is high and nutrients are abundant, mTOR is activated and **shuts off** autophagy.¹⁴ Inhibiting excess **mTOR activity**, on the other hand, can lead to **increased autophagy** (removal of cellular waste).

Said differently, constant consumption of **calories** denies aging cells the ability of clean house via **autophagy**. Fasting **16-18 hours** most days can facilitate autophagy, but most people need ancillary support in the form of drugs or nutrients that suppress excess **mTOR**.

AMPK is an **activator** of autophagy. Stimulating AMPK has been shown to improve metabolic health and lifespan.¹⁴⁻¹⁶

Using this knowledge, scientists set out to discover effective ways to stimulate autophagy.

WHAT YOU NEED TO KNOW

Keep Cells Working Smoothly

- Autophagy is a process cells use to remove old and damaged parts and replace them with new ones. This helps keep cells clear of debris, youthful, and fully functional.
- With age comes a decrease in autophagy, combined with an increase in accumulated damage, accelerating the aging process and increasing risk for many chronic diseases.
- Scientists have identified two nutrients that can stimulate autophagy: the flavonoid luteolin and piperlongumine, a compound isolated from the long pepper plant.
- Working in overlapping and distinct ways, these nutrients can help to maintain cells clear of debris, and functioning to promote better health.



Autophagy Enhancers and Senolytics: A Powerful Pair

Cellular **senescence** is a major contributor to the aging process. Senescent cells have become old and dysfunctional but refuse to die off to make room for new, healthy cells.

Compounds called **senolytics** can *remove* these harmful cells from tissues.

One effective senolytic approach is a weekly combination of **quercetin**, **theaflavins**, and **apigenin**, together with the recently *bioavailable* **fisetin**.

Using senolytics *and* nutrients that activate **autophagy** is a way to help fight aging.

Autophagy helps to keep cells healthy and potentially functioning longer, while **senolytics** get rid of cells that are *already* damaged.

These interventions may help keep tissues in peak form and prevent age-related deterioration and disease.

Working with advanced **artificial intelligence (AI) technology**, they focused on two nutrients, **luteolin** and **piperlongumine**.

Each has been shown to induce **autophagy** individually via overlapping and distinct mechanisms.

Luteolin Protects Brain and Body

Luteolin belongs to the **flavonoid** group of plant nutrients. It is found in several fruits, vegetables, and herbs, including broccoli, parsley, and thyme.

Luteolin has been shown to both **increase AMPK** activity and **inhibit mTOR** signaling.¹⁷⁻²⁰ The cumulative effect is that **autophagy** is activated, and cellular metabolism is improved.

In animals and cell culture, treatment with **luteolin** has been shown to protect the brain, heart, and tested cells.²¹⁻²⁹

For example, animals with a **brain injury** fared better than their non-treated counterparts when given **luteolin**.²⁷

Autophagy was activated, inflammation was reduced, and the overall outcome and recovery from the injury were improved.

Piperlongumine Keeps Cells Youthful

Piperlongumine is a compound isolated from the **long pepper** plant.

Like luteolin, piperlongumine has been shown in animal and cell-culture studies to **activate autophagy** by inhibiting mTOR signaling.^{30,31} There is also evidence that it activates AMPK.³²

But piperlongumine encourages autophagy in another way that's distinct from luteolin.

A protein known as **beclin-1** is a critical *activator* of **autophagy**. Another protein, called **Bcl-2**, binds to beclin-1 and *blocks* its ability to start autophagy.

Piperlongumine causes the release of **beclin-1** from Bcl-2, allowing it to activate autophagy.³⁰

Luteolin and piperlongumine hold promise in maximizing healthy autophagy, rejuvenating cells, and maintaining their optimal function.

Summary

Autophagy declines with age and poor diet, causing cells to become overwhelmed by damage and metabolic waste at an increasing rate. This leads to accelerated aging and increased risk for **chronic disease**.

Stimulating autophagy can help prevent this slide into old age, improving the health and extending the lifespan of animals.

Scientists at the **Insilico Medicine** group in collaboration with LifeExtension® have found two nutrients that activate autophagy: **luteolin** and **piperlongumine**.

In overlapping and distinct ways, they stimulate beneficial autophagy. Together, they can help keep cells functioning youthfully for improved 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 is Insilico Medicine?

Discovery of new medicines and nutraceuticals often takes years. Insilico Medicine has created a paradigm shift by using advanced **artificial intelligence** that reduces development time and costs by analyzing thousands of data points to identify nutrients that reduce aging factors.

With over 120 scientists, the Insilico Medicine group uses **deep-learning artificial intelligence technology** to identify compounds to circumvent deleterious aging processes.

A unique aspect of Insilico's research into dietary ingredients is referred to as "geroprotectors" that mimic the young, healthy signaling state in older human tissues. This research has allowed Insilico to identify nutrients that target aging factors such as **cellular senescence**, declining **stem cell health** and reduced **autophagy**. These nutrient-based "geroprotectors" provide research-driven data to create formulations that foster longevity and increased lifespan.

In addition to nutrient discovery, Insilico works with global pharma and biotech to discover new therapeutics to treat cancer, immune dysfunction and senescence



References

1. Cuervo AM, Bergamini E, Brunk UT, et al. Autophagy and aging: the importance of maintaining “clean” cells. *Autophagy*. 2005 Oct-Dec;1(3):131-40.
2. Martinez-Lopez N, Athonvarangkul D, Singh R. Autophagy and aging. *Adv Exp Med Biol*. 2015;847:73-87.
3. Fernandez AF, Sebt S, Wei Y, et al. Disruption of the beclin 1-BCL2 autophagy regulatory complex promotes longevity in mice. *Nature*. 2018 Jun;558(7708):136-40.
4. Hansen M, Rubinsztein DC, Walker DW. Autophagy as a promoter of longevity: insights from model organisms. *Nat Rev Mol Cell Biol*. 2018 Sep;19(9):579-93.
5. Pyo JO, Yoo SM, Ahn HH, et al. Overexpression of Atg5 in mice activates autophagy and extends lifespan. *Nat Commun*. 2013;4:2300.
6. Abdellatif M, Sedej S, Carmona-Gutierrez D, et al. Autophagy in Cardiovascular Aging. *Circ Res*. 2018 Sep 14;123(7):803-24.
7. Nakamura S, Yoshimori T. Autophagy and Longevity. *Mol Cells*. 2018 Jan 31;41(1):65-72.
8. Ren J, Zhang Y. Targeting Autophagy in Aging and Aging-Related Cardiovascular Diseases. *Trends Pharmacol Sci*. 2018 Dec;39(12):1064-76.
9. Wong SQ, Kumar AV, Mills J, et al. Autophagy in aging and longevity. *Hum Genet*. 2020 Mar;139(3):277-90.
10. Xie Z, Klionsky DJ. Autophagosome formation: core machinery and adaptations. *Nat Cell Biol*. 2007 Oct;9(10):1102-9.
11. Madeo F, Carmona-Gutierrez D, Hofer SJ, et al. Caloric Restriction Mimetics against Age-Associated Disease: Targets, Mechanisms, and Therapeutic Potential. *Cell Metab*. 2019 Mar 5;29(3):592-610.
12. Mattson MP, Moehl K, Ghena N, et al. Intermittent metabolic switching, neuroplasticity and brain health. *Nat Rev Neurosci*. 2018 Feb;19(2):63-80.
13. Vainshtein A, Hood DA. The regulation of autophagy during exercise in skeletal muscle. *J Appl Physiol (1985)*. 2016 Mar 15;120(6):664-73.
14. Kim J, Kundu M, Viollet B, et al. AMPK and mTOR regulate autophagy through direct phosphorylation of Ulk1. *Nat Cell Biol*. 2011 Feb;13(2):132-41.
15. Burkewitz K, Weir HJ, Mair WB. AMPK as a Pro-longevity Target. *Exp Suppl*. 2016;107:227-56.
16. Li Y, Chen Y. AMPK and Autophagy. *Adv Exp Med Biol*. 2019;1206: 85-108.
17. Ou HC, Pandey S, Hung MY, et al. Luteolin: A Natural Flavonoid Enhances the Survival of HUVECs against Oxidative Stress by Modulating AMPK/PKC Pathway. *Am J Chin Med*. 2019;47(3): 541-57.
18. Wang Q, Wang H, Jia Y, et al. Luteolin reduces migration of human glioblastoma cell lines via inhibition of the p-IGF-1R/PI3K/AKT/mTOR signaling pathway. *Oncol Lett*. 2017 Sep;14(3):3545-51.
19. Zhang L, Han YJ, Zhang X, et al. Luteolin reduces obesity-associated insulin resistance in mice by activating AMPK α 1 signalling in adipose tissue macrophages. *Diabetologia*. 2016 Oct;59(10):2219-28.
20. Zhang X, Zhang QX, Wang X, et al. Dietary luteolin activates browning and thermogenesis in mice through an AMPK/PGC1 α pathway-mediated mechanism. *Int J Obes (Lond)*. 2016 Dec;40(12):1841-9.
21. Cao Z, Zhang H, Cai X, et al. Luteolin Promotes Cell Apoptosis by Inducing Autophagy in Hepatocellular Carcinoma. *Cell Physiol Biochem*. 2017;43(5):1803-12.
22. Gelabert-Rebato M, Wiebe JC, Martin-Rincon M, et al. Enhancement of Exercise Performance by 48 Hours, and 15-Day Supplementation with Mangiferin and Luteolin in Men. *Nutrients*. 2019 Feb 6;11(2).
23. Hu J, Man W, Shen M, et al. Luteolin alleviates post-infarction cardiac dysfunction by up-regulating autophagy through Mst1 inhibition. *J Cell Mol Med*. 2016 Jan;20(1):147-56.
24. Liao Y, Xu Y, Cao M, et al. Luteolin Induces Apoptosis and Autophagy in Mouse Macrophage ANA-1 Cells via the Bcl-2 Pathway. *J Immunol Res*. 2018;2018:4623919.
25. Luo Y, Shang P, Li D. Luteolin: A Flavonoid that Has Multiple Cardio-Protective Effects and Its Molecular Mechanisms. *Front Pharmacol*. 2017;8:692.
26. Verschooten L, Barrette K, Van Kelst S, et al. Autophagy inhibitor chloroquine enhanced the cell death inducing effect of the flavonoid luteolin in metastatic squamous cell carcinoma cells. *PLoS One*. 2012;7(10):e48264.
27. Xu J, Wang H, Lu X, et al. Posttraumatic administration of luteolin protects mice from traumatic brain injury: implication of autophagy and inflammation. *Brain Res*. 2014 Sep 25;1582:237-46.
28. You Y, Wang R, Shao N, et al. Luteolin suppresses tumor proliferation through inducing apoptosis and autophagy via MAPK activation in glioma. *Oncol Targets Ther*. 2019;12:2383-96.
29. Aziz N, Kim MY, Cho JY. Anti-inflammatory effects of luteolin: A review of in vitro, in vivo, and in silico studies. *J Ethnopharmacol*. 2018 Oct 28;225:342-58.
30. Liu J, Liu W, Lu Y, et al. Piperlongumine restores the balance of autophagy and apoptosis by increasing BCL2 phosphorylation in rotenone-induced Parkinson disease models. *Autophagy*. 2018;14(5):845-61.
31. Makhov P, Golovine K, Teper E, et al. Piperlongumine promotes autophagy via inhibition of Akt/mTOR signalling and mediates cancer cell death. *Br J Cancer*. 2014 Feb 18;110(4):899-907.
32. Ryu J, Kim MJ, Kim TO, et al. Piperlongumine as a potential activator of AMP-activated protein kinase in HepG2 cells. *Nat Prod Res*. 2014;28(22):2040-3.





THiNK
ZiNC

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

If you don't know by now that zinc promotes healthy immune response (as well as a bunch of other body processes), it's time to get with the program. This formula gives you **50 mg** of zinc in a convenient, vegetarian capsule. Promote immune, heart, and neurological health with Zinc Caps. **What a good idea!**



Item #01813

50 mg • 90 vegetarian capsules

1 bottle \$6.75 • 4 bottles \$6 each



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.



Don't Weight Around

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.

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



Item #02478
60 vegetarian capsules
Two-month supply
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

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.

ACTIVATE CELLULAR

Autophagy

Help Your Cells
Remove Internal
Debris



GEROPROTECT® Autophagy Renew stimulates the body's natural "cellular cleanup" process essential to youthful cellular function and overall health.

Artificial Intelligence was one of the tools utilized by researchers to help identify the best nutrients in this advanced formulation.

This new longevity formula contains **luteolin** and **piperlongumine** to:

- Promote ongoing cellular housekeeping
- Encourage healthy cell debris removal
- Inhibit mTOR signaling

Activating **autophagy** supports healthy cellular function and longevity.

Item #02415 • 30 vegetarian capsules

1 bottle **\$19.50** • 4 bottles \$17.50 each

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



GLUTEN FREE



†Developed in collaboration with Insilico Medicine, 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.



Mg

Magnesium's Role in HEART HEALTH

BY MICHAEL DOWNEY



Magnesium is a hard-working mineral.

It helps **300 enzymes** perform vital functions throughout the body.

Magnesium's benefits range from building bone to producing energy and synthesizing proteins.¹

But it doesn't stop there.

It also helps prevent an array of **cardiovascular disorders**.

Dietary surveys have shown *deficient* intake of **magnesium** is epidemic in the United States.

Data from the *National Health and Nutrition Examination Survey* show that **48%** of Americans of all ages have intake *below* the **estimated average requirement**.^{1,2}

Inadequate magnesium levels have been linked with an increased risk for cardiovascular disease, including stroke, coronary heart disease, heart failure, arrhythmias, and death.^{3,4}

Higher blood levels of **magnesium** are associated with a *lower* cardiovascular disease risk.⁴

Hidden Danger of Low Magnesium

Magnesium is a mineral found in many foods, including leafy vegetables, whole grains, beans, nuts, yogurt, and fish.

But it's difficult to get and **absorb** enough from dietary sources alone.

Approximately **64%** of all men and **67%** of women in the U.S. have inadequate dietary intake of magnesium. Among those above age 71, roughly **81%** of men and **82%** of women have inadequate dietary intake of magnesium.^{5,6}

That's a serious problem.

Magnesium is involved in critical metabolic functions.⁷ This means that myriad bodily systems and functions *depend* on **adequate** magnesium and suffer when **deficiency** occurs.⁵

Adequate magnesium is especially important for healthy and efficient function of **heart muscle** and **blood vessels**.

Recent human studies confirm a strong association between *low* magnesium levels and *higher* heart disease risk.⁵



Correcting Arrhythmias

People with *low* magnesium levels are *more* susceptible to developing **arrhythmias**, potentially fatal disorders of heart rhythm.⁸

Arrhythmias involve abnormal conduction of the electrical impulses that govern heartbeat, causing a beat that is irregular, too fast, or too slow.⁹

Atrial fibrillation, an irregular and often rapid heartbeat, is the leading cardiac cause of **strokes**. This happens when a fluttering **atrial** chamber in the heart causes a clot (thrombus) to form that travels up a carotid artery and blocks blood flow to a portion of the brain. This is called an **ischemic stroke**; the term "ischemia" means "**no blood flow**".

One large study found that people with the lowest blood magnesium levels were approximately **50% more likely** to develop **atrial fibrillation** than those with the *highest* levels. This association occurs even in people *without* cardiovascular disease.¹⁰

Magnesium intake has been shown to correct low-magnesium-related arrhythmias.^{11,12}

For example, intravenous (IV) magnesium is routinely used *before* many heart surgeries that are known to induce postoperative arrhythmias.¹³⁻¹⁷

Oral magnesium is often recommended for those with arrhythmias and low magnesium levels.

Fighting Endothelial Dysfunction

Endothelial dysfunction occurs when the cells lining the inside walls of blood vessels (the **endothelium**) lose normal, healthy function.¹⁸

This promotes the formation of artery-blocking plaque, resulting in **atherosclerosis**, a narrowing of the arteries that restricts blood flow.^{19,20}

In cultured human endothelial cells, magnesium *deficiency* activates the protein complex **NF-kB** (nuclear factor kappa B), a major facilitator of atherosclerosis.²¹

In a randomized, controlled human trial, women aged 40-65, all of whom had high blood pressure and were on diuretic therapy, took either a placebo or **600 mg of magnesium** daily.²²

After six months, those taking magnesium had significantly improved **endothelial function**, which led to *reductions* in blood pressure and *increased blood vessel dilation* (widening).

Systolic blood pressure fell, on average, from **144 mmHg** to **134 mmHg**, and diastolic blood pressure decreased from **88 mmHg** to **81 mmHg**.



In addition, the thickness of the carotid artery—a measure of unhealthy arterial thickening—rose in placebo patients but remained unchanged in magnesium-treated patients.²² Thickening of the carotid artery indicates progression of atherosclerosis.

Preventing Heart Failure

Heart failure occurs when the heart doesn't pump enough blood to meet the body's needs.

Currently there are about **6.2 million** adults in the U.S. with **heart failure**.²³

In one study of 22 patients with symptomatic chronic heart failure, an **800 mg/day** dose of magnesium for three months produced a significant *increase* in **arterial compliance** (a measure of how well an artery can relax and contract in response to blood flow).²⁴

This suggests improved **endothelial function** and improved ability of the arteries to deliver oxygen-rich blood to target organs.

Blood levels of magnesium are *also* strongly associated with cardiovascular risk.

An epidemiological study of 3,523 men aged 60-79, with no prior history of cardiovascular disease, demonstrated that **risk for heart failure** declined steadily with rising magnesium levels.²⁵

WHAT YOU NEED TO KNOW

The Cardiovascular Benefits of Magnesium

- **Magnesium** is a mineral needed for at least **300 enzymes** throughout the body to perform their metabolic functions.
- Human studies confirm a strong association between *low* magnesium levels and *higher* risks of **cardiovascular diseases**.
- Almost half of Americans of all ages are below the estimated average requirement for magnesium.
- Human studies demonstrate that taking **oral magnesium** helps ward off cardiovascular problems and supports overall heart health.

Heartburn Drugs Linked to Dangerously Low Magnesium

The U.S. Food and Drug Administration has advised doctors to check patients' magnesium levels *before* prescribing medications known as **proton-pump inhibitors** or **PPIs**.³⁸

Proton-pump inhibitors like Prevacid®, Prilosec®, and Nexium® are taken for the treatment of **heartburn**, also known as **gastroesophageal reflux disease (GERD)**. They are also used to treat peptic ulcer disease.

A scientific review of 35 studies from 2010 to 2018 suggests that, in some people, taking proton-pump inhibitors *causes* low magnesium levels.³⁹

These low levels are associated with increased risk of **cardiac arrhythmias**, and with one often-deadly type in particular, **tor-sade de pointes** (or **TdP**), which can result in sudden **cardiac arrest**.³⁹

Talk to a doctor about whether to check your magnesium levels before taking proton-pump inhibitors.

Those with the *highest* magnesium blood levels had a **44% lower** risk of heart failure than those with the lowest levels. Higher magnesium levels in this study were associated with reduced markers of **inflammation** and **endothelial dysfunction**.²⁵

Reducing High Blood Pressure

Excess body weight, lack of physical activity, diabetes, and normal aging increase the chances of developing high blood pressure.^{26,27}

A link between magnesium and hypertension has been shown in several human clinical trials.²⁸⁻³⁰

These studies show that the *lower* the magnesium level in patients, the *higher* the systolic blood pressure.

One meta-analysis of trials that enrolled more than 2,000 subjects, found that supplementation with magnesium reduced **systolic** and **diastolic blood pressure** in hypertensive patients.³¹

Those who fail to achieve optimal systolic blood pressure under 120 to 130 mm Hg should consider an anti-hypertension drug like telmisartan.



Lowering Heart Attack and Stroke Risk

Human studies also demonstrate an association between *low* magnesium and *increased* risk of heart attack and stroke.^{6,32-35}

In one analysis of human trials that included a whopping **241,378 participants**, researchers found that every **100 mg** of **magnesium** in the daily diet was associated with an **8% lower** risk of **stroke**.³⁴

A similar association was found in a later published meta-analysis.³⁵

Combating Coronary Artery Disease

Coronary artery disease occurs when the arteries to the heart become narrowed due to atherosclerotic plaque. This reduces blood flow and significantly boosts the risk of a heart attack.

It is the leading cause of death in men and women in the U.S.³⁶

Magnesium intake has been shown to improve heart function *and* exercise tolerance in patients with coronary artery disease.

In one study, scientists gave 53 men with coronary artery disease **365 mg** of **oral magnesium citrate** **twice daily**. After six months, they had improved oxygen utilization during exercise and greater pumping action in their left ventricle, the heart's main pumping chamber.³⁷

These effects indicate that magnesium improved blood flow and oxygen delivery in these patients.

Summary

The mineral **magnesium** is vital for **heart health**.

More than **80%** of people over **age 71** have inadequate dietary intake of magnesium, placing them at risk for serious cardiovascular events.

Cardiovascular disease, including stroke, coronary heart disease, heart failure, arrhythmias, and even death, has been associated with inadequate magnesium levels.

Low-cost **magnesium supplements** offer an easy solution to replenish this essential mineral. •

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. Available at: <https://ods.od.nih.gov/factsheets/Magnesium-Health-Professional/>. Accessed December 9, 2020.
2. Available at: https://www.ars.usda.gov/ARSTUserFiles/80400530/pdf/usual/Usual_Intake_gender_WWEIA_2013_2016.pdf. Accessed December 9, 2020.
3. DiNicolantonio JJ, Liu J, O'Keefe JH. Magnesium for the prevention and treatment of cardiovascular disease. *Open Heart*. 2018;5(2):e000775.
4. Rosique-Esteban N, Guasch-Ferre M, Hernandez-Alonso P, et al. Dietary Magnesium and Cardiovascular Disease: A Review with Emphasis in Epidemiological Studies. *Nutrients*. 2018 Feb 1;10(2):168.
5. Kostov K, Halacheva L. Role of Magnesium Deficiency in Promoting Atherosclerosis, Endothelial Dysfunction, and Arterial Stiffening as Risk Factors for Hypertension. *Int J Mol Sci*. 2018 Jun 11;19(6).
6. Qu X, Jin F, Hao Y, et al. Magnesium and the risk of cardiovascular events: a meta-analysis of prospective cohort studies. *PLoS One*. 2013;8(3):e57720.
7. Workinger JL, Doyle RP, Bortz J. Challenges in the Diagnosis of Magnesium Status. *Nutrients*. 2018 Sep 1;10(9):1202.
8. Tangvoraphonkchai K, Davenport A. Magnesium and Cardiovascular Disease. *Adv Chronic Kidney Dis*. 2018 May;25(3):251-60.
9. Available at: <https://www.nhlbi.nih.gov/health-topics/arrhythmia>. Accessed December 9, 2020.
10. Khan AM, Lubitz SA, Sullivan LM, et al. Low serum magnesium and the development of atrial fibrillation in the community: the Framingham Heart Study. *Circulation*. 2013 Jan 1;127(1):33-8.
11. Agus ZS. Hypomagnesemia. *J Am Soc Nephrol*. 1999 Jul;10(7):1616-22.
12. Efstratiadis G, Sarigianni M, Gougourelas I. Hypomagnesemia and cardiovascular system. *Hippokratia*. 2006 Oct;10(4):147-52.
13. Classen HG, Grober U, Kisters K. [Drug-induced magnesium deficiency]. *Med Monatsschr Pharm*. 2012 Aug;35(8):274-80.
14. Miller S, Crystal E, Garfinkle M, et al. Effects of magnesium on atrial fibrillation after cardiac surgery: a meta-analysis. *Heart*. 2005 May;91(5):618-23.
15. Shechter M. Magnesium and cardiovascular system. *Magnes Res*. 2010 Jun;23(2):60-72.
16. Lee HY, Ghimire S, Kim EY. Magnesium supplementation reduces postoperative arrhythmias after cardiopulmonary bypass in pediatrics: a metaanalysis of randomized controlled trials. *Pediatr Cardiol*. 2013 Aug;34(6):1396-403.
17. Orenes-Pinero E, Montoro-Garcia S, Banerjee A, et al. Pre and post-operative treatments for prevention of atrial fibrillation after cardiac surgery. *Mini Rev Med Chem*. 2012 Nov;12(13):1419-31.
18. Sun HJ, Wu ZY, Nie XW, et al. Role of Endothelial Dysfunction in Cardiovascular Diseases: The Link Between Inflammation and Hydrogen Sulfide. *Front Pharmacol*. 2019;10:1568.



19. Cunha AR, Umbelino B, Correia ML, et al. Magnesium and vascular changes in hypertension. *Int J Hypertens*. 2012;2012:754250.
20. Mudau M, Genis A, Lochner A, et al. Endothelial dysfunction: the early predictor of atherosclerosis. *Cardiovasc J Afr*. 2012 May;23(4):222-31.
21. Ferre S, Baldoli E, Leidi M, et al. Magnesium deficiency promotes a pro-atherogenic phenotype in cultured human endothelial cells via activation of NFkB. *Biochim Biophys Acta*. 2010 Nov;1802(11):952-8.
22. Cunha AR, D'El-Rei J, Medeiros F, et al. Oral magnesium supplementation improves endothelial function and attenuates subclinical atherosclerosis in thiazide-treated hypertensive women. *J Hypertens*. 2017 Jan;35(1):89-97.
23. Virani SS, Alonso A, Benjamin EJ, et al. Heart Disease and Stroke Statistics-2020 Update: A Report From the American Heart Association. *Circulation*. 2020 Mar 3;141(9):e139-e596.
24. Fuentes JC, Salmon AA, Silver MA. Acute and chronic oral magnesium supplementation: effects on endothelial function, exercise capacity, and quality of life in patients with symptomatic heart failure. *Congest Heart Fail*. 2006 Jan-Feb;12(1):9-13.
25. Wannamethee SG, Papacosta O, Lennon L, et al. Serum magnesium and risk of incident heart failure in older men: The British Regional Heart Study. *Eur J Epidemiol*. 2018 Sep;33(9):873-82.
26. Available at: https://www.cdc.gov/dhdsdp/data_statistics/fact_sheets/fs_bloodpressure.htm. Accessed January 28, 2018.
27. Available at: <https://www.webmd.com/hypertension-high-blood-pressure/guide/blood-pressure-causes>. Accessed January 28, 2019.
28. Ma J, Folsom AR, Melnick SL, et al. Associations of serum and dietary magnesium with cardiovascular disease, hypertension, diabetes, insulin, and carotid arterial wall thickness: the ARIC study. Atherosclerosis Risk in Communities Study. *J Clin Epidemiol*. 1995 Jul;48(7):927-40.
29. Rosanoff A. Magnesium supplements may enhance the effect of antihypertensive medications in stage 1 hypertensive subjects. *Magnes Res*. 2010 Mar;23(1):27-40.
30. Whang R, Chrysant S, Dillard B, et al. Hypomagnesemia and hypokalemia in 1,000 treated ambulatory hypertensive patients. *J Am Coll Nutr*. 1982;1(4):317-22.
31. Zhang X, Li Y, Del Gobbo LC, et al. Effects of Magnesium Supplementation on Blood Pressure: A Meta-Analysis of Randomized Double-Blind Placebo-Controlled Trials. *Hypertension*. 2016 Aug;68(2):324-33.
32. DiNicolantonio JJ, O'Keefe JH, Wilson W. Subclinical magnesium deficiency: a principal driver of cardiovascular disease and a public health crisis. *Open Heart*. 2018;5(1):e000668.
33. Grober U, Schmidt J, Kisters K. Magnesium in Prevention and Therapy. *Nutrients*. 2015 Sep 23;7(9):8199-226.
34. Larsson SC, Orsini N, Wolk A. Dietary magnesium intake and risk of stroke: a meta-analysis of prospective studies. *Am J Clin Nutr*. 2012 Feb;95(2):362-6.
35. Zhao B, Hu L, Dong Y, et al. The Effect of Magnesium Intake on Stroke Incidence: A Systematic Review and Meta-Analysis With Trial Sequential Analysis. *Front Neurol*. 2019;10:852.
36. Available at: <https://medlineplus.gov/coronaryartery-disease.html>. Accessed December 9, 2020.
37. Pokan R, Hofmann P, von Duvillard SP, et al. Oral magnesium therapy, exercise heart rate, exercise tolerance, and myocardial function in coronary artery disease patients. *Br J Sports Med*. 2006 Sep;40(9):773-8.
38. Available at: <https://www.fda.gov/drugs/drug-safety-and-availability/fda-drug-safety-communication-low-magnesium-levels-can-be-associated-long-term-use-proton-pump>. Accessed December 9, 2020.
39. Chrysant SG. Proton pump inhibitor-induced hypomagnesemia complicated with serious cardiac arrhythmias. *Expert Rev Cardiovasc Ther*. 2019 May;17(5):345-51.



Love the **you** in the Mirror

AMPK is an *enzyme* in the body that signals cells to burn **fat** for energy.

Over time, AMPK levels decline and can cause accumulation of **abdominal fat**.

AMPK Metabolic Activator provides gynostemma and hesperidin extracts to:

- Revitalize youthful AMPK activity
- Encourage use of abdominal fat for energy
- Promote healthy cellular metabolism



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.





OPTIMIZE DIGESTION *and* INTESTINAL BALANCE

The body's production of **digestive enzymes** decreases with age, leading to diminished nutrient absorption and bloating, as well as other intestinal discomforts—especially after eating a large meal.

Enhanced Super Digestive Enzymes and Probiotics provides a broad range of **enzymes** required to help break down **proteins, fats, carbohydrates**, and other food nutrients—including enzymes that specifically target the cell structures of **plant-based foods**.

This comprehensive **digestive support** formula provides the added benefits of the **probiotic** *Lactospore® B. coagulans*.

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



Item #02022 • 60 vegetarian capsules

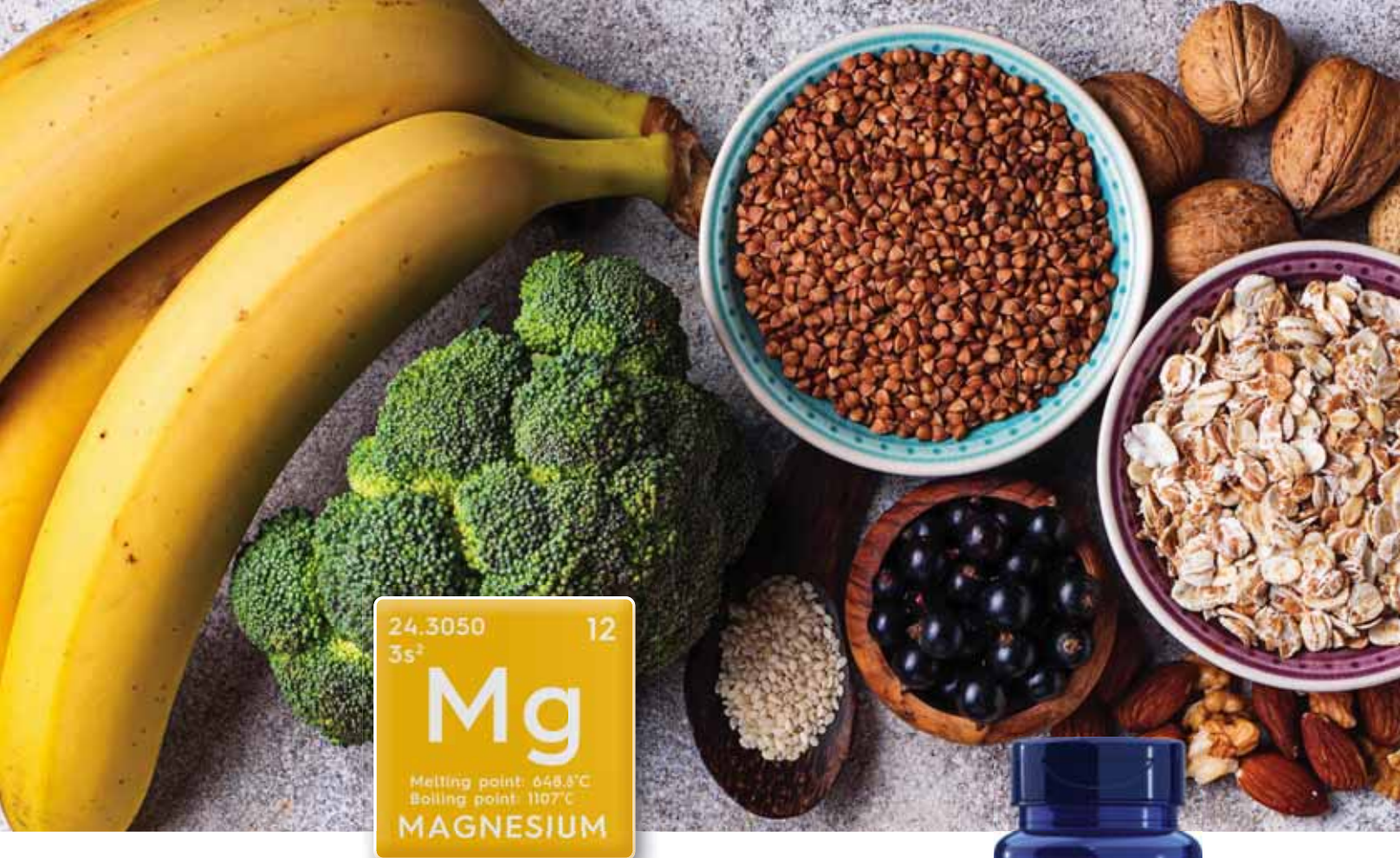
1 bottle \$21

2 bottles \$19.50 each



Lactospore® is a registered trademark of Sabinsa Corp.

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.



EXTEND-RELEASE MAGNESIUM

When You Need It

Unique delivery system provides immediate and extended-release magnesium for full-body coverage of this essential mineral.

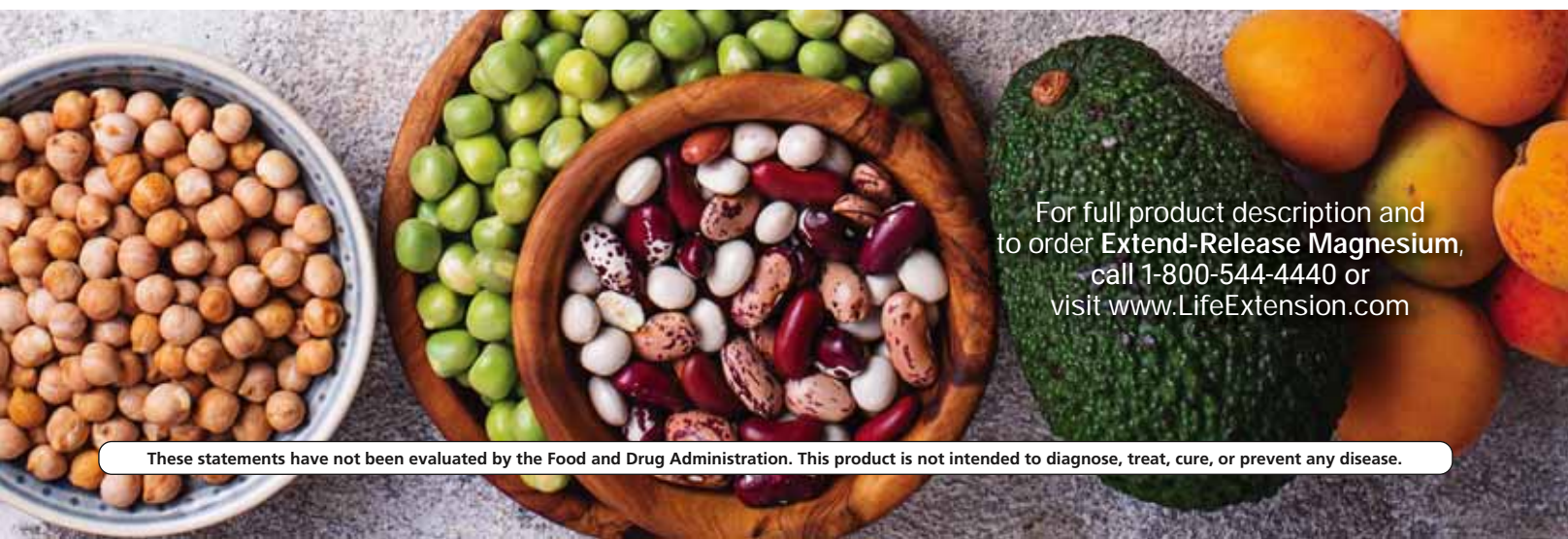
CAUTION: If taken in high doses, magnesium may have a laxative effect.
If this occurs, divide dosing, reduce intake, or discontinue product.

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



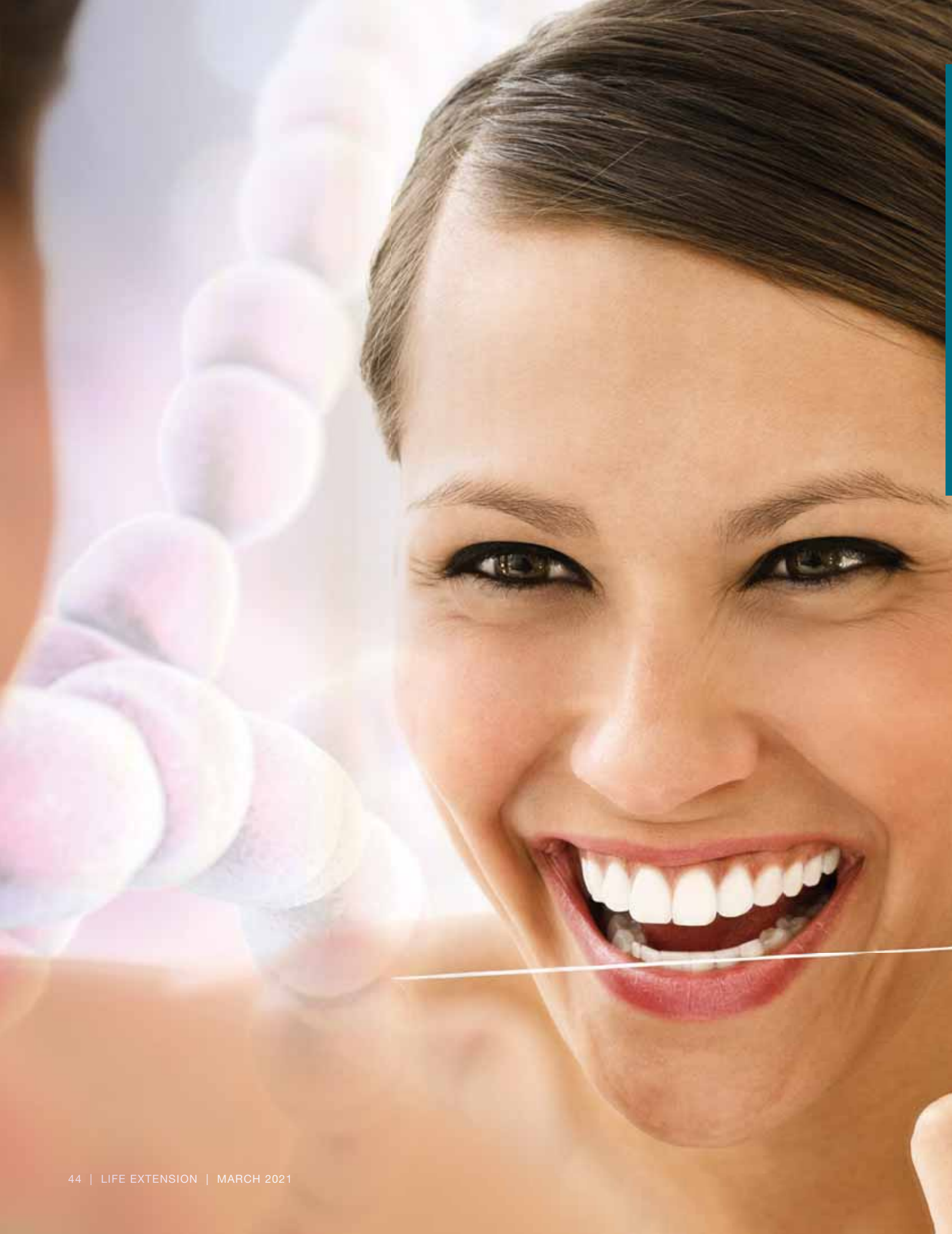
Item #02107 • 60 vegetarian capsules

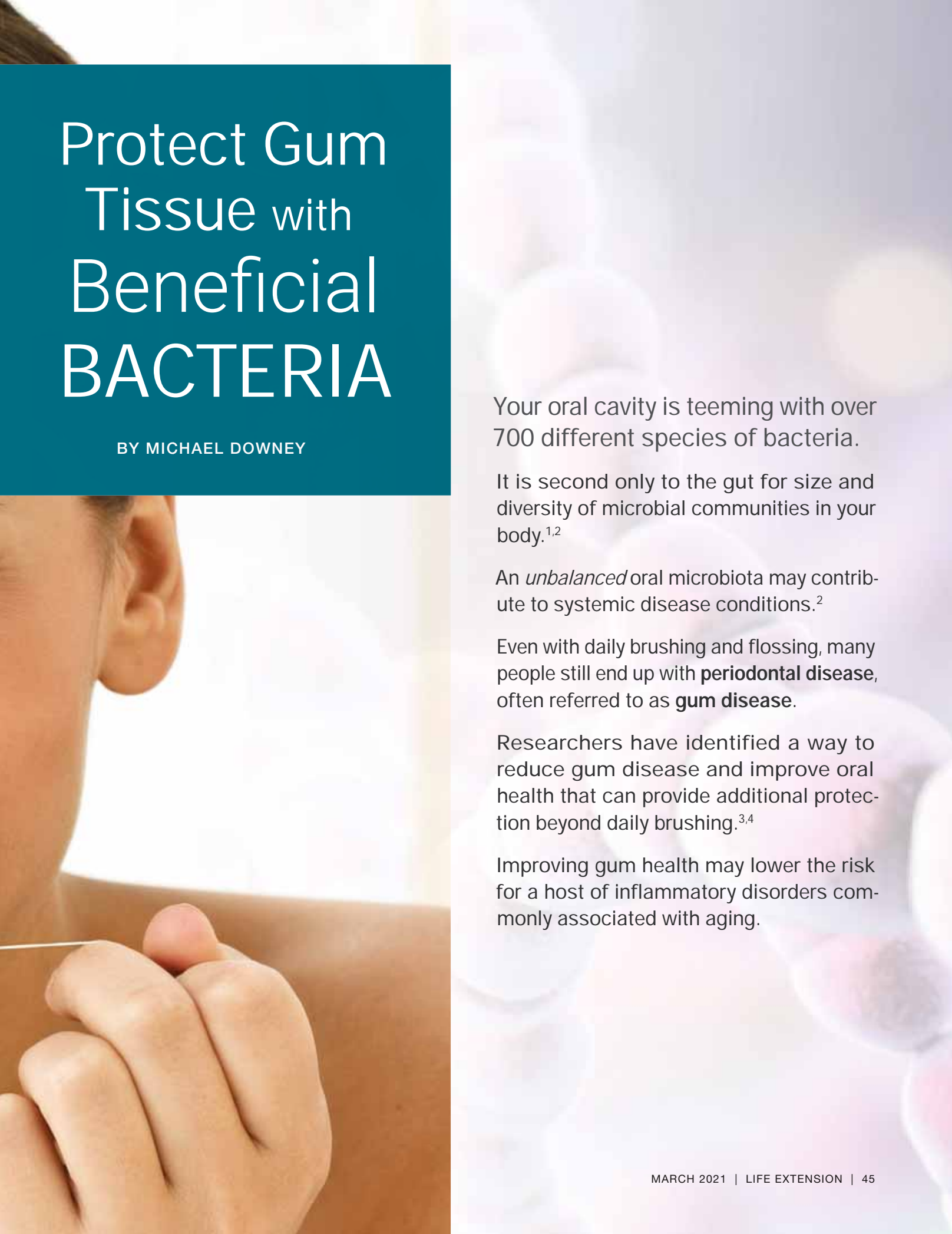
1 bottle **\$9.75** • 4 bottles \$8.75 each



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.





Protect Gum Tissue with Beneficial BACTERIA

BY MICHAEL DOWNEY

Your oral cavity is teeming with over 700 different species of bacteria.

It is second only to the gut for size and diversity of microbial communities in your body.^{1,2}

An *unbalanced* oral microbiota may contribute to systemic disease conditions.²

Even with daily brushing and flossing, many people still end up with **periodontal disease**, often referred to as **gum disease**.

Researchers have identified a way to reduce gum disease and improve oral health that can provide additional protection beyond daily brushing.^{3,4}

Improving gum health may lower the risk for a host of inflammatory disorders commonly associated with aging.

Gum Disease Threatens the Whole Body

More than **47%** of people over age 30 have **gum disease**. After age 65, the rate rises to a shocking **70%**.⁵

Gum disease, or **periodontal disease**, is associated with disorders throughout the body, including cardiovascular, lung, kidney, bone, and Alzheimer's diseases.

An underlying link is periodontal disease's effect on the **oral microbiota**, the natural community of microbes living in the oral cavity.

When healthy, the oral microbiota supports and protects the delicate mucous membranes as well as the surface of the teeth themselves.

However, inadequate oral hygiene, as well as poor diet and lifestyle factors, drugs, and disease, can disrupt this balance. The resulting microbial imbalance—often called **dysbiosis**—allows excessive growth of pathogenic (disease-causing) organisms in the oral cavity.

This, in turn, disrupts the mouth's immune system and creates a vicious cycle that can have disastrous effects on many body systems,⁶ causing diseases in parts of the body far removed from the mouth itself.⁷

Two Beneficial Bacteria Halt Gum Disease

Probiotics are beneficial live bacteria. They have been used for years to rebalance the **gut microbiota**, supporting the growth of helpful organisms and crowding out harmful ones.

The **oral cavity** holds the *second largest and diverse microbiota* after the gut.¹

Beneficial bacteria reduce the dangerous strains, which allows a wider range and number of beneficial microbes to succeed.

After studying numerous types of bacteria, scientists identified **two specific strains** that can restore oral health and halt the process of periodontal disease:^{3,8,9}

- ***Lactobacillus plantarum* L-137**, which boosts oral immune function and promotes healing, and
- ***Streptococcus salivarius* M18**, which kills harmful oral bacteria and then flourishes.

Beneficial Effects

Scientists conducted research into understanding how these two bacteria promote oral health.

They found that a heat-treated form of ***Lactobacillus plantarum* L-137** could improve the immune system's fighting ability.³

In a rat model of metabolic syndrome, oral treatment with ***L. plantarum* L-137** was shown to have **anti-inflammatory** effects on cardiac and fat tissue. That resulted in *reduced*:¹⁰

- Heart dysfunction,
- Accumulation of fat mass under the skin,
- Insulin resistance (a cause of high blood sugar), and
- Levels of pro-inflammatory **IL-6**.

The probiotic ***Streptococcus salivarius* M18** was shown to:

- Colonize the human mouth to generate healthy bacteria to compete with harmful bacteria,^{8,9}
- Generate bacteria-suppressing weapons called *bacteriocins*, which function like antibiotics at the local level,¹¹⁻¹³ to inhibit tooth and **gum disease**—producing organisms,^{8,12-14}



- Produce the enzymes **dextranase** and **urease**, which break down dental plaque,⁸
- Promote a neutral oral **pH**, which supports the oral microbiota,⁸ and
- Reduce **IL-6**, lowering the inflammation that accelerates gum disease and threatens the body.⁸

Researchers then set out to validate these strains in **clinical** trials.

***L. plantarum* L-137** **Fights Gum Disease**

Scientists conducted a controlled, randomized trial of ***L. plantarum* L-137** on 39 volunteers with chronic **periodontitis**.³

Some participants received a placebo. Others took a capsule containing heat-treated ***L. plantarum* L-137**.³

Researchers used a periodontal probe to measure the **pocket depth**, the distance from the gum line to the bottom of the tiny pocket between the gum and tooth root. Healthy gum pockets are **3 mm** or less, while a depth of **4 mm** or more is clinically defined as **periodontal disease**.¹⁵

After 12 weeks, those treated with ***L. plantarum*** had a **64%** greater improvement in pocket depth than placebo recipients.³

These results demonstrate that periodontal disease can be improved with ***L. plantarum* L-137**.

S. Salivarius **Improves Oral Health**

Reducing pocket depth is just one piece of the periodontal disease puzzle, another is dental plaque.

One clinical trial showed that **88%** of ***S. salivarius*** recipients maintained **plaque** scores *lower* than their pretreatment values after a three-month treatment period, compared with **44%** of placebo recipients.⁸

Investigators then conducted a trial to test how ***S. salivarius* M18** affected broader parameters of oral health.⁴

Scientists recruited men and women, aged 20-60, with moderate or severe **gingivitis** (inflammation of the gums) and moderate **periodontitis**.

For 30 days, half received no treatment, and half took lozenges containing **200 million** bacteria of the ***S. salivarius* M18** strain daily after brushing.⁴



WHAT YOU NEED TO KNOW

Beneficial Bacteria Promote Oral Health

- **Gum disease** is extremely common in older adults. It often leads to bleeding gums and tooth loss.
- Gum disease is associated with body-wide health problems, including cardiovascular disease, lung and kidney diseases, cancer, and others.
- Maintaining a healthy and balanced **oral microbiota** protects against gum disease.
- A heat-treated form of the probiotic strain ***L. plantarum* L-137** *boosts* oral immune function, reducing inflammation and promoting healing.
- The probiotic strain ***S. salivarius* M18** has been documented to rebalance the bacterial populations of the mouth, improving oral health.
- Taken daily, these two beneficial bacteria can help prevent gum disease, enhancing oral *and* total body health.

On the last day of treatment, compared to the untreated group, those in the ***S. salivarius* M18** group had:⁴

- **44%** lower mean **plaque index** scores,
- **42%** lower mean **gingival index** scores (which assess the prevalence and severity of gingivitis),
- **53%** lower modified **sulcus bleeding index** scores (a measurement of gum bleeding), and
- **20%** lower **pocket depth** measurements.

Treatment was then stopped, and measurements were taken 30 days later. Even then, *a month after treatment had ended*, the lozenge group had:⁴

- **37%** lower mean **plaque index** scores,
- **35%** lower mean **gingival index** scores,
- **51%** lower modified **sulcus bleeding index** scores, and
- **22%** lower probing **pocket depth** measurements.

This means that the probiotic lozenge significantly improved periodontal health—and sustained these benefits long after treatment stopped.

Summary

Gum disease affects more than **70%** of older adults. It often leads to tooth loss and is associated with an increased risk of serious disorders throughout the body.

A cofactor in the development of periodontal disease is an imbalance in the normal microbial community of the oral cavity.

Scientists have shown that a heat-treated form of the probiotic strain ***L. plantarum* L-137** boosts oral immune function, reduces inflammation, and promotes healing.

A second probiotic strain, ***S. salivarius* M18**, rebalances the bacterial populations of the mouth, crowding out harmful microbes.

Studies show that these two beneficial bacteria strains help prevent gum disease and protect oral *and* total body health.

The ideal time to initiate **oral probiotics** is after a professional teeth cleaning.



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. Deo PN, Deshmukh R. Oral microbiome: Unveiling the fundamentals. *Journal of oral and maxillofacial pathology : JOMFP*. 2019 Jan-Apr;23(1):122-8.
2. Gao L, Xu T, Huang G, et al. Oral microbiomes: more and more importance in oral cavity and whole body. *Protein & cell*. 2018;9(5):488-500.
3. Iwasaki K, Maeda K, Hidaka K, et al. Daily Intake of Heat-killed *Lactobacillus plantarum* L-137 Decreases the Probing Depth in Patients Undergoing Supportive Periodontal Therapy. *Oral Health Prev Dent*. 2016;14(3):207-14.
4. Scariya L, Nagarathna DV, Varghese M. Probiotics in Periodontal Therapy. *Int J Pharm Bio*. 2015 Jan;6(1):242-50.
5. Available at: <https://www.cdc.gov/oralhealth/conditions/periodontal-disease.html>. Accessed December 4, 2020.
6. Mawardi HH, Elbadawi LS, Sonis ST. Current understanding of the relationship between periodontal and systemic diseases. *Saudi Med J*. 2015 Feb;36(2):150-8.
7. Bizzini B, Pizzo G, Scapagnini G, et al. Probiotics and oral health. *Curr Pharm Des*. 2012;18(34):5522-31.
8. Burton JP, Drummond BK, Chilcott CN, et al. Influence of the probiotic *Streptococcus salivarius* strain M18 on indices of dental health in children: a randomized double-blind, placebo-controlled trial. *J Med Microbiol*. 2013 Jun;62(Pt 6):875-84.
9. Burton JP, Wescombe PA, Macklaim JM, et al. Persistence of the oral probiotic *Streptococcus salivarius* M18 is dose dependent and megaplasmid transfer can augment their bacteriocin production and adhesion characteristics. *PLoS One*. 2013;8(6):e65991.
10. Uchinaka A, Azuma N, Mizumoto H, et al. Anti-inflammatory effects of heat-killed *Lactobacillus plantarum* L-137 on cardiac and adipose tissue in rats with metabolic syndrome. *Sci Rep*. 2018 May 25;8(1):8156.
11. Islam MR, Nagao J, Zendo T, et al. Antimicrobial mechanism of lantibiotics. *Biochem Soc Trans*. 2012 Dec 1;40(6):1528-33.
12. Bierbaum G, Sahl HG. Lantibiotics: mode of action, biosynthesis and bioengineering. *Curr Pharm Biotechnol*. 2009 Jan;10(1):2-18.
13. Wescombe PA, Upton M, Renault P, et al. Salivaricin 9, a new lantibiotic produced by *Streptococcus salivarius*. *Microbiology*. 2011 May;157(Pt 5):1290-9.
14. 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.
15. Available at: <http://www.merckmanuals.com/professional/dental-disorders/periodontal-disorders/periodontitis>. Accessed February 1, 2017.

Taurine

Boosts Brain Cell
Regeneration &
Supports
Whole-Body Health



Item #01827 • 90 vegetarian capsules

1 bottle \$9.75

4 bottles \$9 each



Research has found that taurine can promote **new cell formation** in the area of the brain associated with **learning and memory**.

Taurine also enhances **neurites**, tiny projections that help brain cells communicate with each other.

For full product description and to order **Taurine**, 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.

SUPPORTS **HEALTHY** **GLUCOSE** **METABOLISM** IN THE **BRAIN**

Maintaining healthy blood sugar levels is essential for whole-body health.

Benfotiamine *promotes* healthy brain function¹ supporting healthy blood sugar metabolism and protects brain health.²

References

1. Available at: <http://lpi.oregonstate.edu/mic/vitamins/thiamin>. Accessed January 4, 2018.
2. *Neurosci Bull.* 2016;32(6):591-6.



Item #00925 • 120 vegetarian capsules

1 bottle **\$22.50** • 4 bottles \$20.25 each

For full product description and to order **Mega Benfotiamine**, 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.



Promote Oral Health with Targeted Probiotic Blend

FLORASSIST® Oral Hygiene provides the *S. salivarius* **BLIS M18™** oral probiotic that colonizes the mouth and inhibits the growth of unwanted bacteria.¹⁻²

This product also contains beneficial Immuno-LP20®.

Just one mint cherry lozenge of **FLORASSIST® Oral Hygiene** a day maximizes oral hygiene by supporting healthy bacterial colonization throughout the mouth.³⁻⁴

References

1. *Oral Microbiol Immunol.* 2009 Apr;24(2):152-61.
2. *J Med Microbiol.* 2013 Jun;62(Pt 6):875-84.
3. *Benef Microbes.* 2011 Jun;2(2):93-101.
4. IADR/AADR/CADR 89th General Session and Exhibition, 16-19 March 2011, San Diego, CA, USA. Paper no. 150126.



Item #02120 • 30 vegetarian lozenges
1 bottle \$15

4 bottles \$13 each



GLUTEN FREE

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

BLIS™ and BLIS M18™ are trademarks of Blis Technologies Limited and the subject of USA patent no. 7226590. Immuno-LP20® is a registered trademark of House Foods Group 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.



GREEN TEA'S Neuroprotection Benefits

BY SHELDON CANNON



Scientists are finding that compounds found in **green tea** can bolster and protect brain health.¹⁻⁴

One meta-analysis found that the rate of cognitive disorders was **35%** lower in people who regularly drank tea.⁵

Parkinson's disease risk was reduced by **26%** for *every two cups per day* of tea consumed in another study.⁶

The healthful compounds found in green tea work in several different ways to boost brain function and guard against cognitive decline.

For those who do not consume enough green tea, standardized **extracts** provide the beneficial polyphenols called **catechins**.

Green Tea Medicine: Catechins

The tea plant, *Camellia sinensis*, is packed with the health-promoting compounds known as **catechins**.

One of the most abundant and widely studied catechins in green tea is **epigallocatechin gallate (EGCG)**.

Studies of whole tea consumption, extracts of green tea, *and* individual isolated catechins, have all demonstrated health benefits.⁷⁻¹³

Scientists have identified scores of mechanisms by which green tea wards off disease and the ravages of aging.

The widespread consumption of green tea has led to large observational studies that evaluate its association with risk for various disorders, including age-related cognitive decline.

Improving Brain Performance and Mood

Many of these effects of green tea help maintain strong mental function well into the future. But it also has *immediate* effects that improve brain function *now*.

Researchers used memory tasks and an advanced imaging technology called **functional MRI** to evaluate

cognitive functions in healthy volunteers.¹⁴ They found that people who were given a **green tea** extract performed better on memory tasks. They also observed enhanced connectivity between areas in the brain involved in the tasks.

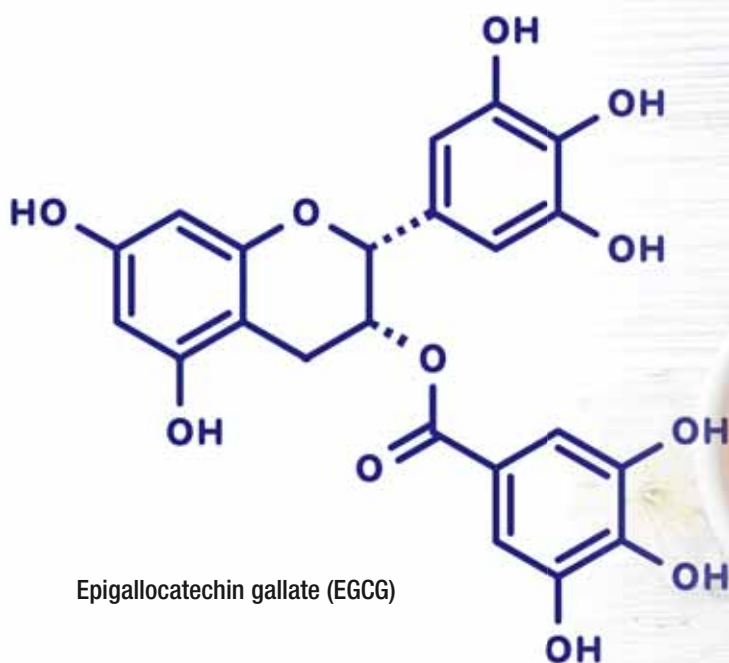
This means they were able to demonstrate *physiological changes in the brain* that correlated with improved mental function.

Another study, using an electroencephalogram to monitor brain activity, saw an overall *increase* in brain wave activity after consuming an EGCG (green tea extract) supplement.¹⁵

Cognitive enhancement isn't the only mental function impacted by green tea. In studies in healthy adults, green tea also **reduced psychological stress**, including feelings of anxiety and depression, and led to a feeling of calmness.^{15,16}

Cognitive Impairment, Alzheimer's, & Dementia

Studies in humans have demonstrated a clear association between tea consumption and a lower occurrence of cognitive disorders, including everything from mild cognitive impairment to Alzheimer's.^{5, 17-20}



One of the largest studies, a pooled analysis of 52,503 participants in countries around the world, found that tea significantly *reduced* the rate of multiple kinds of **cognitive disorders** by **35%**.⁵

Another large meta-analysis evaluated the risk of cognitive disorders in 48,435 individuals.¹⁹ Overall, *higher* tea intake correlated with a significant *reduction* in **cognitive disorders**.

However, when researchers further analyzed these results, they found that **green tea** consumption was more reliably associated with the cognitive benefit than oolong or black tea.

The rate of cognitive disorders in habitual drinkers of **green tea** was **36%** lower than in non-habitual drinkers. Scientists also found a dose-response relationship: The *more* green tea consumed, the *greater the protection* from cognitive dysfunction. In practical terms, those who drank **16 ounces** of green tea per day derived nearly six times *more* protection from development of cognitive disorders than those who drank **3.5 ounces**.

Other studies have examined tests of cognitive function, rather than diagnoses of cognitive disease.^{17,18}

In older adults, green tea was associated with superior performance on these tests. Green tea drinkers scored better for overall cognition, memory function, executive function, and the speed of information processing. And once again, *more* tea intake was linked to *higher* scores.

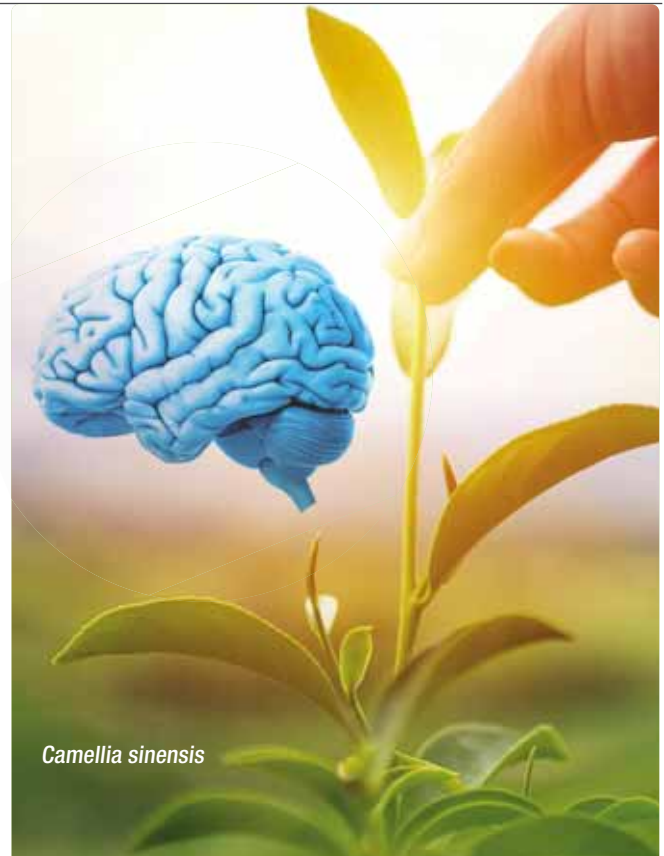
Parkinson's Disease

Parkinson's disease is a neurodegenerative disorder that mostly affects nerve cells in the brain that produce the neurotransmitter dopamine.

It's marked by a progressive loss of motor function, creating difficulties including tremors, slowed movement, and difficulty initiating movements. In more advanced cases, cognitive loss occurs as well, leading to slowed thinking and dementia.

Case-control studies in non-western populations demonstrate a strong protective effect of tea against the development of Parkinson's disease.²¹⁻²³ Up to a **41%** lower rate of Parkinson's was found when comparing those who routinely consume the largest amounts of tea with those who rarely drink tea.

A large meta-analysis included data from a whopping 344,895 individuals all over the world.⁶ As was observed in the studies of cognitive disorders, researchers noted that the *amount* of green tea



Camellia sinensis

WHAT YOU NEED TO KNOW

Green Tea

- Green tea polyphenols have been associated with many diverse health benefits.
- In the brain, green tea offers neuroprotective effects and shields the brain from age-related decline by boosting the creation of *new* brain cells and neural connections.
- Green tea also reduces the risk for neurodegenerative disorders such as Alzheimer's and Parkinson's disease.
- Many large, human studies have demonstrated that green tea intake is significantly associated with reduced risk for age-related cognitive decline and dementia.

intake correlated with the *degree of protection* from Parkinson's disease. In fact, they found that risk of Parkinson's was reduced by **26%** for every **two cups** per day consumed. This effect was more pronounced in European and Asian populations.

Functional Disability

One large, prospective study evaluated the impact that green tea can have on functional disability, regardless of the underlying cause.²⁴ Almost 14,000 Japanese individuals over the age of 64 were followed over time. Researchers found a significant protective effect of greater green tea intake, *reducing* the risk for disability and the need for support for daily activities.

Yet again, the *more* tea a person consumed, the *greater* the protection observed. Those who drank **five or more cups** per day were **33%** less likely to have a significant functional impairment than those who consumed **less than a cup** per day. It's difficult to consume this much green tea but extracts typically contain the amount of polyphenols equivalent to many cups.

Summary

Green tea and its extracts are widely recognized for their numerous health benefits.

In the nervous system, **green tea** provides many protective effects, including:

- Boosting **neurogenesis** (the creation of new brain cells) and **neuroplasticity** (the ability of the brain to adapt) into old age,^{13, 25-33}
- Shielding from the progressive damage that leads to **neurodegenerative** disorders,^{2, 34-38} and
- Offering **neuroprotection** against injuries such as stroke and head trauma.^{29, 39-42}

In the short term, green tea also boosts cognitive function, supporting attention, focus, improvement in mood, and enhanced memory.

Large studies in humans have demonstrated that green tea and its extracts are capable of guarding against age-related brain dysfunction and risk for dementia.





While drinking **five or more cups** of tea per day is difficult, green tea extracts that provide high quantities of polyphenols (catechins) are available in capsule form.

Green tea extracts are available in decaffeinated forms, for those sensitive to caffeine.

For those interested in the biological mechanisms that enable green tea to confer brain protection, turn to the next two pages.

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. Mancini E, Beglinger C, Drewe J, et al. Green tea effects on cognition, mood and human brain function: A systematic review. *Phyto-medicine*. 2017 Oct 15;34:26-37.
2. Pervin M, Unno K, Ohishi T, et al. Beneficial Effects of Green Tea Catechins on Neurodegenerative Diseases. *Molecules*. 2018 May 29;23(6).
3. Polito CA, Cai ZY, Shi YL, et al. Association of Tea Consumption with Risk of Alzheimer's Disease and Anti-Beta-Amyloid Effects of Tea. *Nutrients*. 2018 May 22;10(5).
4. Sangiovanni E, Brivio P, Dell'Agli M, et al. Botanicals as Modulators of Neuroplasticity: Focus on BDNF. *Neural Plast*. 2017;2017:5965371.
5. Ma QP, Huang C, Cui QY, et al. Meta-Analysis of the Association between Tea Intake and the Risk of Cognitive Disorders. *PLoS One*. 2016;11(11):e0165861.
6. Qi H, Li S. Dose-response meta-analysis on coffee, tea and caffeine consumption with risk of Parkinson's disease. *Geriatr Gerontol Int*. 2014 Apr;14(2):430-9.
7. Carnevale R, Loffredo L, Nocella C, et al. Epicatechin and catechin modulate endothelial activation induced by platelets of patients with peripheral artery disease. *Oxid Med Cell Longev*. 2014;2014:691015.
8. Kurbitz C, Heise D, Redmer T, et al. Epicatechin gallate and catechin gallate are superior to epigallocatechin gallate in growth suppression and anti-inflammatory activities in pancreatic tumor cells. *Cancer Sci*. 2011 Apr;102(4):728-34.
9. Noll C, Lameth J, Paul JL, et al. Effect of catechin/epicatechin dietary intake on endothelial dysfunction biomarkers and proinflammatory cytokines in aorta of hyperhomocysteinemic mice. *Eur J Nutr*. 2013 Apr;52(3):1243-50.
10. Stadlbauer S, Steinborn C, Klemd A, et al. Impact of Green Tea Catechin ECG and Its Synthesized Fluorinated Analogue on Prostate Cancer Cells and Stimulated Immunocompetent Cells. *Planta Med*. 2018 Jul;84(11):813-9.
11. Stringer TP, Guerrieri D, Vivar C, et al. Plant-derived flavanol (-) epicatechin mitigates anxiety in association with elevated hippocampal monoamine and BDNF levels, but does not influence pattern separation in mice. *Transl Psychiatry*. 2015 Jan 6;5:e493.
12. Van Amelsvoort JM, Van Hof KH, Mathot JN, et al. Plasma concentrations of individual tea catechins after a single oral dose in humans. *Xenobiotica*. 2001 Dec;31(12):891-901.
13. Zhang Z, Wu H, Huang H. Epicatechin Plus Treadmill Exercise are Neuroprotective Against Moderate-stage Amyloid Precursor Protein/Presenilin 1 Mice. *Pharmacogn Mag*. 2016 May;12(Suppl 2):S139-46.

(References continue on page 60.)

HOW GREEN TEA HELPS THE BRAIN

Green tea has been found to offer multiple beneficial effects for health and metabolism that support whole-brain health.

Boosting Neurogenesis and Neuroplasticity

When we're young, our brains operate at peak performance.

Neurogenesis, the growth of *new* brain cells, occurs in the greatest amount during the embryonic stage and continues throughout adulthood. But it wanes with advancing age.

Neuroplasticity, the brain's ability to adapt and form new neural connections, is critical to learning and maintaining memory and other cognitive functions. It also decreases as we grow older.

Green tea can support both neurogenesis *and* neuroplasticity.

In animal models and in cell cultures, it's been shown to *stimulate* neurogenesis.²⁵⁻²⁷ In studies like these, EGCG supported new brain cell growth and survival in the hippocampus, a

part of the brain critical for the formation of new memories.^{25,28} In an animal study, it also aided stem cell growth in the brain after a traumatic injury.²⁹

One of the most important mediators of neuroplasticity is a growth factor called brain-derived neurotrophic factor (BDNF). Its levels tend to diminish in old age,³⁰ impairing the ability of the brain to adapt and resist injury.

Green tea has the ability to *stimulate* production of BDNF to help maintain optimal brain function.

In one study, the drop in BDNF levels in aging rat brains was *prevented* by supplementing their diet with green tea.³¹ And in older mice, green tea supplementation prevented the decline in BDNF levels and alleviated learning and memory deficits associated with aging.^{13,32,33}





Protection from Age-Related Damage

Cognitive disorders are a terrifying scourge of old age. The two most common are **mild cognitive decline** and **Alzheimer's disease**, the most prevalent type of **dementia**.

The pathology in the brain associated with these disorders includes the deposition of abnormal proteins that accumulate to toxic levels. These proteins, including **beta-amyloid** and **hyperphosphorylated tau**, create the plaques and tangles that cause cognitive function to slow dramatically in Alzheimer's patients.

They also incite neuroinflammation, leading to further injury and cognitive decline.

Green tea protects against these age-related threats in a number of ways.

In several animal studies, green tea was found to significantly *reduce* the build-up of both these toxic proteins, and even to aid in clearing them from brain tissue.³⁴⁻³⁶ Reduction of amyloid and tau deposits in these studies protected cognition, preventing age-related memory and learning deficits.

Green tea also has powerful anti-inflammatory effects in the nervous system, acting to reduce the harmful neuroinflammation associated with these diseases.³⁷

Parkinson's disease has been found to respond to supplementation with green tea as well.² The buildup of **alpha-synuclein** and resulting neuroinflammation and neurotoxicity associated with this disease is *also* reduced by green tea.³⁸

Guarding Against Strokes and Injury

Cognitive disorders aren't the only risks to brain function in later life. Damage to the brain is also common from strokes and head trauma.

Strokes occur most often as a result of blood vessel disease, which can cause either a blockage of blood flow to the brain or bleeding into the brain. These typically occur suddenly and without warning.

Green tea intake can **reduce the risk of brain damage** from strokes in multiple ways. For one, green tea's cardiovascular health benefits help prevent blood vessel disease in the first place. This lowers the risk, not only for stroke, but also for coronary artery heart disease and other conditions.^{39,40}

Green tea can also provide a **neuroprotective** effect, reducing the impact if an injury *does* occur. This was demonstrated in a recent study in rats that had suffered a stroke, which found that green tea reduced the severity of injury.⁴¹ The degree of tissue necrosis (death), oxidative stress, and cognitive deficits were all lowered by tea, and the neuroprotection was greater with green tea than other types of tea.

Neuroprotection of this type is also observed in animal models of **head trauma**. Green tea reduces both the severity of injury *and* the functional deficits that result.^{29,42,43}

(Scientific references are on the previous and following pages.)

14. Schmidt A, Hammann F, Wolnerhanssen B, et al. Green tea extract enhances parieto-frontal connectivity during working memory processing. *Psychopharmacology (Berl)*. 2014 Oct;231(19):3879-88.
15. Scholey A, Downey LA, Ciorciari J, et al. Acute neurocognitive effects of epigallocatechin gallate (EGCG). *Appetite*. 2012 Apr;58(2):767-70.
16. Hozawa A, Kuriyama S, Nakaya N, et al. Green tea consumption is associated with lower psychological distress in a general population: the Ohsaki Cohort 2006 Study. *Am J Clin Nutr*. 2009 Nov;90(5):1390-6.
17. Feng L, Gwee X, Kua EH, et al. Cognitive function and tea consumption in community dwelling older Chinese in Singapore. *J Nutr Health Aging*. 2010 Jun;14(6):433-8.
18. Kuriyama S, Hozawa A, Ohmori K, et al. Green tea consumption and cognitive function: a cross-sectional study from the Tsurugaya Project 1. *Am J Clin Nutr*. 2006 Feb;83(2):355-61.
19. Liu X, Du X, Han G, et al. Association between tea consumption and risk of cognitive disorders: A dose-response meta-analysis of observational studies. *Oncotarget*. 2017 Jun 27;8(26):43306-21.
20. Yang L, Jin X, Yan J, et al. Prevalence of dementia, cognitive status and associated risk factors among elderly of Zhejiang province, China in 2014. *Age Ageing*. 2016 Sep;45(5):708-12.
21. Barranco Quintana JL, Allam MF, Del Castillo AS, et al. Parkinson's disease and tea: a quantitative review. *J Am Coll Nutr*. 2009 Feb;28(1):1-6.
22. Hosseini Tabatabaei N, Babakhani B, Hosseini Tabatabaei A, et al. Non-genetic factors associated with the risk of Parkinson's disease in Iranian patients. *Funct Neurol*. 2013 Apr-May;28(2):107-13.
23. Tanaka K, Miyake Y, Fukushima W, et al. Intake of Japanese and Chinese teas reduces risk of Parkinson's disease. *Parkinsonism Relat Disord*. 2011 Jul;17(6):446-50.
24. Tomata Y, Kakizaki M, Nakaya N, et al. Green tea consumption and the risk of incident functional disability in elderly Japanese: the Ohsaki Cohort 2006 Study. *Am J Clin Nutr*. 2012 Mar;95(3):732-9.

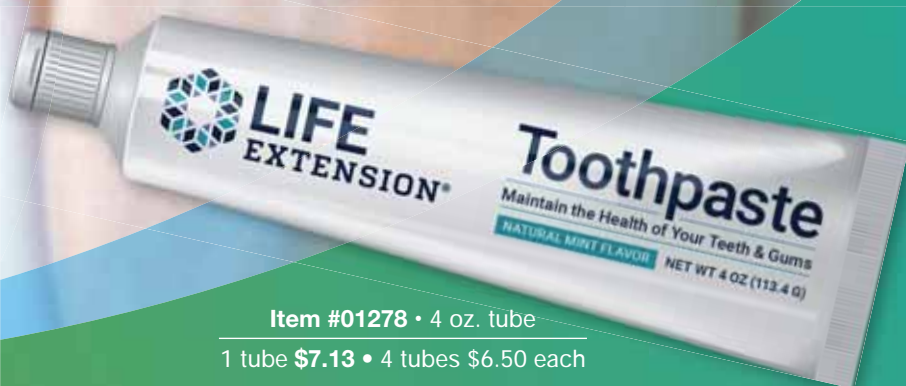


25. Ortiz-Lopez L, Marquez-Valadez B, Gomez-Sanchez A, et al. Green tea compound epigallocatechin-3-gallate (EGCG) increases neuronal survival in adult hippocampal neurogenesis in vivo and in vitro. *Neuroscience*. 2016 May 13;322:208-20.
26. Unno K, Pervin M, Nakagawa A, et al. Blood-Brain Barrier Permeability of Green Tea Catechin Metabolites and their Neuritogenic Activity in Human Neuroblastoma SH-SY5Y Cells. *Mol Nutr Food Res*. 2017 Dec;61(12).
27. Zhang JC, Xu H, Yuan Y, et al. Delayed Treatment with Green Tea Polyphenol EGCG Promotes Neurogenesis After Ischemic Stroke in Adult Mice. *Mol Neurobiol*. 2017 Jul;54(5):3652-64.
28. Wang Y, Li M, Xu X, et al. Green tea epigallocatechin-3-gallate (EGCG) promotes neural progenitor cell proliferation and sonic hedgehog pathway activation during adult hippocampal neurogenesis. *Mol Nutr Food Res*. 2012 Aug;56(8):1292-303.
29. Itoh T, Imano M, Nishida S, et al. (-)-Epigallocatechin-3-gallate increases the number of neural stem cells around the damaged area after rat traumatic brain injury. *J Neural Transm (Vienna)*. 2012 Aug;119(8):877-90.
30. Erickson KI, 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.
31. Assuncao M, Santos-Marques MJ, Carvalho F, et al. Green tea averts age-dependent decline of hippocampal signaling systems related to antioxidant defenses and survival. *Free Radic Biol Med*. 2010 Mar 15;48(6):831-8.
32. Li Q, Zhao HF, Zhang ZF, et al. Long-term administration of green tea catechins prevents age-related spatial learning and memory decline in C57BL/6 J mice by regulating hippocampal cyclic AMP-response element binding protein signaling cascade. *Neuroscience*. 2009 Apr 10;159(4):1208-15.
33. Li Q, Zhao HF, Zhang ZF, et al. Long-term green tea catechin administration prevents spatial learning and memory impairment in senescence-accelerated mouse prone-8 mice by decreasing Abeta1-42 oligomers and upregulating synaptic plasticity-related proteins in the hippocampus. *Neuroscience*. 2009 Oct 20;163(3):741-9.
34. He M, Liu MY, Wang S, et al. [Research on EGCG improving the degenerative changes of the brain in AD model mice induced with chemical drugs]. *Zhong Yao Cai*. 2012 Oct;35(10):1641-4.
35. Rezai-Zadeh K, Arendash GW, Hou H, et al. Green tea epigallocatechin-3-gallate (EGCG) reduces beta-amyloid mediated cognitive impairment and modulates tau pathology in Alzheimer transgenic mice. *Brain Res*. 2008 Jun 12;1214:177-87.
36. Walker JM, Klakotskaia D, Ajit D, et al. Beneficial effects of dietary EGCG and voluntary exercise on behavior in an Alzheimer's disease mouse model. *J Alzheimers Dis*. 2015;44(2):561-72.
37. Venigalla M, Sonogo S, Gyengesi E, et al. Novel promising therapeutics against chronic neuroinflammation and neurodegeneration in Alzheimer's disease. *Neurochem Int*. 2016 May;95:63-74.
38. Caruana M, Vassallo N. Tea Polyphenols in Parkinson's Disease. *Adv Exp Med Biol*. 2015;863:117-37.
39. Babu PV, Liu D. Green tea catechins and cardiovascular health: an update. *Curr Med Chem*. 2008;15(18):1840-50.
40. Pang J, Zhang Z, Zheng TZ, et al. Green tea consumption and risk of cardiovascular and ischemic related diseases: A meta-analysis. *Int J Cardiol*. 2016 Jan 1;202:967-74.
41. Martins A, Schmidt HL, Garcia A, et al. Supplementation with different teas from *Camellia sinensis* prevents memory deficits and hippocampus oxidative stress in ischemia-reperfusion. *Neurochem Int*. 2017 Sep;108:287-95.
42. Itoh T, Imano M, Nishida S, et al. (-)-Epigallocatechin-3-gallate protects against neuronal cell death and improves cerebral function after traumatic brain injury in rats. *Neuromolecular Med*. 2011 Dec;13(4):300-9.
43. Itoh T, Tabuchi M, Mizuguchi N, et al. Neuroprotective effect of (-)-epigallocatechin-3-gallate in rats when administered pre- or post-traumatic brain injury. *J Neural Transm (Vienna)*. 2013 May;120(5):767-83.

Good Health BEGINS IN THE MOUTH

Fluoride-free **Life Extension®** Toothpaste contains innovative ingredients that promote healthy teeth and gums.

- **COENZYME Q10** for protection against harmful molecules
- **GREEN TEA** that is rich in protective catechins
- **HYDROGEN PEROXIDE** to thoroughly clean teeth and gums
- **ALOE VERA** to facilitate natural healing^{1,2}
- **XYLITOL** a natural sweetener that won't decay teeth³
- **FOLIC ACID** for healthier and more resilient gums⁴
- **LACTOFERRIN** to support healthy oral hygiene⁵
- **SQUALANE** derived from olives and rich in vitamin E



Item #01278 • 4 oz. tube

1 tube \$7.13 • 4 tubes \$6.50 each

References

1. *J Indian Soc Periodontol*. 2011 Jul;15(3):205-9.
2. *Br J Dermatol*. 2001 Oct;145(4):535-45.
3. *J Am Dent Assoc*. Jan 2013; 144(1): 21-30.
4. *J Clin Periodontol*. 1984 Oct;11(9):619-28.
5. *Ann Stomatol (Roma)*. 2011 Mar-Jun; 2(3-4):10-8.

For full product description and to order
Life Extension® Toothpaste, 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.

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

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



Item #01647 • 30 vegetarian capsules

1 bottle \$24 • 4 bottles \$18 each



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.

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.

BOOST BRAIN FUNCTION

Mega Green Tea Extract

Mega Green Tea Extract provides powerful beneficial compounds called catechins including EGCG that support brain and whole-body health.

- EGCG supports new brain cell growth¹
- Promotes brain plasticity²
- Improves cognitive performance³
- Enhances brain wave activity⁴

Each cost-effective bottle lasts over three months!

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

An average cup of green tea contains about **150 mg** to **300 mg** of **polyphenols**.⁵ Each capsule of this supplement provides **725 mg** of green tea extract, standardized to **98% polyphenols**. That means you'd have to drink about **3 cups** of green tea to get the same number of polyphenols as one capsule of **Mega Green Tea Extract**.

Mega Green Tea Extract Decaffeinated

Item #00954 • 100 vegetarian capsules

1 bottle **\$22.50**

4 bottles \$18 each

Mega Green Tea Extract Lightly Caffeinated

Item #00953 • 100 vegetarian capsules

1 bottle **\$22.50**

4 bottles \$18 each



* **EGCG** is the acronym for **epigallocatechin gallate**, which is the polyphenol in green tea that has demonstrated the most robust health benefits.

References

1. *Neuroscience*. 2016 May 13;322:208-20.
2. *J Neurosci*. 2010 Apr 14;30(15):5368-75.

3. *J Nutr Health Aging*. 2010 Jun;14(6):433-8.
4. *Appetite*. 2012 Apr;58(2):767-70.
5. *J Transl Med*. 2015;13:79.



For full product description and to order either Mega Green Tea Extract, 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.



Hidden Dangers of TATTOOS

BY GAVIN LOGAN



The numbers of people getting **tattoos** have markedly increased starting more than 20 years ago.

Roughly **38%** of people ages 18-29 now have *at least* one tattoo.¹

Most are unaware of the risks, from infection to exposure to heavy metals, to being unable to detect an early skin cancer.

The **inks** used in tattoos contain pigments that are often derived from **heavy metals**.

There is concern that these **toxins** could raise the risk of cancer, DNA damage, inflammation, oxidative stress, and weakening immune function.

Tattoos remain popular, but they are not without consequential health risks.

Toxic Ink in Tattoos

The moment a tattoo artist gets to work, risks arise. People can have **allergic reactions** to skin dyes or develop a **skin infection** from the wound.²

In May 2019, the U.S. Food & Drug Administration (FDA) issued a **safety advisory**, warning that tattoo ink could be contaminated with **microorganisms**, which can cause infections and scarring.³

The *long-term* effects are potentially more serious.

To make designs, a tattoo artist injects ink into the **dermis**, the second layer of skin.⁴

Some of the pigments used may be derived from **toxic heavy metals**, including mercury, lead, nickel, and cadmium.⁵ Some of these have been classified as **human carcinogens** by the International Agency for Research on Cancer and the U.S. Environmental Protection Agency.⁶

Other pigments are similar to clothing and leather dyes called **azo pigments**. Many of *these* have been shown to be **carcinogenic** or **genotoxic** (damaging to DNA).⁷

These substances can eventually enter the bloodstream.⁸



Spreading Throughout the Body

There are two main ways the potentially toxic ink from tattoos can be carried throughout the body:

- The incisions made by the tattoo needle cause the immune system to send cells called **macrophages** to the area to help close the wound and destroy foreign invaders. These macrophages can transport *larger* ink particles to the **lymph nodes**, glands that filter harmful substances.⁴
- Tiny ink particles called **nanoparticles** can penetrate through the skin layers and enter the bloodstream.⁸ **Carbon black**, the most common ink used in tattoos, is most often associated with *higher* levels of nanoparticles.⁹

In one study, researchers tattooed the backs of mice. Within 42 days, **32%** of the ink from the tattoo had been leached away from the tattoo site.¹⁰

A 2017 analysis found potentially toxic dyes and metals in the lymph nodes of deceased individuals who had had tattoos.⁴

The lymph nodes are a vital part of the **immune system**. A build-up of toxic particles there may *weaken* immunity, hurting the body's ability to ward off infections and illnesses of all kinds.¹¹

Potential Risk of Cancer

Recent studies have shown that metal nanoparticles have the potential to cause **DNA damage**.

A 2019 study of breast cancer cells in animal models showed that exposure to these nanoparticles led to **accelerated tumor growth** and a greatly increased ability for cancer to **metastasize** (spread).¹²

A 2018 review of the medical literature found at least 64 reported cases of **tattoo-associated skin cancer** in humans.¹³

Increased Inflammation

It has been determined in preclinical studies that ink nanoparticles have the ability to cause **chronic inflammation**.¹⁴

Inflammation has been associated with increased risk for type II diabetes, heart disease, strokes, arthritis, Alzheimer's disease and other forms of dementia, and many other illnesses.

The presence of tattoo ink nanoparticles in the skin, lymphatic system, and liver could potentially contribute to increased **oxidative stress**, production of pro-inflammatory **cytokines**, and **cell death** in all these areas.

A review study presented data on nanoparticle ingestion by *inhalation*, which was associated with many potential health problems in addition to cancer, including:¹⁵

- Alzheimer's and Parkinson's disease,
- Asthma, bronchitis, and emphysema,
- High blood pressure and blood clots,
- Heart disease,
- Diseases of the kidneys and liver,
- Crohn's disease (a chronic inflammatory bowel disease), and
- Autoimmune disorders.

Exposure to toxins has also been associated with an increase in **senescent cells** and shortening of **telomeres**.

Both of these effects are associated with a shortened lifespan and increased disease risk.

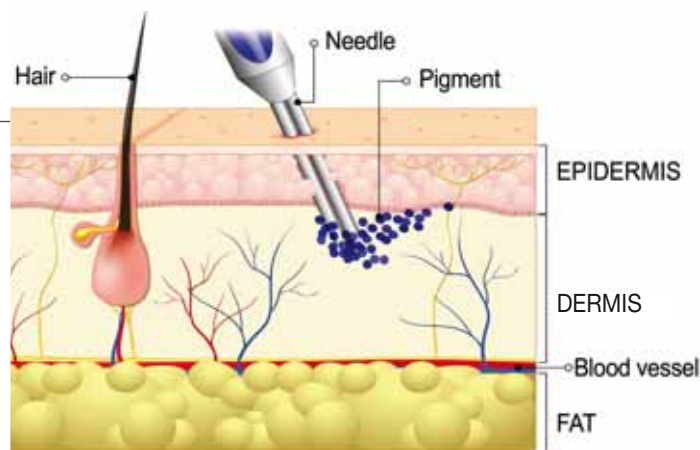
Tattoo Removal

Removing a tattoo is usually done by laser. It involves breaking up ink pigments into a smaller size, so they can more easily migrate away from the skin.

It has been suggested that in the short term, this process could *increase* the amount of metal nanoparticles in the bloodstream, lymph nodes, and liver. Tattoo removal also does further damage to the skin.

Over the next decade, we can expect to see the development of many more **rapid tattoo removal** techniques.¹⁶ This may convince people to see tattoos as a **temporary** decision and get them more frequently.

The harmful impact of a tattoo may be permanent, though. Each time one is applied and then removed, damage to the skin increases, as does exposure to potential toxins.

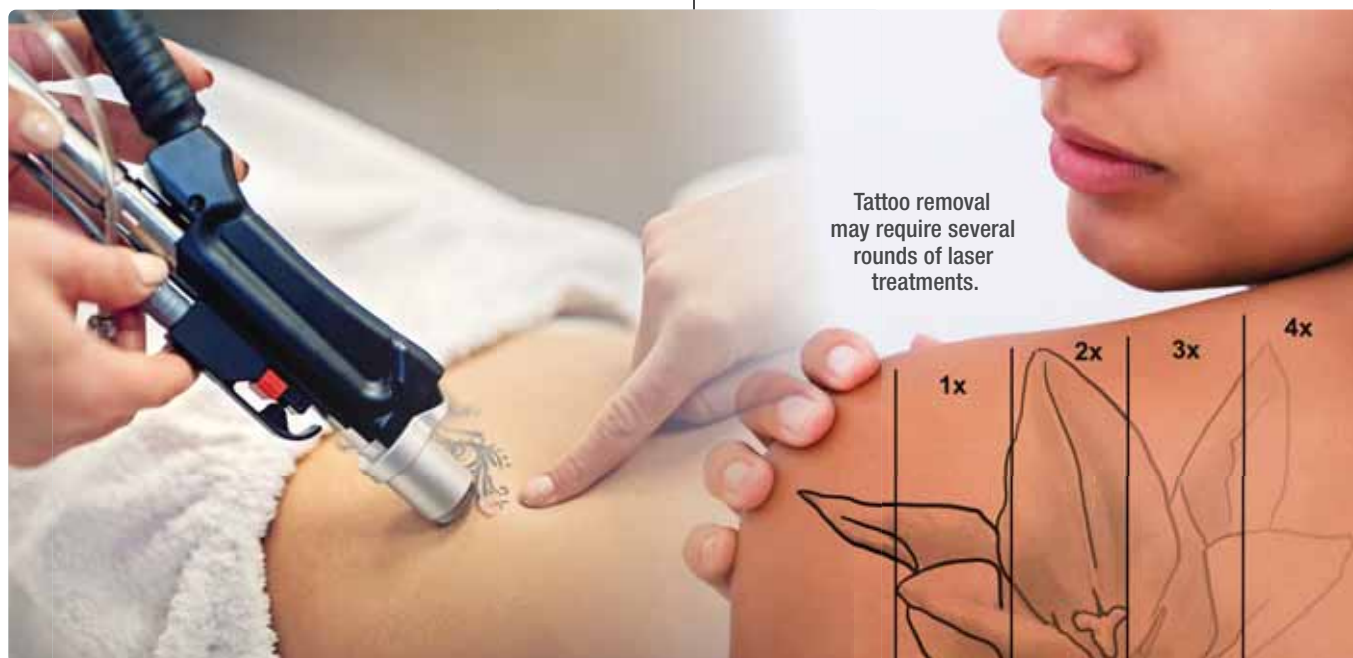


Cross section of human skin with tattoo needle

WHAT YOU NEED TO KNOW

The Risks of Getting Tattooed

- The popularity of **tattoos** has been growing for years, especially among young adults.
- Several risks are well known, including skin **infections** from the wound or infections and scarring from contaminated needles.
- A neglected potential danger is the *ink* used for tattoo designs. They are often derived from **toxic heavy metals**, including mercury and lead, or dyes called **azo pigments**. Many of these are known **carcinogens**.
- Tiny ink particles can enter the bloodstream and lymphatic system, potentially even migrating to the liver. This in turn could potentially increase the risk of certain types of **cancer**.
- Getting a tattoo removed may not undo the damage.
- Though long-term research into the dangers of tattoos needs to be done, their potential to cause harm may have been overlooked.



Conclusion

Little conclusive research has been done into the health effects of **tattoos**. But some of the inks tattoo artists use are derived from **toxic heavy metals** and **dyes**.

These substances have been found to **damage DNA** and to be **carcinogenic**.

Tiny **nanoparticles** from the ink can enter the bloodstream and spread to the lymphatic system and the liver.

They may increase the risk of some cancers and contribute to dangerous chronic inflammation, oxidative stress, and weakening of immune function.

While you or someone you know may be considering getting a tattoo, this is not a decision that should be made lightly, given the potential health risks. •

PHOTOGRAPHY
BY PATRINA LOGAN



Gavin Logan is a longtime supporter who resides in New Zealand. He authored this article and donated it to *Life Extension®* Magazine so that it could be widely disseminated.

References

1. Available at: <https://www.mdedge.com/pediatrics/article/214634/adolescent-medicine/adolescents-should-know-risks-tattoos-and-piercings>. Accessed December 10, 2020.
2. Available at: <https://www.mayoclinic.org/healthy-lifestyle/adult-health/in-depth/tattoos-and-piercings/art-20045067>. Accessed December 10, 2020.

3. Available at: <https://www.fda.gov/cosmetics/cosmetics-recalls-alerts/fda-advises-consumers-tattoo-artists-and-retailers-avoid-using-or-selling-certain-tattoo-inks>. Accessed December 11, 2020.
4. Schreiber I, Hesse B, Seim C, et al. Synchrotron-based nu-XRF mapping and mu-FTIR microscopy enable to look into the fate and effects of tattoo pigments in human skin. *Sci Rep*. 2017 Sep 12;7(1):11395.
5. Available at: <https://www.scientificamerican.com/article/tattoo-ink-mercury-and-other-toxins/>. Accessed December 15, 2020.
6. Tchounwou PB, Yedjou CG, Patlolla AK, et al. Heavy metal toxicity and the environment. *Exp Suppl*. 2012;101:133-64.
7. Moller P, Wallin H. Genotoxic hazards of azo pigments and other colorants related to 1-phenylazo-2-hydroxynaphthalene. *Mutat Res*. 2000 Jan;462(1):13-30.
8. Sepehri M, Sejersen T, Qvortrup K, et al. Tattoo Pigments Are Observed in the Kupffer Cells of the Liver Indicating Blood-Borne Distribution of Tattoo Ink. *Dermatology*. 2017;233(1):86-93.
9. Jacobsen NR, Clausen PA. Carbon black nanoparticles and other problematic constituents of black ink and their potential to harm tattooed humans. *Curr Probl Dermatol*. 2015;48:170-5.
10. Engel E, Vasold R, Santarelli F, et al. Tattooing of skin results in transportation and light-induced decomposition of tattoo pigments--a first quantification in vivo using a mouse model. *Exp Dermatol*. 2010 Jan;19(1):54-60.
11. Available at: <https://www.ndtv.com/food/here-s-how-getting-tattoos-may-put-your-immune-system-in-danger-1749661>. Accessed December 11, 2020.
12. Peng F, Setyawati MI, Tee JK, et al. Nanoparticles promote in vivo breast cancer cell intravasation and extravasation by inducing endothelial leakiness. *Nat Nanotechnol*. 2019 Mar;14(3):279-86.
13. Paprottka FJ, Krezdorn N, Narwan M, et al. Trendy Tattoos-Maybe a Serious Health Risk? *Aesthetic Plast Surg*. 2018 Feb;42(1):310-21.
14. Foerster M, Schreiber I, Luch A, et al. Tattoo inks and cancer. *Cancer Epidemiol*. 2020 Apr;65:101655.
15. Buzzea C, Pacheco I, Robbie K. Nanomaterials and nanoparticles: sources and toxicity. *Biointerphases*. 2007 Dec;2(4):MR17-71.
16. Available at: <https://www.soliton.com/>. Accessed December 11, 2020.

STRONGER BONES STRONGER YOU

Some people require *extra* support for optimal bone strength and flexibility.

Bone Strength Collagen Formula provides collagen as a patented **chelated calcium** designed to support bone health.

Magnesium, silicon, dried plum, vitamin D3, and boron are included to further skeletal support.

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

KoAct® is a patented form of bone collagen with calcium designed to support bone strength and maintain optimal bone health. KoAct® is a registered trademark of AIDP, Inc. Fruitex B® and OsteoBoron® are registered trademarks of VDF Futureceuticals, Inc. U.S. Patent No. 5,962,049.



Item #01725 • 120 capsules

1 bottle \$33.75 • 4 bottles \$30 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.



ways to save



PREMIER REWARDS



FREE

Unlimited
Shipping



4%

Back On
Purchases



\$50 Instant Credit

Use now or
save for later.



Worry-Free

No auto-enrollment.
Cancel anytime.

JOIN PREMIER TODAY!

ONLY \$49.95 PER YEAR.

LifeExtension.com/YourPremier



AUTOSHIP & SAVE

Save an average of 16%
on your supplements!*



FREE Shipping

We ship to any address in the United
States (including Alaska and Hawaii)
regardless of order size.



LOWEST Prices

Always pay the lowest price for your
favorite Life Extension® products.



NEWEST Formulations

Always receive the latest version of
our innovative formulas.

Complimentary program! Cancel any time

LifeExtension.com/AutoShip

Call 1-855-867-9361 | Please use code **REWARDS**

*Average savings based on the average AutoShip discount across all products. 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.

Why I Recommend CoQ10 For My Patients

BY JOEL KAHN, MD



Coenzyme Q10 (CoQ10) is a nutrient found in every cell in our bodies.

It's required to make an important cell energy factor called **adenosine triphosphate**, known as **ATP**.

Blood levels of CoQ10 drop as we age, and studies have shown that **oral intake** can provide a wide variety of benefits—especially for **heart health**.

In this interview, leading cardiologist and anti-aging expert, **Dr. Joel Kahn** tells *Life Extension*[®] how CoQ10 can help prevent heart failure, heart attacks, and other cardiovascular issues.

LE: How did you first come to start treating patients with CoQ10?

Dr. Kahn: Many years ago, I was browsing the National Library of Medicine, searching for ways to treat a special patient's advanced **congestive heart failure**. I found article after article on basic and clinical trials indicating that it was possible to boost production of **cardiac ATP** by using **CoQ10**. After studying several papers, I began recommending CoQ10 routinely for my patients, particularly those with congestive heart failure.

The response over the past 15 years has been transformative. The majority of patients have experienced better energy, improved breathing, and fewer visits to the hospital. I was so convinced that I transitioned my career from interventional to **metabolic cardiology**, which focuses on the role of cellular energy transfer in preventing and treating heart disease.

LE: How long has CoQ10 been used in clinical cardiology practice?

Dr. Kahn: CoQ10 was first discovered in 1957. Nobel Prize-winning chemist Peter Mitchell revolutionized the science behind CoQ10 in the 1960s, when he showed that it plays an integral role in carrying energy to cells. Beginning in the early 1980s, CoQ10 was sold in Japan as a **prescription drug** for heart disease. Today, it is one of the most affordable ways to promote cardiac health and well-being.

LE: Our bodies naturally produce CoQ10. Why do we need additional intake?

Dr. Kahn: By about the age of 40, the production of CoQ10 throughout the body begins to decline. In diseases like **congestive heart failure** (when the heart doesn't pump as well as it should), it may fall even further. And in patients treated with **statin** cholesterol medications, the production of CoQ10 is partially blocked, because the same processes that produce cholesterol also produce CoQ10.

LE: Can you get CoQ10 from dietary sources?

Dr. Kahn: CoQ10 is found in foods such as whole grains, fish, and organ meats like liver, heart, and kidney. Other than the whole grains and fish, these organ-meat foods are bad for cardiac health,

making this path ill-advised. Additionally, the amount available in foods is not sufficient for therapeutic benefits. Directly taking **oral CoQ10** boosts blood and tissue levels.

LE: How does CoQ10 benefit those with **heart failure** or other cardiac problems?

Dr. Kahn: A scientific presentation reported on 420 patients with congestive heart failure who received either **100 mg** of **CoQ10** or a placebo three times a day. After two years, **26%** of the patients on placebo had a cardiac event, but only **15%** of those on CoQ10 had one. Even more impressive, **18%** of patients in the placebo group **died** versus **10%** in the CoQ10 group. And a significant improvement in the class of heart failure was measured.¹

Overall, CoQ10 was found to be safe, to improve symptoms, and to reduce major adverse cardiovascular events. A meta-analysis of studies on congestive heart failure also demonstrated increased exercise capacity and reduced mortality with CoQ10 intake.²

LE: **High blood pressure** can lead to heart failure, heart attacks, strokes, and more. Should people with high blood pressure be taking CoQ10?

Dr. Kahn: My general protocol for *all* patients seen at my preventive heart clinic is to include CoQ10 in their program, especially if they are on a statin cholesterol medication. The role of CoQ10 in reducing blood pressure has been studied, and it has been found help lower **systolic blood pressure**.





LE: There has been a great deal of research on the connection between **oral health** and heart health. Can CoQ10 play a role here as well?

Dr. Kahn: Inflammation of the gums, or **periodontal disease**, may trigger inflammation that affects the whole body, including blood vessels and the heart.

CoQ10 can be deficient in gum disease and boosting levels in the gums by taking oral CoQ10 or applying CoQ10 topically is an approach that studies show leads to faster healing.

In view of the very strong connection between optimal **oral health** and **optimal cardiovascular health**, using CoQ10 for oral health is another way to support healthy vascular systems.

LE: Are there other nutrients people should take *with* CoQ10 for prevention of heart disease?

Dr. Kahn: In addition to CoQ10, the mineral **selenium** is essential for optimal antioxidant defenses. A *deficiency* in antioxidative capacity can

lead to the development of various illnesses, **atherosclerosis** in particular, (when plaque builds up in artery walls, restricting blood flow), and **heart failure**.

The *combination* of selenium and CoQ10 could lead to a more “fuel-efficient” body, better equipped to carry out functions with less damage. This may be especially important for the protection of the heart and optimizing cardiovascular function.

LE: Can you talk about any studies that have been done on the **CoQ10-selenium combination**?

Dr. Kahn: Researchers in Sweden designed a randomized, double-blind, placebo-controlled trial among healthy citizens with an average **age of 78**. They enrolled 443 participants who were given either a placebo or a combined **200 mcg** of selenium and **200 mg** of **CoQ10** daily for four years.³

At the five-year follow-up, a significant *reduction* of cardiovascular mortality was found in the treatment group compared to the placebo group (**5.9%** mortality in

CoQ10-selenium treated patients vs. **12.6%** mortality in placebo-treated patients). A marker of cardiac dysfunction was also significantly lower in the CoQ10-treatment group. And, using echocardiography, better cardiac function was found in the treated group compared to the placebo group.

At the **10-year** follow up, those who had received the CoQ10-selenium combination still had a *reduction* in cardiovascular mortality. The protective action was not confined to the intervention period but persisted during the follow-up periods. Reduced all-cause mortality was also observed during this time.

Even after **12 years**, a significant reduction in cardiovascular mortality persisted, with a rate of **28%** in the treatment group and **45%** in the placebo group. In the study subjects with ischemic heart disease, diabetes, hypertension, and impaired functional capacity, there was a significantly reduced cardiovascular mortality risk. The decline in quality of life was also less in those treated with selenium and CoQ10.

Overall, the use of a combination of selenium and CoQ10 was shown to have a remarkable ability to safely improve cardiovascular survival and, to some extent, all-cause mortality.

LE: Do you recommend that patients who are taking CoQ10 also take selenium for heart health?

Dr. Kahn: I do, for optimal antioxidant function. There are some multivitamins and antioxidant blends that include **selenium**, with the usual amount being **200 mcg** daily. If patients are receiving that dose, no additional selenium is advised.

If they are *not* already taking any selenium, I like a complex combining three different forms of selenium, **Se-Methyl L-Selenocysteine**, **L-Selenomethionine**, and **sodium selenite**, providing **200 mcg** overall, often combined with a small amount of vitamin E.

LE: Aside from heart health, what other benefits have you come across for CoQ10?

Dr. Kahn: Studies have suggested a benefit for the treatment of **migraine headaches**. In a recent meta-analysis of randomized clinical trials, daily CoQ10 significantly reduced the frequency of migraine attacks.⁴ The addition of other nutrients, like **curcumin**, to CoQ10 for migraines has been reported to reduce not only the frequency but also the severity and duration of headaches.

LE: As a specialist in metabolic cardiology, have you found that CoQ10 plays a role in metabolic health?

Dr. Kahn: **Metabolic syndrome** and **inflammation** may be the underlying drivers of many diseases



like diabetes and heart disease. In a recent meta-analysis, CoQ10 intake in individuals with metabolic syndrome led to changes in biomarkers associated with benefit for overall metabolic health.⁵ Moreover, CoQ10 significantly lowered inflammation markers in individuals with metabolic syndrome compared to those on a placebo.

Such benefits with CoQ10 were related, in part, to the accompanying improvement in **glucose control** and **liver function**. The overall findings suggest that optimal regulation of inflammation is crucial for the beneficial effects of CoQ10 in improving metabolic health.

LE: How important a role does CoQ10 play in your medical practice overall?

Dr. Kahn: For the past 40 years, the data to support the use of CoQ10 have been strong and growing. The role of oral CoQ10 intake for a variety of biological functions, none more important or supported than **cardiovascular health** and **longevity**, is obvious. Fortunately, intake of CoQ10, even at doses higher than those used in heart trials, was found to be well-tolerated and safe. I will continue to advise all my clinic patients to optimize their health with the daily use of CoQ10. •

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

Joel Kahn, MD, is the founder of the Kahn Center for Cardiac Longevity in Bingham Farms, Michigan.

References

1. Mortensen SA, Rosenfeldt F, Kumar A, et al. The effect of coenzyme Q10 on morbidity and mortality in chronic heart failure: results from Q-SYMBIO: a randomized double-blind trial. *JACC Heart Fail.* 2014 Dec;2(6):641-9.
2. Rosenfeldt F, Hilton D, Pepe S, et al. Systematic review of effect of coenzyme Q10 in physical exercise, hypertension and heart failure. *Biofactors.* 2003;18(1-4): 91-100.
3. Alehagen U, Aaseth J, Alexander J, et al. Still reduced cardiovascular mortality 12 years after supplementation with selenium and coenzyme Q10 for four years: A validation of previous 10-year follow-up results of a prospective randomized double-blind placebo-controlled trial in elderly. *PLoS One.* 2018;13(4):e0193120.
4. Zeng Z, Li Y, Lu S, et al. Efficacy of CoQ10 as supplementation for migraine: A meta-analysis. *Acta Neurol Scand.* 2019 Mar;139(3):284-93.
5. Dlugla PV, Orlando P, Silvestri S, et al. Coenzyme Q(10) Supplementation Improves Adipokine Levels and Alleviates Inflammation and Lipid Peroxidation in Conditions of Metabolic Syndrome: A Meta-Analysis of Randomized Controlled Trials. *Int J Mol Sci.* 2020 May 4;21(9).

Support **Healthy Cell DNA** with Super Absorbable **TOCOTRIENOLS**

***Tocotrienols** promote **HEALTHY DNA** function*



**Super Absorbable
Tocotrienols**

Item # 01400
60 softgels

1 bottle \$22.50

4 bottles \$21 each

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

Caution: If you are taking anti-coagulant or anti-platelet medications,
or have a bleeding disorder, consult your healthcare provider before taking this product.

EVNol SupraBio™ is a trademark of ExcelVite Inc. and protected by US Patent Nos: 6,596,306 and 7,544,822.
Tocotrienols are extracted and concentrated from sustainably sourced Malaysian red palm oil.



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 quickest way to betray your age is
with a tired appearance ...*

Revive Worn-Out Hair, Skin, and Nails from Within

For full product description and to order **Hair,
Skin & Nails Collagen Plus Formula**,
call **1-800-544-4440** or visit www.LifeExtension.com

Working from the inside out, **Hair,
Skin & Nails Collagen Plus Formula** is
an oral supplement with nutrients shown
to benefit the hair, skin, and nails to
keep them looking vibrant and healthy.
Rejuvenating nutrients include:

- **VERISOL® Bioactive Collagen Peptides®**—Stimulates the formation of new collagen and elastin to promote skin suppleness and elasticity¹
- **Cynatine® HNS Plus**—Provides solubilized keratin, zinc, B vitamins, biotin, and copper to boost production of keratin for strong hair, skin, and nails
- **Biotin**—Supports nail strength and integrity²
- **Silicon**—For the formation of collagen and keratin molecules³



Item #02322 • 120 tablets
1 bottle **\$24**
4 bottles **\$22 each**

References

1. *Skin Pharmacol Physiol.* 2014;27(3):113-9.
2. *Vet Rec.* 1984 Dec 22-29;114(25-26):642-5.
3. *Nutr Today.* 1993;28(4):13-8.

Caution: Individuals with inborn errors of copper metabolism (e.g. Wilson's disease) should avoid daily, chronic use of this product.



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

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.

CoQ10

When
Your
Energy
Matters
Most



Item #01426 • 100 mg, 60 softgels

1 bottle \$46.50 • 4 bottles \$39 each

When every second counts, you need to make sure energy levels are up for any task. **Super Ubiquinol CoQ10 with Enhanced Mitochondrial Support™** can help.

Formulated with a highly-absorbable form of CoQ10 and a patented delivery system, our best-selling CoQ10 formula promotes your heart health and your body's youthful cellular energy production, so you can get the job done.

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.

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.



Restore Smoother, Youthful-Looking Skin from the Inside Out

Wrinkling, dryness, and loss of firmness are outward signs of normal aging.

One reason is loss of **ceramides** that are required for skin to retain its **moisture** and youthful suppleness.

Skin Restoring Ceramides contains wheat-derived ceramide lipids in an oral capsule that **hydrate** the skin and smooth the appearance of fine lines and wrinkles.



Item #02096 • 30 liquid vegetarian capsules

1 bottle \$18.75

4 bottles \$17.25 each

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



Contains wheat. Gluten free.

Ceratiq® is a registered joint-trademark of PLT Health Solutions and Arco, Robertet Group, France.

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.

Matthew McConaughey

The Art of Catching *Greenlights*

BY LAURIE MATHENA



Matthew McConaughey is an Academy Award-winning actor, best known for roles in box-office hits *Magic Mike*, *Failure to Launch*, *Wolf of Wall Street*, and *How to Lose a Guy in 10 Days*.

But underneath his winning smile, chiseled muscles, and party-boy persona, McConaughey is a deep thinker who is on a lifelong quest to better himself.

He's a guy whose number one goal in life was to become a father, who values a relationship with God, and who has kept a journal since he was 15 years old.

McConaughey has lived his life in the spotlight—and he always looked good doing it. Even though he recently turned 50, he's still turning heads.

It's not from good fortune or good genes; it's from being dedicated to working hard and making good lifestyle choices. From caloric restriction and exercise, to supplements like CoQ10 and 7-Keto DHEA, McConaughey's personal health protocols continue to evolve.

McConaughey has always prioritized his physical, mental, and emotional health—and now he's helping others do the same with his nonprofit foundation devoted to teaching high school students to make healthy lifestyle choices.

Staying Fit

Staying physically fit has been important to McConaughey, both professionally—for roles like the dragon slayer in *Reign of Fire* and the stripper in *Magic Mike*—and personally.

Besides eating a healthy diet and drinking lots of water, McConaughey said he doesn't eat his main meal after 6:30 p.m., and he prefers to eat smaller amounts of food, four to five times per day. He drinks a bottle of kombucha (a fermented tea) every day, and he tries to get nine-and-a-half hours of sleep every night.

McConaughey said that breaking a sweat once a day—preferably outside—helps him mentally handle the stress of day-to-day life.

"Stress is part of life. It means you give a damn," said McConaughey on the *Joe Rogan Experience* podcast. "But I know I handle things better... and the outcome is always better... and I enjoy doing it better if I break a sweat and get those endorphins going. That presses reset for me."

McConaughey is known for making dramatic physical transformations for the roles he plays, and he tries to do them in as healthy a way as possible.

For example, he turned to Certified Strength and Conditioning Specialist and supplement expert, Chris Lockwood, PhD, to help him prepare for his role as a male stripper in *Magic Mike*.

Since McConaughey was already in impressive shape and following a healthy diet, Lockwood told *Bodybuilding.com* that he merely tweaked McConaughey's diet by having him increase the amount of lean protein he was eating, decrease the amount of carbs, and add whey protein shakes.

McConaughey had already been taking key supplements like a multivitamin, a green tea product, and CoQ10, but Lockwood said that he also added supplements like 7-Keto DHEA, which is beneficial for burning fat and for metabolic support.

After filming *Magic Mike*, McConaughey once again enlisted

the help of nutritionists to help him safely lose over 50 pounds to play the role of an AIDS patient in *Dallas Buyers Club*.

By consuming a diet of three egg whites for breakfast, five ounces of fish and a cup of vegetables for lunch and dinner, and red wine at night, McConaughey dropped from 188 pounds down to 135.

Most people were stunned by the physical transformation, but McConaughey was struck by the dramatic benefits to his brain from the calorie-restricted diet.

"My mental gain was so acute and so on point," said McConaughey. "I had an incredible amount of mental energy."

Indeed, studies have shown that calorie restriction significantly improves verbal memory scores.¹ And animal studies have shown that it could possibly help you live longer.²

Other roles have called on McConaughey to bulk up his muscles, such as his role as a dragon slayer in *Reign of Fire*. He joked that the McConaugheys are known for their large triceps. "Biceps are for show, but triceps are for dough," his dad would say. McConaughey said he utilizes creatine to help them pop.

"If I take a little bit of creatine, my triceps go bananas," McConaughey said.

The just keep livin Foundation

McConaughey and his wife Camila started the **just keep livin Foundation** in 2009, a nonprofit organization dedicated to empowering high school students by providing them with the tools to lead active lives and make healthy life-style choices.



McConaughy explained, “just keep livin [is] lowercase because life is nobody’s proper noun, and there’s no “g” on the end of *livin* because life’s a verb.”

The just keep livin Foundation teaches students how to be involved in their health, with specific focus on fitness, nutrition, wellness, and community service. It currently serves over 2,500 students in 52 inner-city high schools across the U.S.

The program sets these kids up for success by teaching them to value both themselves and others.

“We just want them to change a few small habits in ways that they can, and in ways that they find enjoyable to do,” said McConaughy.

Just keep livin also teaches important principles to live by, such as finishing what you start. For example, one particular lesson plan is based on this inspirational quote by McConaughy:

“FINISH. Ninety-five percent of people don’t finish what they started. However small the task, only when you finish it can you be proud. No matter what the outcome... FINISH.”

Greenlights

McConaughy recently turned 50. He’s not slowing down, but he is looking back.

McConaughy has journaled since he was 15 years old. He recently revisited those journals, spending months alone poring over 35 years of musings, quotes, and memories, looking back to look forward.

The result was his autobiography, *Greenlights*, a book that quickly topped the *New York Times* Best Selling Books list.

This book is more than the story of McConaughy’s life. Instead, he



said, it’s a “playbook, based on adventures in my life.”

In the book he writes about the greenlights in his life, which he defines as “approvals, support, praise. They’re also cash money, birth, health, success, joy, and fresh starts.”

But perhaps more importantly, he shares how the red and yellow lights—those times he didn’t get the job, or when his father died—were just as important for his learning and personal growth.

He recalls his early life in a tumultuous, working class family, where his parents were divorced twice and married three times to *each other*.

He recalls the miserable year he spent in Australia as an exchange student:

“The time at the [exchange family’s house] was torturous. A livin mental hell,” said McConaughy in *Greenlights*. “Only later did I come

to realize that the suffering and loneliness I experienced would be one of the most important sacrifices of my life. Before my trip to Australia I was never an introspective man. On that trip I was forced to look inside myself for the first time to make sense of what was going on around me. It was a year that shaped who I am today. A year when I found myself because I had to.”

He was also candid about his struggles to stay grounded in the midst of his success, and how he sought peace—and *himself*—by hiking through the jungles of the Amazon and by spending time with the primitive Dogon tribe in Mali, Africa.

“I believe everything we do in life is part of a plan. Sometimes the plan goes as intended, and sometimes it doesn’t. *That’s* part of the plan. Realizing that is a greenlight in itself,” said McConaughy. “The problems



we face today eventually turn into blessings in the rearview mirror of life. In time, yesterday's red light leads us to a greenlight. It's a matter of how we see the challenge in front of us and how we engage with it."

Today, as a married father of three, he has finally found peace with his family, life, and career.

"I've always believed that the science of satisfaction is about learning when, and how, to get a handle on the challenges we face in life," said McConaughey. "We all have scars, we'll get more. So rather than struggle against time and waste it, let's dance *with* time and redeem it, because we don't live longer when we try not to die, we live longer when we're too busy living." •

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

Matthew McConaughey is an Academy Award-winning actor who has starred in over 60 movies. He is the founder of the just keep livin Foundation, a nonprofit organization that helps at-risk high school students make healthier mind and body choices. He is a professor of practice at the University of Texas at Austin, where he teaches a Script to Screen class that he created, and the brand ambassador to the Lincoln Motor Company. In 2020, McConaughey wrote an autobiography called *Greenlights*, which topped the *New York Times* Best Selling Books list.

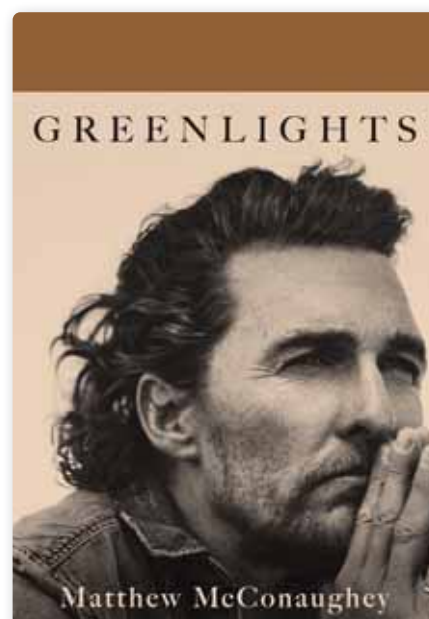
References

1. Witte AV, Fobker M, Gellner R, et al. Caloric restriction improves memory in elderly humans. *Proc Natl Acad Sci U S A*. 2009 Jan 27;106(4):1255-60.
2. Redman LM, Smith SR, Burton JH, et al. Metabolic Slowing and Reduced Oxidative Damage with Sustained Caloric Restriction Support the Rate of Living and Oxidative Damage Theories of Aging. *Cell Metab*. 2018 Apr 3;27(4):805-15 e4.

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

WARNING: This book contains information about Matthew McConaughey's personal life meant for mature audiences.

Item #34181 • Price: \$22.50



HIGHLY ABSORBABLE

Astaxanthin

Supports Heart Health

Astaxanthin is a carotenoid that benefits the brain, heart, skin, and immune system. Research suggests that astaxanthin can play a role in promoting cardiovascular health.¹

Found naturally in seafood and algae, as little as **50%** of **astaxanthin** is normally **absorbed** in the blood-stream.^{2,3}

Life Extension® combines **4 mg** of **astaxanthin** with a blend of four different **phospholipids**, which has been shown to enhance carotenoid **absorption** by **several-fold**.⁴

References

1. *Nutrients*. 2020 Jun; 12(6): 1896.
2. *Mol Nutr Food Res*. 2012 Sep;56(9):1385-97.
3. *Eur J Pharm Sci*. 2003 Jul;19(4):299-304.
4. *Int J Pharm*. 2011 June 30; 412(1-2):99-105.

Item #01923 • 30 softgels
1 bottle \$12

4 bottles \$10.50 each



For full product description and to order
Astaxanthin 4 mg with Phospholipids,
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.



Focus Tea™

**BRAIN-BOOSTER
WITHOUT CAFFEINE**



Item #02212 • One box (14 stick packs)

1 box \$15 • 4 boxes \$13.50 each

Spearmint tea has been shown in **human** studies to boost:¹

- **Mental focus**
- **Working memory**
- **Concentration**

Lab data suggest **spearmint polyphenols** may promote the growth of new **brain cells**.²

Just open a packet, pour **Focus Tea™** into hot water, stir, and enjoy. No steeping needed.



GLUTEN FREE



NON GMO
LE CERTIFIED

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

Neumentix™ is a trademark of Kemin Industries, Inc.

References

1. J Altern Complement Med. 2018;24(1):37-47.
2. Fonseca BA, Herrlinger KA. The effects of a proprietary spearmint extract on neurogenesis rates in rat hippo-campal neurons. Paper presented at: Neuroscience2016; San Diego, CA.

Food Fix

*How to Save Our Health, Our Economies,
Our Communities, and Our Planet—One Bite at a Time*

BY MARK HYMAN, MD



Reversing the global epidemic of chronic disease, healing the environment, and reviving economies, can all be accomplished through, in one word: Food.

In his latest book, *Food Fix*, Mark Hyman, MD, Cleveland Clinic doctor and best-selling author, explains how our current agriculture policies are driving chronic disease, climate change, poverty, violence, and more.

According to Hyman, ultraprocessed foods kill **11 million** people every year and make **60%** of Americans sick with a chronic disease.

How we grow food is the number one cause of climate change—and the culprit behind the alarming loss of soil, water, biodiversity, and pollinators.

Due to current farming practices, it is estimated that the world will run out of topsoil in just 60 more harvests. No topsoil means no food.

We are depleting fresh water sources at **one trillion gallons** more per year than can be replenished by rain.

According to Dr. Hyman, we don't need to fix the food system for a better future; we need a food fix for a *future*.

Fortunately, there are solutions.

In addition to highlighting the enormity of the problem, *Food Fix* provides practical solutions for creating healthier individuals, healthier farming practices, and ultimately a healthier planet.

In this interview with *Life Extension*®, Dr. Hyman talks about why we desperately need a “food fix”—and provides specific suggestions for ways to restore the broken system.

—LAURIE MATHENA

LE: Why are we in such desperate need of a “food fix?”

Dr. Hyman: Our most powerful tool to reverse the global epidemic of chronic disease, heal the environment, reverse climate change, end poverty and social injustice, reform politics, and revive economies is food.

The food we grow, how we grow it, and the food we eat have tremendous implications not just for our waistlines but also for our communities, the planet, and the global economy.

Chronic disease is now the single biggest threat to global economic development. Lifestyle-caused diseases such as heart disease, diabetes, and cancer now kill nearly 50 million people a year, more than twice as many as die from infectious disease.

Lobbyists’ influence over policy makers has put corporations, not citizens, at the center of every aspect of our food system, from what and how food is grown to what is manufactured, marketed, and sold.

When money rules politics, it results in our current uncoordinated and conflicting food policies, which subsidize and protect and facilitate Big Food’s and Big Ag’s domination of our food system to the detriment of our population and our environment.

LE: How do these companies have such a big influence on the system?

Dr. Hyman: Big Ag and Big Food co-opt politicians, public health groups, grassroots advocacy groups, scientists, and schools, and pollute science and public opinion with vast amounts of dollars and misinformation campaigns.

The consolidation and monopolization of the food industry over the last 40 years from hundreds of different processed-food companies, seed companies, and chemical and fertilizer companies into just a few dozen companies make it the largest collective industry in the world, valued at approximately \$15 trillion, or about **17%** of the entire world’s economy.

And it is controlled by a few dozen CEOs who determine what food is grown and how it is grown, processed, distributed, and sold. This affects every single human on the planet.

We are also depleting nature’s capital—capital that, once destroyed, may only be able to be partially reclaimed. The threat is not only to our health and our children’s future, but also to the health of the planet that sustains us.

Our industrial agricultural and food system is the single biggest cause of climate change, exceeding all use of fossil fuels.

Current farming practices may cause us to run out of soil and fresh water in this century. We are destroying our rivers, lakes, and oceans by the runoff of nitrogen-based fertilizers, which is creating vast swaths of marine dead zones.

LE: How do current farming practices impact our health?

Dr. Hyman: Eleven million people die every year from a bad diet. And more than a billion people in the world are overweight and sick from eating our processed, industrialized diet and not eating a healthy, whole foods diet. In fact, the number one factor causing these deaths is the lack of fruits and vegetables in our diet.

The sad thing is that in America only **2%** of our farmland is used to grow fruits and vegetables, despite our government’s recommendations that **50%** of our diet should be fruits and vegetables.

Fifty-nine percent of our farmland is used to grow commodity crops (corn, wheat, soy) that get turned into ultraprocessed foods that we know are deadly. These processed foods make up about **60%** of our diet!





Why does this matter? For every **10%** of your diet that comes from processed food, your risk of death goes up **14%**. That means a lot of extra deaths because we support agriculture that creates food that makes us sick and fat and harms the environment, and not the production of fruits and vegetables and whole foods that make us healthy.

The complexity of the problem prevents people from connecting the dots and taking action. And most of the true costs are not even recognized, limiting the motivation to change the system.

LE: What is the economic impact?

Dr. Hyman: The World Economic Forum estimated that between 2010 and 2030 the global health care costs for chronic disease will exceed \$47 trillion.

They declared this the single biggest threat to global economic development. General Motors spends more on health care than on steel, and Starbucks spends more on health care than on coffee beans!

Any way you slice it, the costs of obesity and chronic disease are weighing the world down. There is little health care infrastructure, few doctors and nurses to treat these problems, and even less money. The “cheap” food that causes disease is not so cheap after all.

LE: How do America’s food policies impact this situation?

Dr. Hyman: If I had to describe the state of America’s food policies in one word, it would be this: chaos! If I got a second word, it would be: disaster.

Eight agencies oversee the government’s food-related policies, and they largely work in silos. They rarely coordinate with one another to achieve a common goal, which makes their policies confused and conflicted. In many cases, they directly contradict one another.

On top of that, most of our food and agriculture policies undermine public health, harm the environment, and increase private profits.

LE: How is the government subsidizing this problem?

Dr. Hyman: Some of the most heavily subsidized foods, like corn and soybeans, are plants that are not inherently unhealthy. But the vast majority of these crops are not consumed whole.

Only **1%** of American-grown corn is sold and eaten whole as corn on the cob. Much of the rest is either fed to factory-farmed livestock to fatten them up before slaughter or converted into biofuels.

As for what does hit your plate, America’s heavily subsidized bounty of corn and soy may start out as whole foods, but by the time you eat them, they’ve been manufactured into ultraprocessed oils and sweeteners and food additives.

Even worse: If those farmers want to diversify and grow tomatoes and broccoli on their farms, they lose all their government support.

As a result of farm subsidies, taxpayers are footing the bill for the chronic disease epidemic while simultaneously underwriting the production of the very foods that are causing it.

LE: Food is the problem...but it’s also the solution.

Dr. Hyman: The reason this problem is pretty much ignored or attacked piecemeal is that this epidemic has come on fast and furiously over the last 40 years and blindsided society and governments. And better medication or medical care can’t solve these chronic diseases.

The solution? Our forks.

Mounting research proves that food is medicine and demonstrates how whole foods, especially an increase in vegetables and fruit, can prevent or reverse chronic disease.

At Geisinger Health Systems, providing food-insecure poorly controlled type II diabetics with a year's worth of whole foods reduced health care costs by **80%** and dramatically improved their health outcomes.

According to Dr. Dariush Mozaffarian, "The idea of food as medicine is not only an idea whose time has come. It's an idea that's absolutely essential to our health care system."

LE: Let's switch gears and talk about the environmental impact of our current food system. How are current farming practices harming the planet—and threatening our future?

Dr. Hyman: Our food system isn't just making the world's population sick; it's making the environment sick. Innovations in agriculture over the last century have allowed us to produce more food than ever, but at a serious cost.

The methods we use to grow food are contributing to our future inability to grow food, by increasing

greenhouse gas emissions, raising temperatures, and making current cropland unfarmable.

The U.N. projects that in 60 years we may completely "mine" all our topsoil, making it almost impossible to grow food. Soil gone. No food. No people. That's 60 more harvests.

What will your grandchildren eat?

Water scarcity is also a huge issue; at the World Economic Forum, I heard Jim Kim, the former head of the World Bank, say, "The wars of the future will be fought over water, not oil."

Through tillage and erosion, soils have lost 133 billion tons of carbon into the atmosphere since we started farming, driving global warming.

Big fertilizer conglomerates produce 20 million metric tons of fertilizer a year using fossil-fuel-intensive processes. When that fertilizer is applied to farms, the damage is wrought on the soil, and it weakens plants, pollutes water systems, and drives huge external costs.

Halting land degradation has become an urgent global imperative.

LE: How could regenerative agriculture help solve the water shortage problem?

Dr. Hyman: Water is a limited resource. Only **5%** of water on the planet is fresh water. We are depleting our ancient aquifers faster than rainfall can replenish them.

The biggest one in America, the Ogallala Aquifer in the Midwest, is being depleted by more than a trillion gallons more a year than can be refilled by rain. Irrigation of crops is the main cause.

Dirt can't hold water. Soil can. If we switched to range (grass)-fed regenerative livestock production, we would restore soils, draw down carbon (reversing climate change), and store massive amounts of water, which can prevent floods and droughts.

LE: What could be done politically to change this destructive system?

Dr. Hyman: For starters, the government has to reform its subsidies system. Farmers need incentives to





FOR MORE INFORMATION

For a quick reference guide to all the solutions outlined in *Food Fix*, visit www.foodfixbook.com. To learn more about any of the issues that stem from our food industry, take a look at the online resource guide for articles, studies, reports, books, videos, companies, and organizations that are raising awareness and changing the conversation at www.foodfixbook.com/resources.

Reprinted with permission from *Food Fix* by Mark Hyman, copyright © 2020. Published by Little, Brown Spark, an imprint of Little, Brown Books.

grow more nutritious foods using regenerative practices.

Subsidies should also support farmers to transition to organically or regeneratively grown crops, grass-fed and grass-finished pasture-raised livestock, and organically produced milk. These subsidies can help farmers buy new seeds, develop new crops, and purchase new farm equipment that will help them transition to more regenerative practices.

Beyond subsidies, the federal government feeds millions of people in schools, hospitals, and prisons, as well as military and government workers.

It can promote healthy eating and create markets for farmers by requiring that schools, prisons, and military bases use a percentage of their budgets to buy locally sourced food from nearby farms and, at the very least, healthy whole foods that promote health rather than disease.

A national food policy would transform our broken food system into one that aligns public health objectives with economic and

environmental goals. It would make healthful choices the default option for Americans while slashing health care costs and helping farmers, protecting the environment, and reversing climate change.

LE: How can individuals advocate for change?

Dr. Hyman: These are just a few of the many innovations and ideas moving from the margins to the center and providing a road map for fixing our food system.

It is the great work of our time. And it depends on all of us.

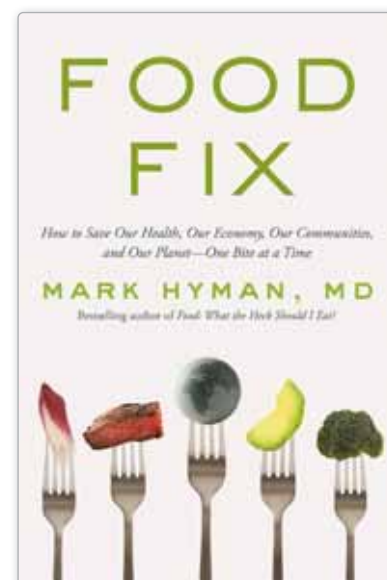
We need a national (and ultimately global) campaign to fix our food system. If you're interested in helping transform our food system and want to learn more, please join our campaign and prescription for a new food system at www.foodfix.org. •

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

ABOUT THE AUTHOR:

Mark Hyman, MD is the Head of Strategy and Innovation for the Cleveland Clinic Center for Functional Medicine, and founder and director of The UltraWellness Center. He is the bestselling author of numerous books, including, *Food: What the Heck Should I Cook?; Eat Fat, Get Thin;* and *The Blood Sugar Solution 10-Day Detox Diet*.

To order a copy of *Food Fix*, call 1-800-544-4440 or visit www.LifeExtension.com
Item: #34179 • Price: \$21



OPTIMIZED FUCOIDAN

THE JAPANESE SECRET OF LONGEVITY

For thousands of years, the Japanese, who have one of the longest lifespans in the world,¹ have been consuming a type of brown seaweed that is rich in a molecule called **fucoidan**.

Over 1,000 published studies have found that **fucoidan**:²⁻⁶

- Promotes DNA protection
- Supports a healthy immune system
- Promotes tissue regeneration
- Sustains cell-to-cell communication

Maritech® 926 fucoidan is sourced from hand-harvested, wild seaweed found exclusively in pristine ocean water.

One capsule of **Optimized Fucoidan with Maritech® 926** provides **88.5 mg** of standardized *Undaria pinnatifida* extract, equaling the amount of fucoidan typically found in a traditional Japanese diet.⁷⁻⁹ Most people require only one capsule daily, though aging individuals seeking to enhance the benefit may choose to take two per day.

Item #01513 • 60 vegetarian capsules
1 bottle **\$27** • 4 bottles \$24.75 each

For full product description and to order **Optimized Fucoidan with Maritech® 926**, call 1-800-544-4440 or visit www.LifeExtension.com

Maritech® 926 is a registered trademark of Marinova Pty Ltd.

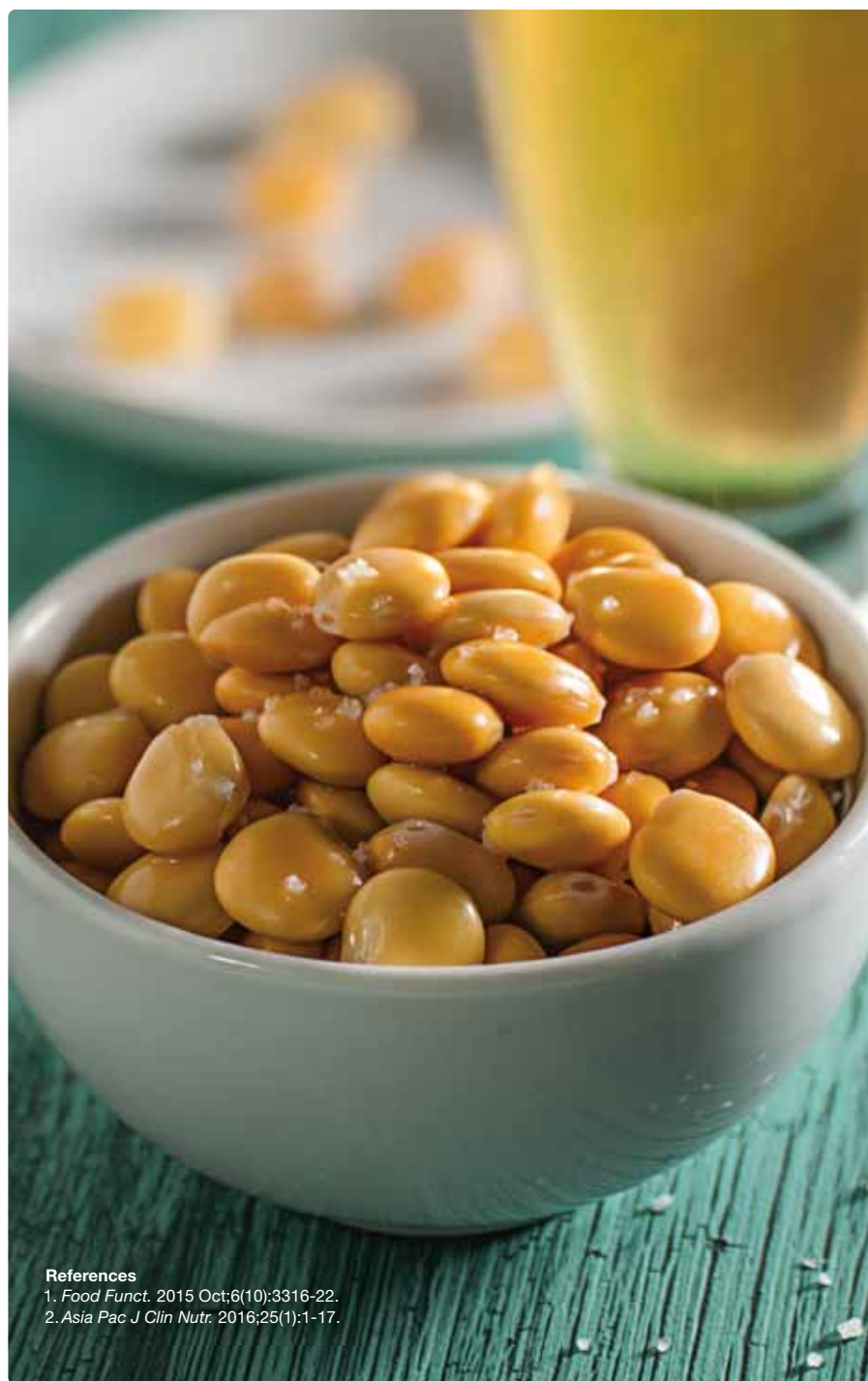


References

1. *Asia Pac J Public Health*. 2003;15 Suppl:S3-9.
2. *Molecules*. 2014 May 9;19(5):5981-98.
3. *Antibiot Khimioter*. 1995 Feb;40(2):9-13.
4. *J Pharm Pharmacol*. 2008 Apr;60(4):499-503.
5. *Biol Pharm Bull*. 2004 Feb;27(2):266-70.
6. *Annu Rev Biochem*. 2004;73:491-537.
7. *Biosci. Biotechnol Biochem*. 73(2):335-38.
8. *J Korean Fish Soc*. 28(2):227-36.
9. *Asia Pac J Clin Nutr*. 2009; 18(2):145-54.

Lupini Beans

BY LAURIE MATHENA



References

1. *Food Funct.* 2015 Oct;6(10):3316-22.
2. *Asia Pac J Clin Nutr.* 2016;25(1):1-17.

Lupini beans are a common snack in Mediterranean regions, dating back as far as 4,200 years. But they've only made an appearance in the U.S. in recent years.

Raw lupini beans are a protein powerhouse ready to meet the growing demand for plant-based protein sources.

Lupini beans (also called *lupin* beans) provide **more** protein than chickpeas, **fewer** carbs than pistachios, and **fewer** calories than almonds.

They also have more fiber than chickpeas, oats, and quinoa.

Lupini beans contain very little starch or sugar, making them an ideal low-carb option for type II diabetics or anyone else concerned about keeping their blood sugar balanced.

An in-vitro study found that lupini beans increase the generation of short-chain fatty acids in the gut, while also increasing the population of good gut bacteria.¹

Numerous randomized, controlled clinical trials have shown that replacing meat with legumes like lupini beans has a positive impact on longevity, diabetes, cardiovascular disease, and weight management.²

Eating lupini beans may also lower blood pressure, improve blood lipids, and improve insulin sensitivity.²

Consumed whole, lupini beans can be added to salads or combined with roasted vegetables.

When they're ground up, these beans have a neutral taste, making them a versatile dish that can take on the flavor of any spices for which you're in the mood. They also provide a low-carb option to quinoa or rice.

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

BRAIN HEALTH

- 01524 Acetyl-L-Carnitine
- 01974 Acetyl-L-Carnitine Arginate
- 01659 Citicoline® (CDP-Choline)
- 02321 Cognitex® Basics
- 02396 Cognitex® Elite
- 02397 Cognitex® Elite Pregnenolone
- 01540 DMAE Bitartrate (dimethylaminoethanol)
- 02006 Dopa-Mind™
- 02212 Focus Tea™
- 01658 Ginkgo Biloba Certified Extract™
- 01527 Huperzine A
- 00020 Lecithin Granules
- 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
- 54160 Black Vinegar
- 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
- 01805 Asian Energy Boost
- 00972 D-Ribose Powder
- 01473 D-Ribose Tablets
- 01900 Energy Renew
- 01544 Forskolin
- 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
- 01647 PQQ Caps • 20 mg
- 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
- 00463 Flaxseed Oil
- 01937 Mega EPA/DHA
- 02218 Mega GLA Sesame Lignans
- 01983 Super Omega-3 EPA/DHA Fish Oil, Sesame Lignans & Olive Extract
- 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 Sweetener
- 00432 Stevia™ Sweetener

GLUCOSE MANAGEMENT

- 01503 CinSulin® with InSea2® 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 (Dehydroepiandrosterone) 15 mg, 100 capsules
- 00335 DHEA (Dehydroepiandrosterone) 25 mg, 100 capsules
- 00882 DHEA (Dehydroepiandrosterone) 50 mg, 60 capsules
- 00607 DHEA (Dehydroepiandrosterone) 25 mg, 100 vegetarian dissolve in mouth tablets
- 01689 DHEA (Dehydroepiandrosterone) 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 with 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®
- 00955 Immune Protect with PARACTIN®
- 02005 Immune Senescence Protection Formula™
- 29727 Kinoko® Gold AHCC
- 24404 Kinoko® Platinum AHCC
- 00316 Kyolic® Garlic Formula 102
- 00789 Kyolic® Reserve
- 01681 Lactoferrin (Apolactoferrin) Caps
- 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 Boswellia
- 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 Serrafazyme
- 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
- 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
- 00550 Chlorella
- 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 Polyphenol Extract
- 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 with 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
- 30731 Ionic Selenium
- 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
- 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 PEA 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
- 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
 80176 Collagen Boosting Peptide Cream
 80156 Collagen Boosting Peptide Serum
 02408 Collagen Peptides for Skin & Joints
 80169 Cucumber Hydra Peptide Eye Cream
 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
 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 Liquid Emulsified
 02244 Liquid Vitamin D3 • 2,000 IU, 1 fl oz
 02232 Liquid Vitamin D3 • 2,000 IU, 1 fl oz, mint
 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
 1,000 mg, 60 veg tablets
 02227 Vitamin C and Bio-Quercetin Phytosome
 1,000 mg, 250 veg tablets
 01753 Vitamin D3 • 25 mcg (1,000 IU), 90 softgels
 01751 Vitamin D3 • 25 mcg (1,000 IU), 250 softgels
 01713 Vitamin D3 • 125 mcg (5,000 IU), 60 softgels
 01718 Vitamin D3 • 175 mcg (7,000 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
 01492 Optimized Irvingia with Phase 3™ Calorie Control Complex
 01432 Optimized Saffron
 00818 Super CLA Blend with Sesame Lignans
 01902 Waist-Line Control™
 02151 Wellness Code® Appetite 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

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



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.

HIGHLY PURIFIED

Fish Oil



EPA/DHA FISH OIL +
SESAME LIGNANS + OLIVE EXTRACT

EPA/DHA FISH OIL +
SESAME LIGNANS + OLIVE EXTRACT +
KRILL + ASTAXANTHIN



SUPER OMEGA-3*
EPA/DHA Fish Oil,
Sesame Lignans & Olive Extract
(2,400 mg of EPA + DHA in four softgels)

Item #01982 • 120 softgels
1 bottle \$24 • 4 bottles \$21 each



SUPER OMEGA-3 PLUS
EPA/DHA Fish Oil, Sesame Lignans,
Olive Extract, Krill & Astaxanthin
(2,520 mg of EPA + DHA in four softgels)

Item #01988 • 120 softgels
1 bottle \$33.75 • 4 bottles \$31.50 each

For full product description and to order **Super Omega-3**, or
Super Omega-3 Plus, call 1-800-544-4440 or visit www.LifeExtension.com

CAUTION: If you are taking anti-coagulant or anti-platelet medications, or have a bleeding disorder, consult your healthcare provider before taking this product.

* Highest Independent 5-star rating, International Fish Oil Society For Over Nine Years.
IFOS™ certification mark is a registered trademark of Nutrasource Diagnostics, 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 Science of a Healthier Life®

PO BOX 407198
FORT LAUDERDALE, FLORIDA 33340-7198



IN THIS EDITION OF *LIFE EXTENSION*® MAGAZINE



24 RESTORE YOUTHFUL CELL FUNCTION

Scientists have identified methods to reduce toxic waste that accumulates inside aging cells by turning on a natural cleansing process called **autophagy**.

34 MAGNESIUM'S ROLE IN HEART HEALTH

More than half of all Americans have *low* magnesium levels, which predisposes them to higher risks of illnesses including cardiovascular disorders.



44 PROTECT GUM TISSUE WITH BENEFICIAL BACTERIA

Two **probiotics** *improve gum health* and *reduce oral plaque*.

52 BRAIN-PROTECTIVE EFFECTS OF GREEN TEA

Green tea polyphenols promote the formation of new brain cells and neural connections. Green-tea drinkers were shown to have a **35% reduced** incidence of cognitive disorders.

71 WHY I RECOMMEND CoQ10 FOR MY PATIENTS

Dr. Joel Kahn discusses how **coenzyme Q10** helps cardiac patients prevent heart failure, heart attacks, and other cardiovascular issues.



79 MATTHEW McCONAUGHEY'S PERSONAL AGE-DELAY PROGRAM

Acclaimed actor **Matthew McConaughey** follows a holistic health program that includes caloric restriction, exercise, and supplements. He details it all in his book, *GREENLIGHTS*.

VISIT US ONLINE AT LIFEEXTENSION.COM