Probiotic Relief from Seasonal Allergies

LifeExtension®

LifeExtension.com

Stay Healthy, Live Better

May 2019

New Way to Benefit with GREEN TEA

Dangers of Excess Insulin

Taurine Grows New Brain Cells

Proton-Pump Inhibitors Increase Liver Cancer Risk

Age-Reversal Research Update

$5.99US $5.99CAN
05>
0 71486 01139 2

Compare **TWO-PER-DAY** *to* the Leading Brand **CENTRUM®**

The **Two-Per-Day** multinutrient formula is superior to commercial multivitamins because it provides vastly ***higher*** potencies of **vitamins**, **minerals** and **plant extracts**.

Centrum® Can't Compete

TWO-PER-DAY provides:

- **50 times the vitamin B1**
- **25 times the vitamin B6**
- **12 times the vitamin B12**
- **10 times the biotin**
- **10 times the selenium**
- **8 times the vitamin C**
- **2.5 times the vitamin B3**
- **2 times the vitamin D**
- **2 times the vitamin E**
- **2 times the zinc**

Two-Per-Day Capsules
Item #02314 • 120 capsules (2-month supply)

	Retail Price	Your Price
1 bottle	$24	**$18**
4 bottles		**$16 each**

Two-Per-Day Tablets
Item #02315 • 120 tablets (2-month supply)

	Retail Price	Your Price
1 bottle	$23	**$17.25**
4 bottles		**$15.50 each**

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

* Rated based on results of the 2018 ConsumerLab.com Survey of Supplements Users. More information at www.consumerlab.com/survey2018

Lycored Lycopene™ is a registered trademark of Lycored; Orange, New Jersey. SelenoExcell® is a registered trademark of Cypress Systems Inc. L-OptiZinc ® and logo are trademarks of Lonza or its affiliates. Crominex® 3+, Capros® and PrimaVie® are registered trademarks of Natreon, Inc.

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

LifeExtension Magazine

Table of Contents

Volume Twenty Five / Number Five • May 2019

REPORTS

MAXIMIZE GREEN TEA BENEFITS

Published studies show that drinking ***large*** amounts of **green tea** reduces the risk of degenerative disorders. A novel **extract** provides **8** different catechins—the equivalent of up to **12 cups** of standard green tea.

DEPARTMENTS

LifeExtension® Magazine

MAY 2019 • Volume Twenty Five • Number Five

Connect with Life Extension on the Web!

find us on facebook

Facebook.com/LifeExtension

For instant access to special offers and promotions, product news, and exclusive health and wellness information.

follow us on twitter

Twitter.com/LifeExtension

For up-to-the-minute health tips, breaking industry news, and the latest updates in medical research.

Customer care is available to take your calls **24 hours a day, 7 days a week.**

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 • 954-766-8144

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

Publisher • LE Publications, Inc.

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

Contributors
Michael Downey • Scott Fogle, ND • Amy Huang • Richard Mayer
Laurie Mathena • Susan Weil • Sonia Whitman • Jon VanZile • John Verona

Advertising
Vice President of Marketing • Rey Searles • rsearles@lifeextension.com
National Advertising Manager • Tamu Mills • 404-347-1755

Senior Director of Sales and Business Development
Carolyn Bouchard • cbouchard@lifeextension.com • 954-202-7685

Circulation & Distribution
Life Extension • 3600 West Commercial Blvd., Fort 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 • Wellness email: wellness@LifeExtension.com

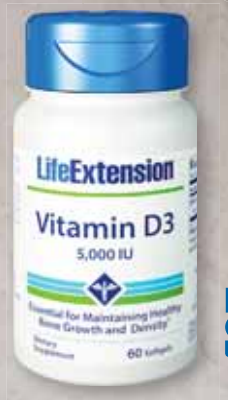
At *Life Extension Magazine*® we value your opinion and welcome feedback.
Please mail your comments to *Life Extension Magazine*,
Attn: Letters to the Editor, PO Box 407198, Fort Lauderdale, FL 33340
or email us: LEmagazine@LifeExtension.com

#1 Rated Catalog/Internet Merchant—3-Time Winner

Ratings based on results of the
2019 ConsumerLab.com
Survey of Supplement Users.
More information at
www.consumerlab.com/survey2018.

LIFE EXTENSION (ISSN 1524-198X) Vol. 25, No. 5 ©2019 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.

DEFEND YOUR HEALTH



NON GMO
LE CERTIFIED

Item #01713 • 5,000 IU • 60 softgels
Retail Price is $10 • **Your Price is $7.50**
4 bottles are only $6.50 each

For full product description and to order **Vitamin D3**, call **1-800-544-4440** or visit **www.LifeExtension.com**

VITAMIN D3

Systemic support for youthful cell function, bone health, and supporting normal insulin and blood-sugar levels.

TOP RATED VITAMIN D PRODUCTS
#1
ConsumerLab.com
CONSUMER SATISFACTION
2 Time Winner!
LIFE EXTENSION
2019

Caution: Individuals consuming more than 2,000 IU/day of vitamin D (from diet and supplements) should periodically obtain a serum 25-hydroxy vitamin D measurement. Do not exceed 10,000 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.

Medical Advisory Board

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

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

Mark S. Bezzek, MD, FACP, FAARM, FAAEM, is board-certified 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.

Carmen Fusco, MS, RN, CNS, is a research scientist and clinical nutritionist in New York City who has lectured and written numerous articles on the biochemical approach to the prevention of aging and degenerative diseases.

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.

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

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

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

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

Herbert Pardell, DO, FAAIM, practices internal medicine at the Emerald Hills Medical Center in Hollywood, FL. He is a medical director of the **Life Extension Foundation®**.

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.

Paul Wand, MD, Fort Lauderdale, FL, is a clinical neurologist with special expertise in treating and reversing diabetic peripheral neuropathy and brain injuries from various causes.

Scientific Advisory Board

Örn Adalsteinsson, PhD, is chairman of the **Life Extension**® Scientific Advisory board. He holds a master's and doctorate from the Massachusetts Institute of Technology (MIT). He has specialized in human therapeutics including vaccines, monoclonal antibodies, product development, nutraceuticals, formulations, artificial intelligence, hormones, and nutritional supplementation. He has also authored articles and contributed to peer-reviewed publications and served as an editor for the *Journal of Medicinal Food*.

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.

Frank Eichhorn, MD, is a urologist specializing in prostate cancer for 10 years. He has a private practice in Bad Reichenhall, Germany, and is prostate cancer consultant at the Urologische Klinik Castringius, Planegg, Munich. In his integrative approach to prostate cancer he works together with an international network of experts to improve treatment outcomes for prostate cancer patients with a special focus on natural and translational medicine.

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.

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.

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

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

Dipnarine Maharaj MD, MB, ChB, FRCP (Glasgow), FRCP (Edinburgh), FRCPath., FACP
Dr. Dipnarine Maharaj 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.

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.

Your Brain Health Is in Your Hands

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

Neuro-Mag®
Magnesium L-Threonate

Item #01603 • 90 veg. caps.
Retail Price is $40

Your Price is $30
4 bottles are only $27 each

Neuro-Mag®
Magnesium L-Threonate
Powder

Item #02032 • 93.35 grams of powder
Retail Price is $38

Your Price is $28.50
4 jars are only $26 each

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

NON GMO

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

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

Tragedy of Delayed Prevention

BY WILLIAM FALOON

We at **Life Extension®** interact with new supporters who come to us with serious disorders, such as failing **kidneys**.

A record number of Americans now require **dialysis** treatments to remove waste products from their blood. **Dialysis** is not nearly as efficient as healthy kidneys that work around the clock.[1,2]

To put this into perspective, the five-year survival rate for patients who start dialysis was only **36%** compared to **86%** for those who received a **kidney transplant**.[3] Neither scenario comes close to having healthy kidneys.

Type II diabetes is a risk factor for kidney disease. Around **10%-40%** of type II diabetics will experience **kidney failure**.[4] Research shows that before diabetes is diagnosed, ***higher-than-normal*** blood **sugar** levels damage kidneys.[5]

A significant part of the American population (about **27%**) has **blood sugar** levels that are ***higher-than-normal—***but not high enough to meet the threshold for **type II diabetes**.[6]

This "prediabetic" phase places people at risk for kidney disease,[5,7] potentially crippling neuropathy,[8,9] heart disorders,[10,11] cancer,[12,13] and stroke.[14]

Our longstanding position is that the term "**prediabetes**" should be **abolished**. Anyone with less-than-optimal **glucose**, **insulin** and **hemoglobin A1c (HbA1c)** blood levels should aggressively intervene to reverse these glycemic markers.

Instead of this logical approach, what usually happens is that elevated **glucose** and **insulin** smolder for years.

In many of these cases, type II diabetes is not diagnosed until permanent damage is inflicted.

Drugs to treat type II diabetes are frequently advertised. Too bad TV commercials don't promote comprehensive **blood tests** to identify diabetic risk factors before they cripple or kill.

The tragedy for most victims of degenerative illness is that their disease was **preventable** with ***early***-diagnosis.

This editorial will review recent findings indicating that many Americans needlessly suffer **diabetic complications**. I will also describe an easy way to detect diabetes risk at an ***earlier*** stage, before significant damage is done.

Most readers of this magazine take steps to reduce their risk of diabetes, such as supplementing with **vitamin D**.

In people with ***higher*** vitamin D blood levels **(>50 ng/mL)**, transition from **prediabetes** to **type II diabetes** may be reduced as much as **80%**.[15]

But as I wrote on the previous page, we at **Life Extension®** advocate for the term "**prediabetes**" to be abolished. Our rationale is that the risk of **diabetic complications** is substantially increased even in those with **high-normal** blood glucose levels.

Nerve Damage Starts Early

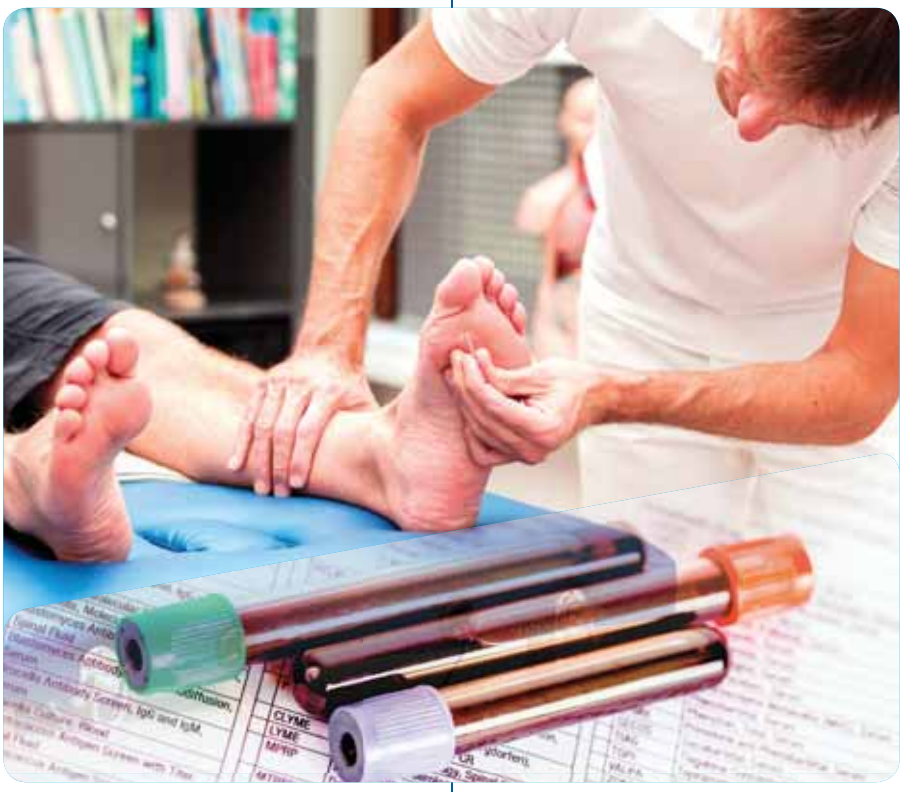
Small, capillary-like blood vessels that are embedded in nerve bundles feed the nerves throughout our bodies, including small and large nerves in our feet.

An elevation of glycemic markers means that excessive blood sugar and glycation are inflicting damage to small nerve fibers by cutting off blood circulation. This is the reason why crippling **neuropathic** pain is often the first sign of **type II diabetes**. This **nerve damage** may have begun decades before.

A **2018** study looked at **hemoglobin A1c** levels in groups of people with and without diabetes.[16]

Hemoglobin A1c is a marker of long-term sugar control, whereas **fasting glucose** only tells us what blood sugar levels are, at a single point in time

This study found subclinical, small nerve-fiber impairments in non-diabetics whose **hemoglobin A1c** levels were only **5.5%** to **6%**, whereas those with **HbA1c** of less than **5.5%** did not have these changes.[16]



This study corroborates what we've argued for decades — that sugar-related pathologies begin long before full-blown type II diabetes is diagnosed. The authors of this study concluded:

"These findings underscore the importance of early treatment at the prediabetes and early diabetes stages to prevent nerve fiber decline that is likely irreversible."[16]

Most of you have your **hemoglobin A1c** tested each year. This **2018** study and others validate the importance of targeting **HbA1c** below **5.5%**.

Keep Your Heart From "Shrinking"

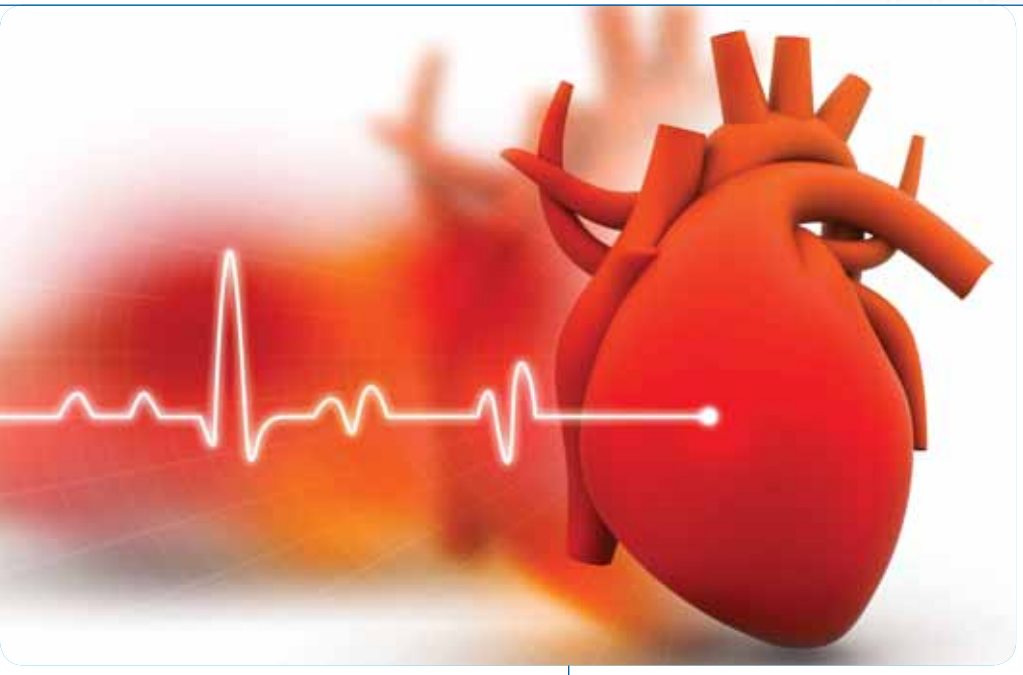
To evaluate the effect of abnormal blood sugar levels on the heart muscle, **MRI scans** were performed on the **hearts** of diabetics and prediabetics and compared to a control group of normal-glycemic subjects. None of the study subjects had a history of cardiovascular disease.[17]

There was a stepwise decrease in right ventricular (heart) volume in men with **prediabetes** (-20.4) and **diabetes** (-25.6) in comparison with non-diabetic controls.[17]

This study shows that atrophy (shrinkage) of the heart muscle occurs in both **prediabetes** and frank **diabetes**,[17] which is why we want the term "**prediabetes**" to be abolished.

The authors of this **2018** study that looked at the **heart** via **MRI** imaging concluded:

"This study points towards early subclinical changes in right ventricular volumes in men with diabetes and prediabetes."[17]



Higher Blood Sugar Increases Atrial Fibrillation Risk

In **atrial fibrillation**, the heart's upper chambers beat irregularly (quiver) instead of beating normally.[18]

Quivering of the heart's upper chambers increases the risk of a clot forming. When these clots break off and enter the bloodstream, they readily lodge in arteries in the brain causing an **ischemic stroke**.[18]

Atrial fibrillation causes about **15%** to **25%** of strokes. The danger of these clots is so high that atrial fibrillation patients are usually placed on **anticoagulant drugs** (warfarin or Pradaxa®).[19]

These drugs carry the **side effect** of risk of **internal bleeding**.[19] Yet the incidence of abnormal blood **clot** formation is so high in **atrial fibrillation** that the risk-to-reward ratio often favors use of these anti-coagulant drugs.

Atrial fibrillation is the most prevalent cardiac rhythm disorder in the elderly.[20] A meta-analysis of 32 studies found that **prediabetics** have a **20%** increased risk of atrial fibrillation while **diabetics** have a **28%** increased risk.[21]

Stroke was long ago shown to be a diabetic complication. One pathological factor is damage inflicted on the brain's arteries by elevated blood sugar.[22]

This new data reveals another reason why diabetics suffer more strokes. They have ***higher*** incidences of **atrial fibrillation**. This analysis also reveals that atrial fibrillation risk in **prediabetics** is not that much lower than in full-blown diabetics.[22]

Impaired Cardiac Fitness

Not all overweight people are diabetic.

A group of researchers examined relationships between **glycemic control** (as measured by **hemoglobin A1c**) and **cardiovascular fitness** in overweight/obese subjects with and without type II diabetes.[23]

A statistically significant relationship was observed between lower **hemoglobin A1c** and better **cardiovascular fitness**.[23]

The authors of this published study commented that even a mild **worsening** of **glycemic control** can adversely influence cardiovascular health measures.[23]

Recognizing "Prediabetic" Risks

About **86 million** people in the United States fit the clinical definition for **prediabetes**.[6] This represents about **27%** of the entire population of the United States.

Prevalence of **prediabetes** increased each year between 2011 and 2014, which contributed to the nearly **2 million** new diagnoses of **type II diabetes** made each year.[6]

A detailed analysis published in **2018** found that **type II diabetics** had higher adjusted odds of suffering **cardiovascular** and **kidney diseases** compared to **prediabetics**.[6]

Prediabetics, on the other hand had more of the following disorders compared to diagnosed type II diabetics:[6]

- Cancer
- Arthritis
- Depressive disorder
- Chronic obstructive pulmonary disease

One reason prediabetics have higher rates of the above diseases is that most **type II diabetics** are treated with a drug (metformin) that increases cellular **AMPK** activity.

Activating AMPK has been shown to help protect against a host of degenerative diseases.[24-26]

Prediabetes and Hypertension

High blood pressure and high blood sugar severely impact the **heart** and **kidneys**.

A study published in **2018** looked at hypertensive patients with and without prediabetes. The following "cardiovascular events" were evaluated:[10]

- Cardiovascular death
- Stroke
- Heart failure
- Myocardial infarction

The incidences of these cardiovascular events were **61%** higher in the **prediabetic** group compared to those with normal blood glucose levels.[10]

This study also found a correlation between **kidney** impairment and increased **cardiovascular events**. This finding corroborates similar conclusions from previous studies.[10]

Hemoglobin A1c Blood Level and Stroke Risk

A systematic review of 29 prior studies assessed the association between rising **hemoglobin A1c** and first **stroke** risk.[22]

In this review, the risk of ischemic strokes—the most common type—increased with each **1%** increase in HbA1c. In diabetics the risk of ischemic stroke increased **24%** with each **1%** increase in HbA1c. But in those without diabetes, stroke risk increased a whopping **49%** for each **1%** increase in HbA1c.[22]

You may wonder why stroke risk is ***higher*** in non-diabetics. My opinion is that it's because **diabetics** usually receive preventive treatment for stroke risk factors (such as elevated blood pressure and lipids), adhere to healthier diets, and are prescribed **AMPK activator** drugs like **metformin**.

Non-diabetics may not take their elevated glycemic markers seriously.

Diabetes Increases Cancer Risk

Data collected from 47 prior studies further confirm that **diabetes** heightens the risk for **cancer**.

The overall findings showed that **women** with diabetes are **27%** more likely to develop cancer while diabetic **men** are at **19%** increased risk.[27]

Higher **blood sugar** levels have been associated with elevated cancer risks, including **pancreatic** and **breast** malignancies.[28,29]

Long before type II diabetes is diagnosed, huge amounts of insulin are produced to suppress surging blood glucose levels. The combination of elevated **insulin and glucose** in diabetics fuels unwanted cell proliferation and damages cell regulatory mechanisms.

The result is an increased risk of deadly cancers. Authors of this 2018 analysis concluded:

"We have also demonstrated for the first time that women with diabetes are more likely to develop any form of cancer (than men), and have a significantly higher chance of developing kidney, oral, and stomach cancers and leukemia."[30]

We have previously reported on studies showing that ***higher-than-normal*** blood sugar sharply increases breast cancer risk in non-diabetic women.[31,32]

Keeping your ***glycemic*** markers in low normal ranges should be part of a cancer prevention strategy.

This study showed that a small increase in **HbA1c** blood levels is associated with increased first-ever ischemic or hemorrhagic stroke risk, whether or not one is diagnosed with diabetes. This led the authors of this 2018 analysis to conclude:

"These findings suggest that more intensive HbA1c glycemic control targets may be required for optimal ischemic stroke prevention."[22]

Optimal HbA1c is under **5.5%**. When HbA1c levels rise to **6.5%**, there is a substantially greater risk of **stroke**. This observational analysis suggests **non-diabetics** (in addition to diabetics) benefit from better **glycemic** control.[22]

Tragedy of Delayed Prevention

Each day, 5,000 Americans perish from a degenerative illness.[33] Far more suffer from a chronic disease that impairs their quality of life.

The majority of these disabilities and deaths are **preventable** with annual comprehensive **blood tests**.

The absurdity is that many Americans wait for a diabetic complication to manifest (such as neuropathy, stroke, or kidney failure) before paying attention to their glycemic risk markers.

Several times a week, I review new data confirming that even slightly elevated blood **glucose** or **hemoglobin A1c** predisposes us to increased risks faced by diabetics.

The good news is that these risk factors can be lowered using a variety of proven interventions.

Annual Blood Test Super Sale

With normal aging, our cellular **insulin sensitivity** decreases.[34,35] The result is higher blood sugar that can be measured with readily available blood tests.

Comprehensive **blood tests** uncover *early* markers of disease that are reversible if detected in time.

Yet the inconvenience of doctors' appointments (and increasing cost) causes many people to delay having their blood tested.

Life Extension® broke down these barriers decades ago by offering comprehensive blood testing direct to our supporters.

Once a year we **discount** prices to enable our readers to have comprehensive testing done for only **$199**. These same tests at commercial labs cost far more.

With thousands of blood-drawing stations available across most of the United States, either on a walk-in basis or by appointment, there is no need to delay.

These tests provide evaluations for cardiovascular and cancer risk factors. This enables individuals to change their unhealthy behavior patterns before serious illness manifests.

Turn this page to see the descriptions of the many tests that are included in our **Male** and **Female Blood Test Panels**. These panels include **hemoglobin A1c**, **glucose**, and measures of **kidney function**.

This year we've added **fasting insulin** to these popular panels to better enable our readers to achieve *optimal* glycemic control. See the box on the next page to learn why it is so important to know your **fasting insulin** level when seeking to protect against hidden pathologies caused by excessive blood sugar.

To order the **Male** or **Female Panel** at the year's lowest prices, call **1-800-208-3444** or log on to LifeExtension.com/blood

For longer life,

William Faloon, Co-Founder
Life Extension Buyers Club

How Diabetes Hides from Physicians

Young people who eat properly and are physically active typically maintain optimal glycemic control.

When a meal is consumed, their pancreas secretes **insulin** to move **glucose** into cells for energy metabolism. After meals, insulin production drops to a low level, just enough to keep blood glucose in proper balance.

With aging, our cells lose **insulin sensitivity**. This requires more insulin to be secreted to drive glucose into cells, including **fat cells**.[34,36]

Increased **fat storage** occurs when the body is overloaded with more glucose than is needed for healthy energy production. Excess insulin helps cells convert glucose into fat. Unwanted **weight gain** is a frequent consequence.

As people become more sedentary and consume excess calories, even more insulin is secreted to maintain balanced glucose levels.

Excess Insulin Can Cover Up Glycemic Control Problems

Long before type II diabetes is diagnosed, many people secrete large amounts of **insulin** from their pancreas to keep glucose from spiking too high.

The problem is that continuous secretion of **insulin** from the pancreas can keep **fasting glucose** and **hemoglobin A1c** at deceptively low levels.

To put this in perspective, late-stage **type II diabetics** often require **insulin injections**. This exogenous-administered insulin reduces **glucose** and **hemoglobin A1c** blood levels. But these people are still **diabetic** from the standpoint of their risk for complications.

Common blood measures of diabetes **(glucose** and **hemoglobin A1c)** may also be suppressed in many people whose pancreas are secreting ***large*** amounts of **insulin** around the clock.

In other words, a person can suffer from the damaging pathologies that we usually associate with diabetes even when **glucose** and **HbA1c** blood levels appear normal. That's because chronically elevated **insulin** can push down glucose (and hemoglobin A1c) for years (or decades) before cellular insulin sensitivity becomes so impaired that full-blown **type II diabetes** is diagnosed.

Chronically elevated **fasting insulin** has been associated in many studies with greater risk of diabetic complications, even before diabetes shows up on conventional blood tests.[37-40]

For these reasons, we are adding a **fasting insulin** test to this year's popular **Male** and **Female Panels**…at no extra charge!

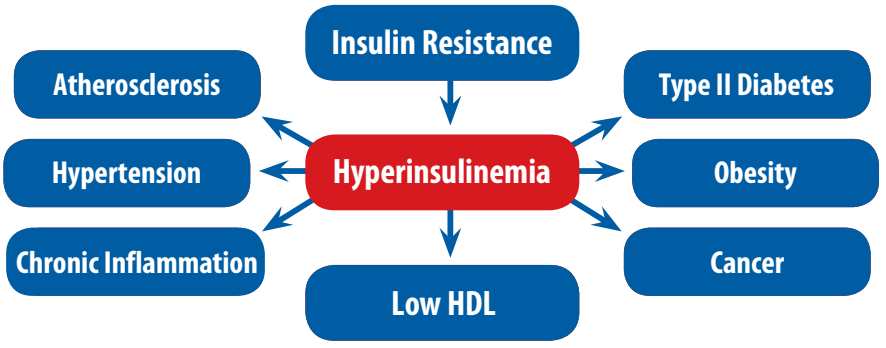
This will better enable our supporters to assess their glycemic control status by reviewing their **glucose**, **hemoglobin A1c** and **insulin** blood levels simultaneously.

How to Lower Elevated Insulin

If **fasting insulin** is higher than **5 uIU/mL**, this is an indicator of insulin resistance and can be useful as an early warning sign to be more vigilant in preventing diabetes.

This includes healthier food choices, more physical activity, and initiation of a preventive program with **AMPK activators** like the drug **metformin**[41,42] and/or nutrients that have similar effects (like gynostemma leaf extract[43-45] and hesperidin[46-48]).

The article beginning on page 56 of this month's issue describes health concerns, including inability to lose surplus **body fat** that are associated with excess **fasting insulin**. We also convey observational data that associate higher **fasting insulin** levels with increased prevalence of degenerative disorders. *(References can be found on page 14.)*



Excess insulin and insulin resistance cause deleterious changes in many biochemical pathways that can lead to the development of a number of degenerative diseases and potentially life-threatening metabolic consequences.[49-61]

Comprehensive Blood Tests at Low Super Sale Prices

The value of the **Male** and **Female Blood Panels** improves as more tests are added at no additional cost. Last year, **apolipoprotein B** was added to better measure **vascular** risk. This year, **fasting insulin** has been added to provide a clearer picture of one's metabolic status. If elevated, steps to reduce **fasting insulin** can help assist with **weight loss** and achieving better **glucose** control.
See the huge number of parameters included in these test panels:

MALE PANEL

METABOLIC PROFILE
NEW
Glucose
Insulin
Hemoglobin A1c
Kidney function tests: creatinine, BUN, uric acid, BUN/creatinine ratio
Liver function tests: AST, ALT, LDH, GGT, bilirubin, alkaline phosphatase
Blood minerals: calcium, potassium, phosphorus, sodium, chloride, iron
Blood proteins: albumin, globulin, total protein, albumin/globulin ratio

CARDIAC MARKERS
Apolipoprotein B (ApoB)
Homocysteine
C-Reactive Protein (high sensitivity)

LIPID PROFILE
Total Cholesterol
LDL (low-density lipoprotein)
HDL (high-density lipoprotein)
Triglycerides

COMPLETE BLOOD COUNT (CBC)
Red Blood Cell count including: hemoglobin, hematocrit, MCV, MCH, MCHC, RDW
White Blood Cell count including: lymphocytes, monocytes, eosinophils, neutrophils, basophils
Platelet count

CANCER MARKER
PSA (Prostate Specific Antigen)

HORMONES
Free and Total Testosterone
DHEA-S
Estradiol (an estrogen)
TSH (thyroid function)
Vitamin D (25-hydroxyvitamin D)

FEMALE PANEL

METABOLIC PROFILE
NEW
Glucose
Insulin
Hemoglobin A1c
Kidney function tests: creatinine, BUN, uric acid, BUN/creatinine ratio
Liver function tests: AST, ALT, LDH, GGT, bilirubin, alkaline phosphatase
Blood minerals: calcium, potassium, phosphorus, sodium, chloride, iron
Blood proteins: albumin, globulin, total protein, albumin/globulin ratio

CARDIAC MARKERS
Apolipoprotein B (ApoB)
Homocysteine
C-Reactive Protein (high sensitivity)

LIPID PROFILE
Total Cholesterol
LDL (low-density lipoprotein)
HDL (high-density lipoprotein)
Triglycerides

COMPLETE BLOOD COUNT (CBC)
Red Blood Cell count including: hemoglobin, hematocrit, MCV, MCH, MCHC, RDW
White Blood Cell count including: lymphocytes, monocytes, eosinophils, neutrophils, basophils
Platelet count

HORMONES
Progesterone
Estradiol (an estrogen)
Free and Total Testosterone
DHEA-S
TSH (thyroid function)
Vitamin D (25-hydroxyvitamin D)

Lab Test Super Sale • March 25 – June 3, 2019.

Retail price: $400 • Your Price: $199

To obtain these comprehensive Male or Female Panels at these low prices, call 1-800-208-3444 or log on to www.LifeExtension.com/blood to order your requisition forms.

LifeExtension®
NATIONAL DIAGNOSTICS, INC.

Then–at your convenience–when you have the form, you can visit one of the blood-drawing facilities provided by LabCorp in your area or at the **Life Extension Nutrition Center** in Ft. Lauderdale.

Blood testing services are available only in the continental United States and Anchorage, AK. Not available in Maryland. Restrictions apply for residents of MA, NY, NJ, RI, and PA.

References

1. Available at: https://www.niddk.nih.gov/health-information/health-statistics/kidney-disease. Accessed February 25, 2019.
2. Available at: https://www.kidney.org/news/newsroom/factsheets/End-Stage-Renal-Disease-in-the-US. Accessed February 25, 2019.
3. Available at: https://www.niddk.nih.gov/-/media/Files/Kidney-Disease/KU_Diseases_Stats_508.pdf. Accessed February 25, 2019.
4. Available at: https://www.medicalnewstoday.com/articles/304528.php. Accessed February 25, 2019.
5. Melsom T, Schei J, Stefansson VT, et al. Prediabetes and Risk of Glomerular Hyperfiltration and Albuminuria in the General Nondiabetic Population: A Prospective Cohort Study. *Am J Kidney Dis*. 2016 Jun;67(6):841-50.
6. Iranfar N, Smith TC. When Should "Pre" Carry as Much Weight in the Diabetes Comorbidity Debate? Insights From a Population-Based Survey. *Prev Chronic Dis*. 2018 Mar 22;15:E36.
7. Plantinga LC, Crews DC, Coresh J, et al. Prevalence of chronic kidney disease in US adults with undiagnosed diabetes or prediabetes. *Clin J Am Soc Nephrol*. 2010 Apr;5(4):673-82.
8. Tabak AG, Herder C, Rathmann W, et al. Prediabetes: a high-risk state for diabetes development. *Lancet*. 2012 Jun 16;379(9833):2279-90.
9. Papanas N, Vinik AI, Ziegler D. Neuropathy in prediabetes: does the clock start ticking early? *Nat Rev Endocrinol*. 2011 Jul 12;7(11):682-90.
10. Garcia-Carretero R, Vigil-Medina L, Mora-Jimenez I, et al. Cardiovascular risk assessment in prediabetic patients in a hypertensive population: The role of cystatin C. *Diabetes Metab Syndr*. 2018 Sep;12(5):625-9.
11. Despres JP, Lamarche B, Mauriege P, et al. Hyperinsulinemia as an independent risk factor for ischemic heart disease. *N Engl J Med*. 1996 Apr 11;334(15):952-7.
12. Xu WG, Qian YF, Wu J. The effect of prediabetes on hepatocellular carcinoma risk: a systematic review and meta-analysis. *Minerva Med*. 2017 Apr;108(2):185-90.
13. Crispo A, Augustin LS, Grimaldi M, et al. Risk Differences Between Prediabetes And Diabetes According To Breast Cancer Molecular Subtypes. *J Cell Physiol*. 2017 May;232(5):1144-50.
14. Mijajlovic MD, Aleksic VM, Sternic NM, et al. Role of prediabetes in stroke. *Neuropsychiatr Dis Treat*. 2017;13:259-67.
15. Park SK, Garland CF, Gorham ED, et al. Plasma 25-hydroxyvitamin D concentration and risk of type 2 diabetes and pre-diabetes: 12-year cohort study. *PLoS One*. 2018;13(4):e0193070.
16. Abraham A, Barnett C, Katzberg HD, et al. Nerve function varies with hemoglobin A1c in controls and type 2 diabetes. *J Diabetes Complications*. 2018 Apr;32(4):424-8.
17. Patscheider H, Lorbeer R, Auweter S, et al. Subclinical changes in MRI-determined right ventricular volumes and function in subjects with prediabetes and diabetes. *Eur Radiol*. 2018 Jul;28(7):3105-13.
18. January CT, Wann LS, Alpert JS, et al. 2014 AHA/ACC/HRS guideline for the management of patients with atrial fibrillation: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines and the Heart Rhythm Society. *J Am Coll Cardiol*. 2014 Dec 2;64(21):e1-76.
19. Available at: https://emedicine.medscape.com/article/151066-treatment#showall. Accessed February 26, 2019.
20. Curtis AB, Karki R, Hattoum A, et al. Arrhythmias in Patients >/=80 Years of Age: Pathophysiology, Management, and Outcomes. *J Am Coll Cardiol*. 2018 May 8;71(18):2041-57.
21. Aune D, Feng T, Schlesinger S, et al. Diabetes mellitus, blood glucose and the risk of atrial fibrillation: A systematic review and meta-analysis of cohort studies. *J Diabetes Complications*. 2018 May;32(5):501-11.
22. Mitsios JP, Ekinci EI, Mitsios GP, et al. Relationship Between Glycated Hemoglobin and Stroke Risk: A Systematic Review and Meta-Analysis. *J Am Heart Assoc*. 2018 May 17;7(11).
23. Moxley EW, Smith D, Quinn L, et al. Relationships Between Glycemic Control and Cardiovascular Fitness. *Biol Res Nurs*. 2018 Jul;20(4):422-8.
24. Available at: https://www.lifeextension.com/magazine/2014/ss/ampk/page-01. Accessed February 26, 2019.
25. Salminen A, Kaarniranta K. AMP-activated protein kinase (AMPK) controls the aging process via an integrated signaling network. *Ageing Res Rev*. 2012 Apr;11(2):230-41.
26. Towler MC, Hardie DG. AMP-activated protein kinase in metabolic control and insulin signaling. *Circ Res*. 2007 Feb 16;100(3):328-41.
27. Ohkuma T, Peters SAE, Woodward M. Sex differences in the association between diabetes and cancer: a systematic review and meta-analysis of 121 cohorts including 20 million individuals and one million events. *Diabetologia*. 2018 Oct;61(10):2140-54.
28. Ryu TY, Park J, Scherer PE. Hyperglycemia as a risk factor for cancer progression. *Diabetes Metab J*. 2014 Oct;38(5):330-6.
29. Chang SC, Yang WV. Hyperglycemia, tumorigenesis, and chronic inflammation. *Crit Rev Oncol Hematol*. 2016 Dec;108:146-53.
30. Available at: https://www.sciencedaily.com/releases/2018/07/180719195650.htm. Accessed February 26, 2019.
31. Available at: https://www.lifeextension.com/Magazine/2013/2/elevated-glucose-increases-incidence-of-breast-cancer-and-brain-shrinkage/Page-01. Accessed February 26, 2019.
32. Available at: https://www.lifeextension.com/magazine/2014/2/when-will-doctors-recognize-this-leading-cause-of-death/page-01?p=1. Accessed February 26, 2019.
33. Available at: https://www.cdc.gov/nchs/fastats/deaths.htm. Accessed February 26, 2019.
34. Evans JL, Goldfine ID. Aging and insulin resistance: just say iNOS. *Diabetes*. 2013 Feb;62(2):346-8.
35. de la Monte SM. Insulin Resistance and Neurodegeneration: Progress Towards the Development of New Therapeutics for Alzheimer's Disease. *Drugs*. 2017 Jan;77(1):47-65.
36. Ryan AS. Insulin resistance with aging: effects of diet and exercise. *Sports Med*. 2000 Nov;30(5):327-46.
37. Pennings N, Jaber J, Ahiawodzi P. Ten-year weight gain is associated with elevated fasting insulin levels and precedes glucose elevation. *Diabetes Metab Res Rev*. 2018 May;34(4):e2986.
38. Wang F, Han L, Hu D. Fasting insulin, insulin resistance and risk of hypertension in the general population: A meta-analysis. *Clin Chim Acta*. 2017 Jan;464:57-63.
39. Zhang X, Li J, Zheng S, et al. Fasting insulin, insulin resistance, and risk of cardiovascular or all-cause mortality in non-diabetic adults: a meta-analysis. *Biosci Rep*. 2017 Oct 31;37(5).
40. Jung JY, Park SK, Choi JM, et al. Evaluation of risk for metabolic syndrome according to the fasting insulin concentration in Korean men. *Clin Chim Acta*. 2017 Jan;464:123-7.
41. Hawley SA, Gadalla AE, Olsen GS, et al. The antidiabetic drug metformin activates the AMP-activated protein kinase cascade via an adenine nucleotide-independent mechanism. *Diabetes*. 2002 Aug;51(8):2420-5.
42. Crawley D, Chandra A, Loda M, et al. Metformin and longevity (METAL): a window of opportunity study investigating the biological effects of metformin in localised prostate cancer. *BMC Cancer*. 2017 Jul 21;17(1):494.
43. Gauhar R, Hwang SL, Jeong SS, et al. Heat-processed Gynostemma pentaphyllum extract improves obesity in ob/ob mice by activating AMP-activated protein kinase. *Biotechnol Lett*. 2012 Sep;34(9):1607-16.

44. Huyen VT, Phan DV, Thang P, et al. Antidiabetic effect of Gynostemma pentaphyllum tea in randomly assigned type 2 diabetic patients. *Horm Metab Res.* 2010 May;42(5):353-7.
45. Park SH, Huh TL, Kim SY, et al. Antiobesity effect of Gynostemma pentaphyllum extract (actiponin): a randomized, double-blind, placebo-controlled trial. *Obesity (Silver Spring).* 2014 Jan;22(1):63-71.
46. Pu P. [Protection mechanisms of hesperidin on mouse with insulin resistance]. *Zhongguo Zhong Yao Za Zhi.* 2016 Sep;41(17):3290-5.
47. Rizza S, Muniyappa R, Iantorno M, et al. Citrus polyphenol hesperidin stimulates production of nitric oxide in endothelial cells while improving endothelial function and reducing inflammatory markers in patients with metabolic syndrome. *J Clin Endocrinol Metab.* 2011 May;96(5):E782-92.
48. Salden BN, Troost FJ, de Groot E, et al. Randomized clinical trial on the efficacy of hesperidin 2S on validated cardiovascular biomarkers in healthy overweight individuals. *Am J Clin Nutr.* 2016 Dec;104(6):1523-33.
49. Chu NF, Spiegelman D, Hotamisligil GS, et al. Plasma insulin, leptin, and soluble TNF receptors levels in relation to obesity-related atherogenic and thrombogenic cardiovascular disease risk factors among men. *Atherosclerosis.* 2001 Aug;157(2):495-503.
50. Burnol AF, Morzyglod L, Popineau L. [Cross-talk between insulin signaling and cell proliferation pathways]. *Ann Endocrinol (Paris).* 2013 May;74(2):74-8.
51. Nilsen TI, Vatten LJ. Prospective study of colorectal cancer risk and physical activity, diabetes, blood glucose and BMI: exploring the hyperinsulinaemia hypothesis. *Br J Cancer.* 2001 Feb 2;84(3):417-22.
52. Balkau B, Kahn HS, Courbon D, et al. Hyperinsulinemia predicts fatal liver cancer but is inversely associated with fatal cancer at some other sites: the Paris Prospective Study. *Diabetes Care.* 2001 May;24(5):843-9.
53. Godsland IF, Crook D, Walton C, et al. Influence of insulin resistance, secretion, and clearance on serum cholesterol, triglycerides, lipoprotein cholesterol, and blood pressure in healthy men. *Arterioscler Thromb.* 1992 Sep;12(9):1030-5.
54. Salonen JT, Lakka TA, Lakka HM, et al. Hyperinsulinemia is associated with the incidence of hypertension and dyslipidemia in middle-aged men. *Diabetes.* 1998 Feb;47(2):270-5.
55. Stannard SR, Johnson NA. Insulin resistance and elevated triglyceride in muscle: more important for survival than "thrifty" genes? *J Physiol.* 2004 Feb 1;554(Pt 3):595-607.
56. Mykkanen L, Kuusisto J, Haffner SM, et al. Hyperinsulinemia predicts multiple atherogenic changes in lipoproteins in elderly subjects. *Arterioscler Thromb.* 1994 Apr;14(4):518-26.
57. Karhapaa P, Malkki M, Laakso M. Isolated low HDL cholesterol. An insulin-resistant state. *Diabetes.* 1994 Mar;43(3):411-7.
58. Ko GT, Cockram CS, Woo J, et al. Obesity, insulin resistance and isolated low high-density-lipoprotein cholesterol in Chinese subjects. *Diabet Med.* 2001 Aug;18(8):663-6.
59. Goldstein BJ. Insulin resistance as the core defect in type 2 diabetes mellitus. *Am J Cardiol.* 2002 Sep 5;90(5A):3G-10G.
60. Haffner SM, Stern MP, Mitchell BD, et al. Incidence of type II diabetes in Mexican Americans predicted by fasting insulin and glucose levels, obesity, and body-fat distribution. *Diabetes.* 1990 Mar;39(3):283-8.
61. Modan M, Halkin H, Almog S, et al. Hyperinsulinemia. A link between hypertension obesity and glucose intolerance. *J Clin Invest.* 1985 Mar;75(3):809-17.

Additional Lab Tests

To review the many lab tests available at **Super Sale prices**, turn to the last two pages of this issue.

Scientifically Studied in Europe

EYE

PRESSURE SUPPORT WITH Mirtogenol®

Eye Pressure Support with Mirtogenol® formula may support healthy blood flow within the tiny vessels (***microvasculature***) of your eyes, helping to promote healthy fluid pressure.

Eye Pressure Support with Mirtogenol®
Item #01514 • 30 vegetarian capsules

	Retail Price	Your Price
1 bottle	$38	**$28.50**
4 bottles		**$25.50 each**

For full product description and to order
Eye Pressure Support with Mirtogenol®
call **1-800-544-4440**
or visit **www.LifeExtension.com**

Mirtogenol® is a registered trademark of Horphag Research, Ltd.
Mirtoselect® is a registered trademark of Indena, S.p.A., Milan, Italy.
Pycnogenol® is a registered trademark of Horphag Research, Ltd.
Pycnogenol® is protected by U.S. patents #5,720,956 and #6,372,266 and other international patents.

NON GMO LE CERTIFIED

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

YOUR CHOICE OF **HIGHLY-CONCENTRATED** FORMULAS:

SUPER OMEGA-3 Fish oil
EPA/DHA with sesame lignans
and olive polyphenols

	Retail Price	Your Price
1 bottle	$32	**$24**
4 bottles		**$21 each**

Item # 01982 • 120 softgels

SUPER OMEGA-3 Fish oil
EPA/DHA with sesame lignans
and olive polyphenols
(Enteric-coated for sensitive stomachs)

	Retail Price	Your Price
1 bottle	$34	**$25.50**
4 bottles		**$23.25 each**

Item # 01984 • 120 enteric coated softgels

SUPER OMEGA-3 Fish oil
EPA/DHA with krill, astaxanthin,
sesame lignans,
and olive polyphenols

	Retail Price	Your Price
1 bottle	$45	**$33.75**
4 bottles		**$31.50 each**

Item # 01988 • 120 softgels

#1 Omega-3 EPA/DHA Products
4-Time Winner!*

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

NON GMO

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

* Rated based on results of the 2018 ConsumerLab.com Survey of Supplement Users. More information at www.consumerlab.com/survey2018

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.

FREE Unlimited Shipping

4% Back on Purchases

ALL YEAR LONG

☑ **$50 Bonus Credit**
Use now or save for later.

☑ **Worry Free**
No auto-enrollment. Cancel anytime.

Join Premier Today! Only $49.95 per year.

Visit **LifeExtension.com/JoinPremier** • Call **1-866-748-7504** toll-free
Use Code YRX901A.

LifeExtension®

Premier Rewards service is good for a full 12 months from the date of purchase and can be renewed as early as 6 months prior to your expiration date. Upon renewal, a full 12 months s added to your current expiration date, or the renewal date if expired. Redeem LE Dollars to purchase virtually anything we sell, including products, lab tests, and sale items — and even to pay shipping fees! —at the rate of 1 LE Dollar equal to $1 USD at checkout (gift cards, Premier fees, and *Life Extension* Magazine® subscriptions excluded). FREE unlimited standard shipping to any mailing address within the United States, excluding U.S. territories. Also includes discounts on nonstandard shipping and shipping outside of the U.S. International customers can join Premier for $59.95 USD.

Inflammation in Midlife Linked to Steeper Cognitive Decline in Later Life

Middle-aged people with higher levels of chronic inflammation experience greater cognitive decline for the next two decades, according to a study published in the journal *Neurology*. *

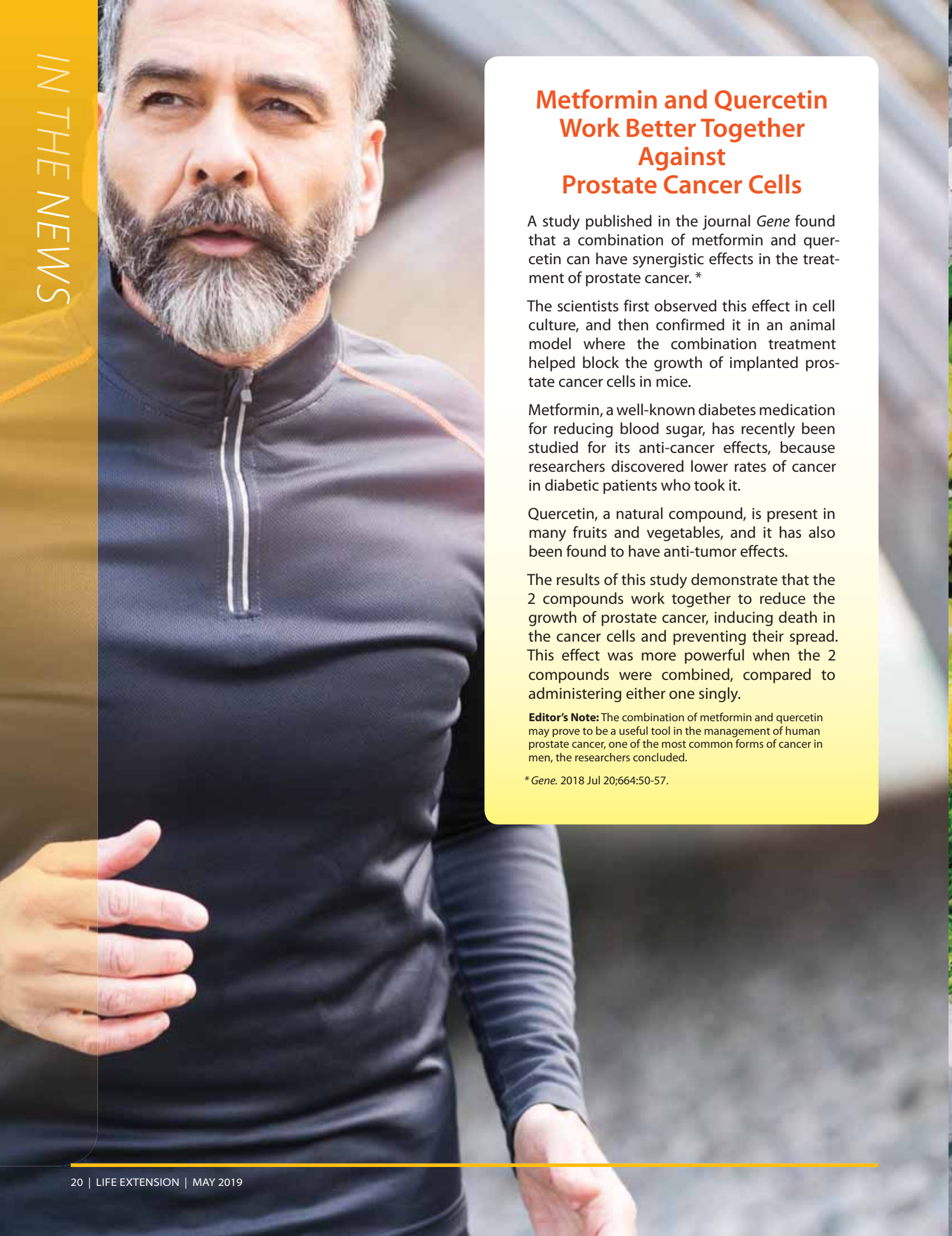
For 20 years, researchers followed 12,336 participants, whose average age was 57 at the start. These men and women were part of the ongoing study called Atherosclerosis Risk in Communities (ARIC). The individuals' inflammation composite score, using 4 blood biomarkers, was measured at the beginning. Another measurement of inflammation, C-reactive protein (CRP), was taken later. Each person's cognitive ability was also assessed at the start of the study, 6 to 9 years later, and at the end.

Researchers determined cognition scores by measuring memory, executive function and language, at three different times over the course of the study. They adjusted for a wide range of variables, including educational attainment, demographic factors, and the presence of disease.

What they found was that people with the highest inflammation scores had a **7.8%** steeper decline in cognitive ability than those with the lowest scores. Additionally, participants with the highest CRP levels showed cognitive decline at a rate that was **11.6%** higher than for those with the lowest levels, notably in the area of memory.

Editor's Note: "Our findings highlight what may be an early pathogenic role for systemic inflammation as a driver of cognitive decline in the decades leading up to older adulthood," the authors concluded.

Neurology. 2019 Feb 13.



Metformin and Quercetin Work Better Together Against Prostate Cancer Cells

A study published in the journal *Gene* found that a combination of metformin and quercetin can have synergistic effects in the treatment of prostate cancer. *

The scientists first observed this effect in cell culture, and then confirmed it in an animal model where the combination treatment helped block the growth of implanted prostate cancer cells in mice.

Metformin, a well-known diabetes medication for reducing blood sugar, has recently been studied for its anti-cancer effects, because researchers discovered lower rates of cancer in diabetic patients who took it.

Quercetin, a natural compound, is present in many fruits and vegetables, and it has also been found to have anti-tumor effects.

The results of this study demonstrate that the 2 compounds work together to reduce the growth of prostate cancer, inducing death in the cancer cells and preventing their spread. This effect was more powerful when the 2 compounds were combined, compared to administering either one singly.

Editor's Note: The combination of metformin and quercetin may prove to be a useful tool in the management of human prostate cancer, one of the most common forms of cancer in men, the researchers concluded.

* *Gene.* 2018 Jul 20;664:50-57.

When You Eat May be as Important as What You Eat

A study supported by the American Heart Association found that people who consumed **30%** or more of their calories for the day after **6 p.m.** were at an increased risk for disease.* This was the case even when eating at night was not associated with obesity.

Data were analyzed from 12,708 participants 18 to 76 years old, in the Hispanic Community Health Study/Study of Latinos. The subjects consumed, on average, **35.7%** of their daily calories after 6 p.m.

The researchers observed an increase in risk factors for diabetes, including higher fasting glucose, insulin, and insulin resistance in association with each **1%** increase in the number of daily calories consumed later than 6 p.m., which is about 20 calories in a 2,000-calorie-a-day diet. Among the **56.6%** of participants who consumed more than **30%** of their calories after 6 p.m., there was a **23%** higher risk of developing hypertension and a **19%** greater risk of becoming prediabetic, in comparison with the risks experienced by those who consumed less than **30%** of their daily intake after 6 p.m.

Editor's Note: "There is increasing evidence that when we eat is important, in addition to what we eat and how much we eat," said lead author Nour Makarem, PhD. "In our study we show that if you eat most of your calories before 6 p.m., you may have better cardiovascular health. Your meal timing matters and eating earlier in the day may be an important strategy to help lower the risk for heart disease."

* 2018. American Heart Association Scientific Sessions.

Sedentary Lifestyle Can Raise Risk for Kidney and Bladder Cancer

A lifetime of physical inactivity has been shown to increase the risk for kidney and bladder cancer, even when obesity is not a factor, according to a study published in the journal *Cancer Epidemiology*. *

After identifying 160 patients diagnosed with renal (kidney) cancer and 208 patients with bladder cancer, researchers compared them to 766 age-matched control subjects who did not have cancer.

Study subjects were then asked in detail about their physical activity. In particular, the researchers wanted to identify those individuals who reported that they had not participated in any regular physical activity throughout their lifetimes.

The findings showed that a sedentary lifestyle, lacking in regular physical exertion, was significantly associated with more than **1.7 times** greater risk for both of these forms of cancer. Furthermore, even when removing subjects who were obese from the analysis, absence of physical activity was still an independent predictor of cancer risk.

Editor's Note: For decades, physicians have recognized sedentary lifestyle as a major risk factor for metabolic disease, obesity, and cardiovascular disease. However, increasing evidence is linking lack of physical activity to risk for other chronic diseases, including various forms of cancer. It appears that this increased risk is not tied only to obesity, as even sedentary individuals with normal weight were at higher risk for renal and bladder cancer.

* *Cancer Epidemiol.* 2017 Aug;49:24-29.

Lactoferrin Can Help Ease Loss of Taste, Smell, after Chemotherapy

A frequent side effect for chemotherapy patients, abnormalities in taste and smell, can be improved by supplementing with lactoferrin (a protein that occurs in milk and saliva) the journal *Food & Function* reported. * A study found that lactoferrin could help reduce chemotherapy-related loss of taste and smell, which can have an impact on patients' food intake.

Twelve healthy participants and 19 cancer patients with chemotherapy-related taste and smell abnormalities were given **3** lactoferrin tablets of **250 mg** each, per day, for 30 days. Saliva samples were analyzed for proteins and minerals at the beginning of the treatment period, at 30 days, and then 30 days after the end of treatment.

A significant level of abnormalities in taste and smell was associated with a loss of salivary immune proteins and high salivary iron, and these changes were modified following supplementation with lactoferrin. "Our research shows that daily lactoferrin supplementation elicits changes in the salivary protein profiles in cancer patients—changes that may be influential in helping to protect taste buds and odor perception," researcher Susan Duncan said.

Editor's Note: "This study demonstrated the feasibility of developing lactoferrin supplementation as a treatment to reduce taste and smell abnormalities caused by chemotherapy, and improve patients' oral immunity," the researchers asserted.

* *Food Funct.* 2018 Sep 19;9(9):4948-4958.

REJUVENATE YOUR SKIN
FROM WITHIN

Restore Collagen
AND
Hyaluronic Acid
WITH DELIGHTFUL GUMMIES

Oral ingestion of **collagen peptides** and **hyaluronic acid** boosts these rejuvenating factors in normal, aging skin.

Clinical results reveal improved skin elasticity, increased moisture, and a **20%** reduction in the depth of eye wrinkles.

The new **Gummy Science Youthful Collagen** formula provides clinically studied* doses with daily intake of 4 tasty **chewable gummies**.

Item #02304 • 80 gummies
Retail Price is $34 • **Your Price is $25.50**
4 jars are only $23 each

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

** Skin Pharmacol Physiol.* 2014;27(1):47-55. ** Skin Pharmacol Physiol.* 2014;27(3):113-9.
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.

FORESIGHT FOR YOUR
EYESIGHT

MacuGuard® Ocular Support provides lutein, *trans*-zeaxanthin, and *meso*-zeaxanthin to help maintain structural integrity of the macula and retina.[1-5]

Alpha-carotene is included based on new evidence that it helps support the macular pigment.[1]

People supplementing with saffron showed an improvement in vision as measured by their seeing an average of two additional lines on the eye chart commonly used by doctors to test vision.[1]

This formula provides the optimal dose of saffron along with cyanidin-3-glucoside to support healthy vision.[6-8]

MacuGuard® Ocular Support with Saffron

Item #01992 • 60 softgels
Retail Price is $25
Your Price is $18.75
4 bottles are only $17.50 each

Each bottle lasts for two months.

References
1. *JAMA Ophthalmol.* 2015;133(12):1415-24.
2. *Nutrients.* 2013 April;5(4):1169-85.
3. *Nutrition.* 2011 Sep;27(9):960-6.
4. *Free Radic Biol Med.* 2012;53(6):1298-307.
5. *J Ophthalmol.* 2015;2015:523027.
6. *Evid Based Complement Alternat Med.* 2012;2012:429124.
7. *Invest Ophthalmol Vis Sci.* 2010;51(12):6118-24.
8. *J Agric Food Chem. 2003* Jun 4;51(12):3560-3.

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

NON GMO LE CERTIFIED

LuteinPlus® and Mz® are registered trademarks of NutriProducts Ltd., UK, licensed under U.S. Patent 8,623,428.

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.

MAXIMIZE GREEN TEA'S Health Benefits

BY SUSAN WEIL

Validation of the whole-body benefits of ***green tea*** continues to grow.[1-6]

A human study published in ***The Journal of the American Medical Association*** found that consuming **5** or more cups of **green tea** daily was associated with a **26%** lower risk of **cardiovascular death**.[1]

A meta-analysis found that for every **500 ml**-per-day increase in **green tea** consumption (about **3 cups**), the risk of **cognitive disorders** decreased **29%**.[2]

The most impressive published data shows meaningful reductions in risks of certain **cancers** in those who consume the most green tea.

Published studies largely focus on a compound found in green tea leaves called **epigallocatechin gallate (EGCG)**.

Several *other* compounds in **green tea** have also demonstrated health benefits.[7-14] For many people, obtaining these other compounds has been difficult.

Using a patented technique,[15] a new ***highly absorbable*** extract provides **8** different green tea catechins.

This novel extract enables people to easily obtain the catechin content equivalent of drinking up to **12 cups** of standard **green tea**.

In **1992**, ***Life Extension***® published an article describing significant health benefits in people who consumed large quantities of **green tea** beverages.

While drinking green tea throughout the day is popular in **Japan**, it was challenging for people in Western cultures to adapt to this practice.

One reason large amounts of tea need to be consumed are ***absorption*** issues. It requires a lot of tea to boost **blood levels** of disease-fighting green tea ***polyphenols***.

This led to massive research efforts to develop **extracts** from **green tea leaves**. This research yielded concentrated powders of active **polyphenols** that were more ***absorbable*** than green tea beverages.

Unlike FDA-regulated **prescription drugs**, free-market forces drove down the price of standardized **green tea extracts** to where they became one of the better values on the dietary supplement marketplace.

Relentless research has advanced this ***absorption*** technology to a new level. Health conscious consumers can now benefit from ***higher*** potencies of a broader spectrum of **green tea polyphenols**.

What Are Catechins?

Green tea comes from leaves that have not yet oxidized to become **black tea**.

These leaves contain a rich mixture of **polyphenols** called ***catechins*** (pronounced *cat-eh-kins*).

The most abundant catechin in green tea is **epigallocatechin gallate (EGCG)**, accounting for as much as **65%** of all green tea catechins.[17]

Thousands of published studies describe the benefits of **epigallocatechin gallate (EGCG)**.

Scientists have identified other green tea catechins that also contribute to its long list of health benefits. These additional catechins are:[7-14]

- ***Catechin***
- ***Catechin gallate***
- ***Epicatechin***
- ***Epicatechin gallate***
- ***Epigallocatechin***
- ***Gallocatechin***
- ***Gallocatechin gallate***

In animal and human studies, *greater* **green tea** consumption and *increased* ***catechin*** intake are correlated with improvements in health and reduced disease risks, including:

- Reduced cancer incidence,
- Reduced incidence of heart attack, stroke, and metabolic disease,
- Protection of brain function, and more.[2,17-27]

New Green Tea Extract

To provide a broader range of beneficial catechins, scientists have developed a novel green tea extract that delivers **8** different **catechins** that can be efficiently ***absorbed*** by the body.[15]

The process starts with non-genetically modified (non-GMO) tea plants grown in a pristine, remote, mountain environment in South Africa.

Within just 6 hours of harvest, the fresh, live tea is processed at the same location by a patented extraction process which "unlocks" 8 catechins naturally found in tea, making them more available for optimal absorption in the body.

The catechins are then formulated into plant-derived ***liposomes***, tiny spherical structures that can easily pass through cell membranes, allowing greater absorption directly by the cells in the body. That means an individual can now obtain and absorb a greater amount of green tea's benefits from a smaller amount of tea.

By using these special techniques, the green tea extract can stay in the body for up to 24 hours, allowing for greater absorption of all 8 green tea catechins.[16]

Reduced Risk of Cardiovascular Disease

Green tea consumption correlates with reductions in risk factors for several major cardiovascular diseases. Among its benefits:[3,4,19,28]

- **Lower blood pressure**. Among adults without hypertension, tea drinkers have a lower risk of developing it—**46%** lower for people who regularly drink **1-5 cups** per day and **65%** lower for those drinking more than **5 cups** per day.[4] In individuals with existing hypertension, systolic blood pressure was reduced by **6.4%** after 12 weeks of drinking a beverage with green tea extract containing a mixture of catechins.[3]
- **Improvement in cholesterol levels**. LDL (or "bad") cholesterol levels were reduced in green tea drinkers.[3,19,28,29] In a **2018** study, obese and overweight women who received a green tea extract rich in multiple catechins for 6 weeks experienced an average (modest) **4.8%** decrease in LDL cholesterol levels.[29]
- **Reduction in body fat and obesity**. Individuals who, on a daily basis for 12 weeks, consumed a beverage with a green tea extract, containing a mixture of catechins, had a **10.3%** and **9.4%** reduction, respectively, in total body-fat mass and visceral-area fat. Waist circumference was also reduced by **1 inch**.[3]

Green tea also supports blood vessel health and maintains healthy blood flow. It does this by:[19]

- Preventing vascular inflammation, which can contribute to development of **atherosclerosis**, a harmful buildup of plaque in the arteries,
- Inhibiting the abnormal proliferation of smooth muscle cells, also associated with hardening of the arteries and progression of atherosclerosis,
- Reducing dysfunction in the ***endothelial*** cells (which line the interior surface of blood vessels), helping to maintain healthy arterial malleability and blood pressure, and
- Reducing adhesion of platelets to blood vessel walls, suggesting that it may prevent dangerous clots that block blood flow and can cause stroke and/or heart attack.

The net effect of these benefits is that green tea intake is strongly associated with reduced risk of **cardiovascular disease** and **death**.

Broad-Spectrum Green Tea

- **Green tea from the *Camellia sinensis* plant is an abundant source of polyphenols known as catechins (pronounced *cat-eh-kins*).**
- **Green tea catechins are powerful free-radical scavengers and anti-inflammatory compounds that have been tied to the range of health benefits associated with green tea consumption.**
- **Increasing intake of various types of catechins is associated with reduced risk for many age-related disorders, including cardiovascular, metabolic, and neurodegenerative diseases, and cancer.**
- **A new extract of green tea provides greater bioavailability for a broad spectrum of catechins found in green tea, increasing their health benefits.**
- **This green tea extract boosts total catechin bioavailability up to 12 times.**

What You Need to Know

A large, prospective study of human subjects, followed long-term, was published in *The Journal of the American Medical Association (JAMA)*.[1] In more than 40,000 individuals, those who consumed more than **5 cups** of green tea daily benefited from as much as **26%** lower risk of death from cardiovascular causes compared to people who drank less than one cup daily.[1]

Anti-Cancer Effects

Researchers for many years have focused on green tea's unique, multiple anti-cancer benefits.

The catechins in green tea have shown an ability to fight cancer in multiple ways.[18,30]

In addition to powerful free-radical scavenging and anti-inflammatory effects, which help protect cells from harmful mutations that can lead to cancer, several green tea catechins demonstrate a wide range of other benefits, including:

- **Killing cancer cells.** Green tea catechins trigger programmed cell death (***apoptosis***) in cancer cells, but not in healthy cells.[7,8,18,30]
- **Stopping cancer growth.** The progression of cancer is often aided by various growth factors and the pathways they activate in the growing tumor. Green tea catechins have been found to *block* several of these signaling pathways and their effects.[18,30,31]
- **Keeping tumors from getting nutrients.** For tumors to grow, they require new blood vessel growth to supply nutrients. Catechins from green tea block the formation of new tumor blood vessels and starve the tumor cells of the nutrients they require.[32,33]
- **Blocking cancer activation.** Cellular stress can promote tumor growth by activating the pro-inflammatory signaling pathway ***NF-kB*** (nuclear factor-kappaB). Studies have shown that *suppressing* NF-κB activation can help lower pro-cancer signaling. Experiments have shown that green tea can reduce tissue inflammation and retard the progression of cancer cells.[7,18,30]

Animal and cell studies have shown that green tea is associated with protection from various forms of cancer, including some of the most common, such as breast, prostate, lung, colon, and skin cancer.[18,34-36]

Slightly Improved Blood Sugar Control

Chronically elevated blood glucose levels can progress into diabetes and can be a factor in a myriad of degenerative diseases.[37,38] Over time, it causes damage to almost all tissues in the body, greatly accelerating aging and increasing the risks for many age-related diseases.

Dietary changes and weight loss are often recommended to improve control of glucose levels. The catechins in **green tea** can also aid the body in processing glucose and *preventing* the harmful effects of elevated glucose.

A group of researchers performed a pooled analysis of 17 randomized human trials of **green tea extract** (using both beverage and capsules) for glucose control.[21] Overall, these studies found that intake of green tea extract modestly reduced **glucose levels** (on average by almost **2 mg/dL**).

Green tea extract was found to lower values of **hemoglobin A1c** (HbA1c), a measure of long-term glucose control. Higher levels of HbA1c result in greater incidences of diabetic complications. HbA1c is often used to track progress in the treatment of patients with diabetes.

Green tea trials show an average HbA1c reduction of **0.3%**—a notable amount, since less than a **1%** difference in HbA1c can mean a significant difference in disease risk.[21,39]

These studies demonstrate that green tea doesn't just slightly *lower* blood glucose, it helps *maintain* healthy levels over time.

Protecting Against Neurodegeneration

Neurodegenerative disorders such as mild cognitive impairment, Alzheimer's, and Parkinson's are growing increasingly common. Unchecked, they rob the aging population of brain function, particularly cognitive abilities such as memory and attention.

Several studies have confirmed the link between tea consumption and protection from neurodegenerative diseases such as Alzheimer's dementia and Parkinson's disease.[20,22,23]

A team of researchers in China recently performed a meta-analysis, pooling results from several well-designed studies including more than 48,000 participants.[2] What they found is that *higher* consumption of tea was associated with *lower* odds of cognitive disorders.

When researchers went further and looked at the effects of specific types of tea, they found that only *green* tea, not other types such as black tea or oolong tea, remained a significant predictor of beneficial cognitive outcomes. Green tea was associated with **36%** lower odds of developing **cognitive disorders**.[2]

Several other studies have revealed similar findings, not just for cognitive decline and dementia but also for other neurodegenerative disorders such as Parkinson's disease.[17,20,22-24]

Summary

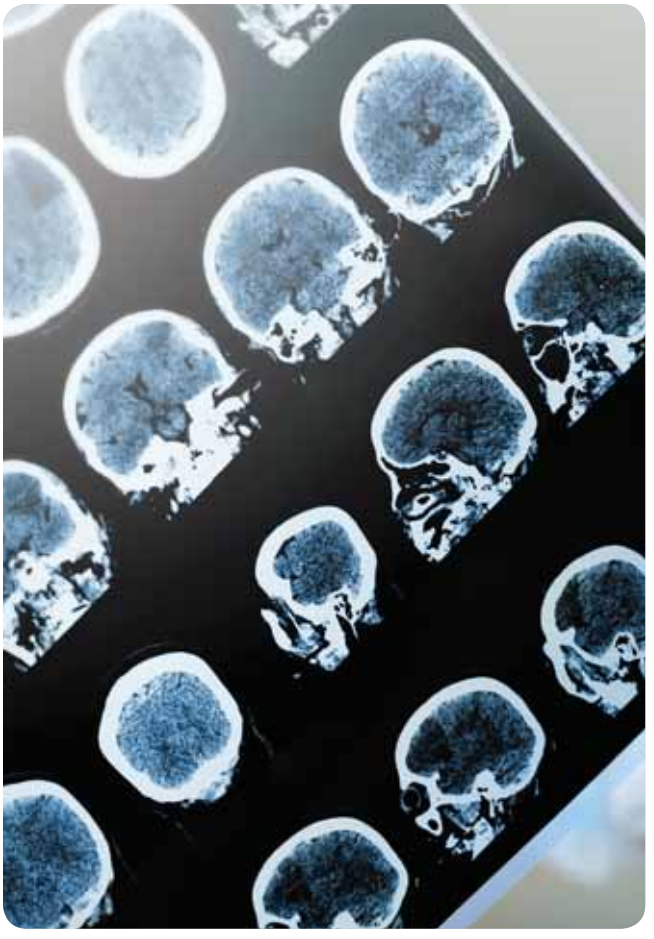
Green tea is rich in an assortment of healthful plant compounds known as catechins.

Studies consistently demonstrate that *higher* intake of green tea and its catechins is associated with *lower* risk for common age-related diseases, including cardiovascular disease, metabolic syndrome, cognitive dysfunction, and cancer.

It's difficult and impractical to drink the large volume of green tea required to maximize its benefits. Green tea extracts make it far easier to increase catechin intake.

A new **broad-spectrum green tea extract** provides 8 different, highly bioavailable catechins. Encapsulating them in easily-absorbed liposomes further enhances their stability and bioavailability and equates to drinking the catechin content equivalent of up to **12 cups** of standard green tea. ●

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

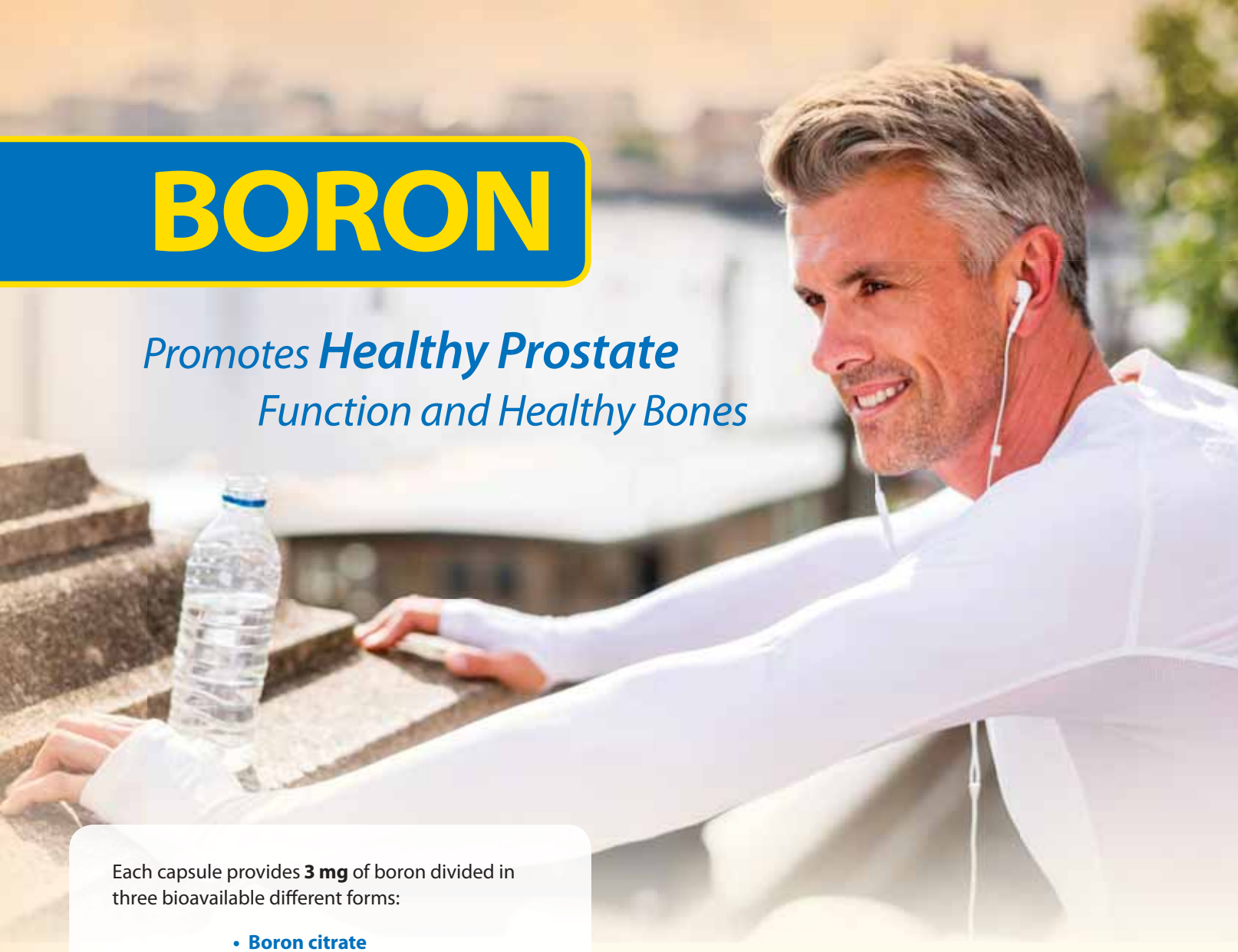


References

1. Kuriyama S, Shimazu T, Ohmori K, et al. Green tea consumption and mortality due to cardiovascular disease, cancer, and all causes in Japan: the Ohsaki study. *JAMA.* 2006 Sep 13;296(10):1255-65.
2. 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.
3. Nagao T, Hase T, Tokimitsu I. A green tea extract high in catechins reduces body fat and cardiovascular risks in humans. *Obesity (Silver Spring).* 2007 Jun;15(6):1473-83.
4. Yang YC, Lu FH, Wu JS, et al. The protective effect of habitual tea consumption on hypertension. *Arch Intern Med.* 2004 Jul 26;164(14):1534-40.
5. 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.
6. 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.
7. 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.
8. 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.
9. 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.
10. Noll C, Lameth J, Paul JL, et al. Effect of catechin/epicatechin dietary intake on endothelial dysfunction biomarkers and pro-inflammatory cytokines in aorta of hyperhomocysteinemic mice. *Eur J Nutr.* 2013 Apr;52(3):1243-50.
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.
14. Ko CH, Lau KM, Choy WY, et al. Effects of tea catechins, epigallocatechin, gallocatechin, and gallocatechin gallate, on bone metabolism. *J Agric Food Chem.* 2009 Aug 26;57(16):7293-7.
15. Plandai. A cross-over study comparing the bioavailability Phytofare(R) against Phytofare(R)Pheroid® Catechin Complex and a generic green tea extract. 2015.
16. Coyne Healthcare. Origine 8™ The Complete Green Tea Extract.
17. Mancini E, Beglinger C, Drewe J, et al. Green tea effects on cognition, mood and human brain function: A systematic review. *Phytomedicine.* 2017 Oct 15;34:26-37.
18. Shimizu M, Shirakami Y, Moriwaki H. Targeting receptor tyrosine kinases for chemoprevention by green tea catechin, EGCG. *Int J Mol Sci.* 2008 Jun;9(6):1034-49.
19. Babu PV, Liu D. Green tea catechins and cardiovascular health: an update. *Curr Med Chem.* 2008;15(18):1840-50.
20. Farzaei MH, Bahramsoltani R, Abbasabadi Z, et al. Role of green tea catechins in prevention of age-related cognitive decline: Pharmacological targets and clinical perspective. *J Cell Physiol.* 2019 Mar;234(3):2447-59.
21. Liu K, Zhou R, Wang B, et al. Effect of green tea on glucose control and insulin sensitivity: a meta-analysis of 17 randomized controlled trials. *Am J Clin Nutr.* 2013 Aug;98(2):340-8.
22. Pervin M, Unno K, Ohishi T, et al. Beneficial Effects of Green Tea Catechins on Neurodegenerative Diseases. *Molecules.* 2018 May 29;23(6).
23. 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).
24. 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.
25. Hussain M, Habib Ur R, Akhtar L. Therapeutic benefits of green tea extract on various parameters in non-alcoholic fatty liver disease patients. *Pak J Med Sci.* 2017 Jul-Aug;33(4):931-6.
26. McKay DL, Blumberg JB. The role of tea in human health: an update. *J Am Coll Nutr.* 2002 Feb;21(1):1-13.
27. Sangiovanni E, Brivio P, Dell'Agli M, et al. Botanicals as Modulators of Neuroplasticity: Focus on BDNF. *Neural Plast.* 2017;2017:5965371.
28. Zheng XX, Xu YL, Li SH, et al. Green tea intake lowers fasting serum total and LDL cholesterol in adults: a meta-analysis of 14 randomized controlled trials. *Am J Clin Nutr.* 2011 Aug;94(2):601-10.
29. Huang L-H, Liu C-Y, Wang L-Y, et al. Effects of green tea extract on overweight and obese women with high levels of low density-lipoprotein-cholesterol (LDL-C): a randomised, double-blind, and cross-over placebo-controlled clinical trial. *BMC Complementary and Alternative Medicine.* 2018 Nov 6;18(1):294.
30. Singh BN, Shankar S, Srivastava RK. Green tea catechin, epigallocatechin-3-gallate (EGCG): mechanisms, perspectives and clinical applications. *Biochem Pharmacol.* 2011 Dec 15;82(12):1807-21.
31. Shimizu M, Shirakami Y, Sakai H, et al. EGCG inhibits activation of the insulin-like growth factor (IGF)/IGF-1 receptor axis in human hepatocellular carcinoma cells. *Cancer Lett.* 2008 Apr 8;262(1):10-8.
32. Cao Y, Cao R. Angiogenesis inhibited by drinking tea. *Nature.* 1999 Apr 1;398(6726):381.
33. Rodriguez SK, Guo W, Liu L, et al. Green tea catechin, epigallocatechin-3-gallate, inhibits vascular endothelial growth factor angiogenic signaling by disrupting the formation of a receptor complex. *Int J Cancer.* 2006 Apr 1;118(7):1635-44.
34. Mukhtar H, Ahmad N. Tea polyphenols: prevention of cancer and optimizing health. *Am J Clin Nutr.* 2000 Jun;71(6 Suppl):1698S-702S; discussion 703S-4S.
35. Shimizu M, Weinstein IB. Modulation of signal transduction by tea catechins and related phytochemicals. *Mutat Res.* 2005 Dec 11;591(1-2):147-60.
36. Yang CS, Maliakal P, Meng X. Inhibition of carcinogenesis by tea. *Annu Rev Pharmacol Toxicol.* 2002;42:25-54.
37. Available at: http://www.diabetes.org/diabetes-basics/diagnosis/. Accessed January 25, 2019.
38. Huang Y, Cai X, Mai W, et al. Association between prediabetes and risk of cardiovascular disease and all cause mortality: systematic review and meta-analysis. *Bmj.* 2016 Nov 23;355:i5953.
39. Available at: https://www.niddk.nih.gov/health-information/diabetes/overview/tests-diagnosis/a1c-test#diagnose. Accessed January 30, 2019.

BORON

Promotes ***Healthy Prostate***
Function and Healthy Bones



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

- **Boron citrate**
- **Boron aspartate**
- **Boron glycinate**

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

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

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

	Retail Price	Your Price
1 bottle	$5.95	**$4.46**
4 bottles		**$3.94 each**

Item #01661 • 100 vegetarian capsules

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

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

MAGNESIUM
CRITICAL FOR WHOLE-BODY HEALTH

Magnesium is a critically important mineral, yet most Americans do not obtain enough from their diet.

Magnesium helps:[1,2]

- Keep **heart rhythm** steady.
- Promote normal **blood pressure**.
- Maintain normal **muscle** and **nerve function**.
- Support a healthy **immune system**.
- Keep **bones strong**.
- Maintain **blood sugar levels** already within normal range.

The recommended intake of magnesium to maintain vascular health is **500 mg** or more a day.

Each Life Extension® **Magnesium Cap** provides **500 mg** of elemental magnesium for ***9 cents a day***!

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

NON GMO

	Retail Price	Your Price
1 bottle	$12	**$9**
4 bottles		**$7.50 each**

Item #01459 • 100 vegetarian capsules

References
1. *Am J Clin Nutr.* 1987;45:1305-12.
2. *Clinica Chimica Acta.* 2000;294:1-26.

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

TRAACS® is a registered trademark of Albion Laboratories, 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 TO THE Max

Green T-Max is a highly bioavailable ***broad-spectrum*** green tea extract from the mountains of South Africa.

One capsule of new **Green T-Max** delivers ***eight different catechins*** and provides the catechin content equivalent of up to **12 cups** of standard green tea.

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

Item #02305 • 60 vegetarian capsules
Retail Price is $24 • **Your Price is $18**
4 bottles are only $16.50 each

Origine 8™ is a trademark of Phytoceutics Int 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.

Battling ALLERGIES *with* PROBIOTICS

BY MICHAEL DOWNEY

Runny noses. Itchy eyes. Sneezing. Congestion.

Millions of people suffer from **seasonal allergies** and turn to prescription and over-the-counter medications to find relief.

Scientists have discovered a surprising alternative approach: **probiotics**.

The idea of using helpful bacteria to reduce allergic symptoms may sound radical, but clinical trials show it to be quite beneficial.

In one study, a specific probiotic, ***Lactobacillus acidophilus* L-92**, led to a **2.5-fold** improvement in **nasal allergy** symptoms and a **4.7-fold** improvement in eye symptoms compared to people using a **placebo**.[1]

Other trials show that a combination of ***L. acidophilus* L-92** and **fermented yeast** result in:

- **43% fewer days** with **nasal congestion**
- **24% reduction** in **swollen nasal passages**
- **31% reduction** in **eye symptoms**[2-4]

These are significant findings for allergy sufferers.

A new combination of **probiotic** and **fermented yeast** works by targeting the *root cause* of allergies: an out-of-balance immune response.

Attacking the Cause of Allergies

Allergies affect more than 50 million American adults every year.

They are the 6th leading cause of chronic illness in America, costing society more than **$18 billion** annually.[5,6]

An allergic reaction occurs when the immune system *overreacts* to something in the environment that is harmless to most people.

When the body perceives a threat from an allergen such as dust or pollen, it swings into defensive action. The result is watery eyes and a runny nose designed to flush the allergen out from the body.

These allergy symptoms are the last in a long, domino effect of reactions involving the body's immune-system cells.

Once an allergy attack occurs, most people reach for over-the-counter medications for relief. The problem is that antihistamines, steroids (like Flonase®), and decongestants, only provide *temporary relief*.

A better solution is to stop the body from overreacting to harmless threats like pollen or dust.

For that to happen we need to restore normal immune balance—and that involves *retraining immune system cells* in what's called the **Th2** family.

Th2 cells are also known as **T helper type 2 cells**. Th2 cells play a role in organizing a protective immune response to outside invaders such as allergens.

Two ingredients have been identified, ***Lactobacillus acidophilus* L-92** and **yeast fermentate**, that effectively retrain the immune system to take pollen and other allergens in stride and mute the excessive inflammatory responses that produce irritating allergy symptoms.

Regulating the Immune Response

Researchers sought to identify ingredients that would work on the cause of allergic reactions by reining in the immune system's **Th2 cells**.

Scientists in Japan and the U.S. uncovered 2 compounds that help restore normal **Th2 balance**. These 2 supplements, ***Lactobacillus acidophilus* L-92** and **yeast fermentate**, *reduce* symptoms by *lowering* the allergic response to pollen and other allergens.

This group of scientists began investigating **probiotics** for allergy relief because they are essential for a healthy gut, where many of the body's immune cells reside.[7]

When researchers compared 12 different probiotic strains in a lab study, ***L. acidophilus* L-92** stood out for its impact on seasonal allergies.[8] Animal studies showed that this strain reduces levels of the inflammatory antibodies known as **immunoglobulin E** (which trigger the release of chemicals that cause an allergic reaction), reduces substances associated with **Th2**, and boosts cells associated with better immune balance.[8,9]

Similarly, a fermented form of baker's yeast (*Saccharomyces cerevisiae*) called **yeast fermentate** reduces IgE, providing additional allergy relief.[10]

As a result, these 2 ingredients can quell allergy symptoms *without* causing the side effects seen with anti-inflammatory, antihistamine, or decongestant drugs.

To validate that these immune-balancing effects beneficially impact allergies, scientists conducted studies on human volunteers.

Human Studies with *L. acidophilus* L-92

First, researchers focused on the allergy benefits of ***Lactobacillus acidophilus* L-92**.

People allergic to **Japanese cedar pollen**, a potent allergen, were enlisted for a clinical study that covered 2 consecutive annual allergy seasons. They received either a placebo or *L. acidophilus* L-92.[3]

In the first allergy season, the ***Lactobacillus acidophilus* L-92** treatment group showed a **31% reduction** in the eye symptom/medication score, which indicated reduced experience of itchy or watery eyes *and* the need for less medication. This improved eye symptom/medication score was found again in the second allergy season. Researchers also found a trend towards improved scores for reduced swelling and color of membranes lining the nostrils.[3] (Allergic mucous membranes appear pale, while healthy membranes are pink.)

In a second study, researchers gave either a placebo or *L. acidophilus* L-92, every day for 8 weeks, to 49 people with year-round **hay fever**, which can be more difficult to manage than seasonal allergies.[2]

They documented an approximate **28%** improvement in nasal membrane color at week 6 and an approximate **24%** improvement in nasal membrane color at week 8. Patient-reported symptom/medication scores fell, compared with placebo recipients, by about **19%** after 8 weeks. There was also a trend towards improvement in eye symptoms, such as itchiness and redness.[2]

A third trial, lasting 8 weeks, demonstrated the ability of *L. acidophilus* L-92 to alleviate symptoms in people who did not start taking it until *after* they were exposed to the allergen. Eighty volunteers with cedar-pollen allergy were exposed to this pollen for 3 hours *before* receiving the probiotic. The results were astonishing: Treated individuals demonstrated a **2.5-fold improvement** in **nasal symptoms** and a **4.7-fold improvement** in **eye symptoms** compared with placebo subjects.[1]

What You Need to Know

Seasonal Allergy Relief

- **Current medications for seasonal allergies target the symptoms, like sneezing, runny nose, and itchy eyes.**
- **A novel approach focuses, instead, on the *cause* of allergies, restoring the normal balance between immune-system cells that promote allergic reactions and those that suppress them.**
- **In a major advance for allergy sufferers, the probiotic *Lactobacillus acidophilus* L-92 and yeast fermentate demonstrate the ability to restore immune balance.**
- **Human studies have shown that this "retraining" of the immune system substantially reduces the severity of allergic symptoms *and* the duration of seasonal allergies.**

In several other studies, scientists found that *L. acidophilus* L-92 also has a favorable effect on **eczema** (***atopic dermatitis***), a condition closely related to seasonal allergies. This form of allergic response is characterized by itchy, scaly, oozing lesions on the skin, and can affect the skin on any part of the body. Taking this probiotic was shown to reduce symptom scores for eczema by more than **50%**[11,12] and to help reduce the spread of eczema from one part of the body to another.[13]

Taken together, these findings demonstrate significant reductions in symptoms of seasonal and year-round allergies.

Human Studies with Yeast Fermentate

Scientists also performed clinical studies with yeast fermentate.

Researchers conducted a pilot study on 25 healthy individuals, giving them either a **placebo** or **500 mg** of dried **yeast fermentate** daily for 5 weeks during the beginning of the allergy season.[10]

The placebo treatment had no effect. But **half** of the treated male volunteers reported a **complete absence of allergy symptoms**, which fully returned 1-2 weeks after they stopped taking the supplement.

Antibodies called **IgE** are one of the causes of hay fever symptoms. Based on this study, researchers surmised that **yeast fermentate** helps reduce **IgE**.

IgE causes the body to release chemicals (like histamines) that cause an allergic reaction and produce symptoms that can affect the eyes, nose, throat, lungs, or skin.

Over the course of this 5-week study, as the allergy season went into full swing, blood levels of **IgE** steadily increased among placebo recipients indicating heightened allergic responses.

In those subjects taking the yeast fermentate, IgE levels barely changed, indicating a reduced allergic reaction. The conclusion from this study is that yeast fermentate calms allergic responses by stabilizing IgE levels.[10]

A larger clinical study was then undertaken, with 96 people who had a documented history of seasonal allergies and hay fever. During the highest pollen-count portion of the year, participants took either a placebo or **500 mg** of dried yeast fermentate once daily.[4]

The first 6 weeks of the 12-week study took place during the highest pollen-count period. During this time, scientists documented a reduction in the severity of runny nose and nasal congestion in the treatment group.

Compared to a placebo group, the supplemented subjects experienced **43% fewer total days** with **nasal congestion**. By the end of the study, they also showed decreased levels of white blood cells in their nasal mucus, indicating reduced activation of allergy-triggering cells.[4]

These clinical effects deliver clear and substantial quality-of-life improvements for those who suffer from seasonal allergies.

The Risks of Allergy Medications

During allergy season, people resort to an assortment of over-the-counter medications such as antihistamines, steroids, and decongestants.

To alleviate symptoms, these drugs are intended to block *the histamines and suppress the inflammation* that produce runny noses, and watery eyes.

But allergy medications come with many potential side effects, including drowsiness, constipation, headache, rapid heartbeat, and sleep problems.[14] In fact, drugs from the category called anticholinergics — which includes some commonly used anti-allergy medications like diphenhydramine (Benadryl®) — have been associated with a potentially increased risk of Alzheimer's disease.[15]

Here is a list of possible side effects:[14]

ANTIHISTAMINES:

Drowsiness, dry mouth/nose/throat, stomach problems, blurred vision, and constipation.

Examples: Benadryl®, Claritin®, Zyrtec®, Allegra®, Claritin Eye® (eye drops)

NASAL CORTICOSTEROIDS:

Nasal dryness/irritation, nosebleeds, throat irritation, headache, nausea, vomiting, cough, and (with long-term use) fungal infections of the throat, immune suppression.

Examples: Flonase® (nasal), Nasacort® (nasal)

MAST CELL STABILIZERS:

Stinging sensation inside the nose.

Examples: Alomide® (eye drops), Intal® (inhaler), Nasalcrom® (nasal)

LEUKOTRIENE INHIBITORS:

Weakness, upset stomach, earache, dizziness, cough, headache, trouble sleeping, and (less likely) flu-like symptoms.

Example: Singulair®

NASAL DECONGESTANTS:

Burning/stinging/dryness in the nose, runny nose, and sneezing.

Example: Afrin®

ORAL DECONGESTANTS:

Dizziness, headache, nervousness, fast heartbeat, increased blood pressure, loss of appetite, and problems sleeping.

Example: Sudafed®

NASAL ANTICHOLINERGICS:

Bloody/dry nose, nasal congestion, dry mouth, bad taste in the mouth, irritated throat, dizziness, and nausea.

Example: Atrovent®

TOPICAL CORTICOSTEROIDS (FOR SKIN ALLERGIES):

Burning, itching, redness, changes to skin color, and thinning of skin.

Example: Cortaid®

TOPICAL IMMUNOMODULATORS (FOR SKIN ALLERGIES):

Stinging, burning, irritation, itching at the application site, and possibly headache and flu symptoms.

Example: Protopic® ointment

Summary

Mainstream allergy medications target symptoms, not the root cause of the problem, and come with an array of potential side effects.

Scientists have identified 2 ingredients that retrain the immune system not to overreact to pollen and other allergens, muting the excessive inflammatory responses behind allergy symptoms.

In human studies, the probiotic ***Lactobacillus acidophilus*** **L-92** and **yeast fermentate** substantially reduced seasonal allergy symptoms, such as swollen nasal passages and eye irritation, and resulted in **43%** fewer days with nasal congestion.

These two supplements provide a unique option for improving the quality of life in allergy sufferers. ●

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. Enomoto MI, T; Take, CR; et. al. . Effects of oral ingestion of L. acidophilus GRAS L. acidophilus L-92 strain on the cedar pollen allergy - Verification of preventive action in artificial exposure facility. *The 56th Annual Meeting of the Japanese Society of Allergology, Tokyo, Japan.* 2006.
2. Ishida Y, Nakamura F, Kanzato H, et al. Clinical effects of Lactobacillus acidophilus strain L-92 on perennial allergic rhinitis: a double-blind, placebo-controlled study. *J Dairy Sci.* 2005 Feb;88(2):527-33.
3. Ishida Y, Nakamura F, Kanzato H, et al. Effect of milk fermented with Lactobacillus acidophilus strain L-92 on symptoms of Japanese cedar pollen allergy: a randomized placebo-controlled trial. *Biosci Biotechnol Biochem.* 2005 Sep;69(9):1652-60.
4. Moyad MA, Robinson LE, Kittelsrud JM, et al. Immunogenic yeast-based fermentation product reduces allergic rhinitis-induced nasal congestion: a randomized, double-blind, placebo-controlled trial. *Adv Ther.* 2009 Aug;26(8):795-804.
5. Available at: http://www.cdc.gov/healthcommunication/ToolsTemplates/EntertainmentEd/Tips/Allergies.html. Accessed March 26, 2018.
6. Available at: http://www.aafa.org/page/allergy-facts.aspx. Accessed March 26, 2018.
7. Furness JB, Kunze WA, Clerc N. Nutrient tasting and signaling mechanisms in the gut. II. The intestine as a sensory organ: neural, endocrine, and immune responses. *Am J Physiol.* 1999 Nov;277(5):G922-8.
8. Ishida Y, Bandou I, Kanzato H, et al. Decrease in ovalbumin specific IgE of mice serum after oral uptake of lactic acid bacteria. *Biosci Biotechnol Biochem.* 2003 May;67(5):951-7.
9. Torii A, Torii S, Fujiwara S, et al. Lactobacillus Acidophilus strain L-92 regulates the production of Th1 cytokine as well as Th2 cytokines. *Allergol Int.* 2007 Sep;56(3):293-301.
10. Jensen GS, Patterson, K.M., Barnes, J., Schauss, A.G., Beaman, R., Reeves, S.G. and Robinson, L.E.,. A double-blind placebo-controlled, randomized pilot study: consumption of a high-metabolite immunogen from yeast culture has beneficial effects on erythrocyte health and mucosal immune protection in healthy subjects. *The Open Nutrition Journal.* 2008;2:pp.68-75.
11. Torii S, Torii A, Itoh K, et al. Effects of oral administration of Lactobacillus acidophilus L-92 on the symptoms and serum markers of atopic dermatitis in children. *Int Arch Allergy Immunol.* 2011;154(3):236-45.
12. Yamamoto K, Yokoyama K, Matsukawa T, et al. Efficacy of prolonged ingestion of Lactobacillus acidophilus L-92 in adult patients with atopic dermatitis. *J Dairy Sci.* 2016 Jul;99(7):5039-46.
13. Inoue Y, Kambara T, Murata N, et al. Effects of oral administration of Lactobacillus acidophilus L-92 on the symptoms and serum cytokines of atopic dermatitis in Japanese adults: a double-blind, randomized, clinical trial. *Int Arch Allergy Immunol.* 2014;165(4):247-54.
14. Available at: https://www.rxlist.com/allergy_medications/drugs-condition.htm. Accessed February 13, 2019.
15. Gray SL, Anderson ML, Dublin S, et al. Cumulative use of strong anticholinergics and incident dementia: a prospective cohort study. *JAMA Intern Med.* 2015 Mar;175(3):401-7.

ADVANCED HEART-HEALTH FORMULA

POTASSIUM
with Extend-Release
MAGNESIUM

Magnesium is a major factor in promoting a healthy cardiovascular system.

Research suggests when magnesium and potassium are combined there is ***greater*** support for healthy blood pressure levels that are already within the normal range.

Potassium with Extend-Release Magnesium provides **250 mg** of two forms of magnesium plus **99 mg** of potassium.

One form of magnesium is **immediate-release** while the other is coated in a proprietary encapsulation technology to release magnesium over a 6-hour period.

Take **one** capsule once or twice daily.

Potassium with Extend-Release Magnesium

Item # 02309 • 60 Vegetarian Capsules

	Retail Price	Your Price
1 bottle	$15	**$11.25**
4 bottles		**$10** each

NON GMO PROJECT VERIFIED

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

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

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

A line of skin care products developed by renowned dermatologist Gary Goldfaden, MD

COSMESIS SKIN CARE

Developed Exclusively for Life Extension®

Stem the Effects of Skin Aging

Item #80172 • 2 oz. jar
Retail Price is $59 • **Your Price is $44.25**
4 jars are only $39 each

Plant-stem cell extracts from ***Euterpe oleracea*** (Açaí or cabbage palm fruit) and ***Centella asiatica*** (gotu kola) rejuvenate aging skin.

Combined with **seaweed extracts** in a new topical formula, they help protect and hydrate the skin, leaving it looking younger and healthier.

For full product description and to order **Multi Stem Cell Hydration Cream**, call 1-800-544-4440 or visit www.LifeExtension.com

Good Nasal Health:
BREATHE EASY!

This oral **probiotic** and **yeast** combination supports normal immune and inflammatory function and may promote a healthy response to seasonal, environmental substances.

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

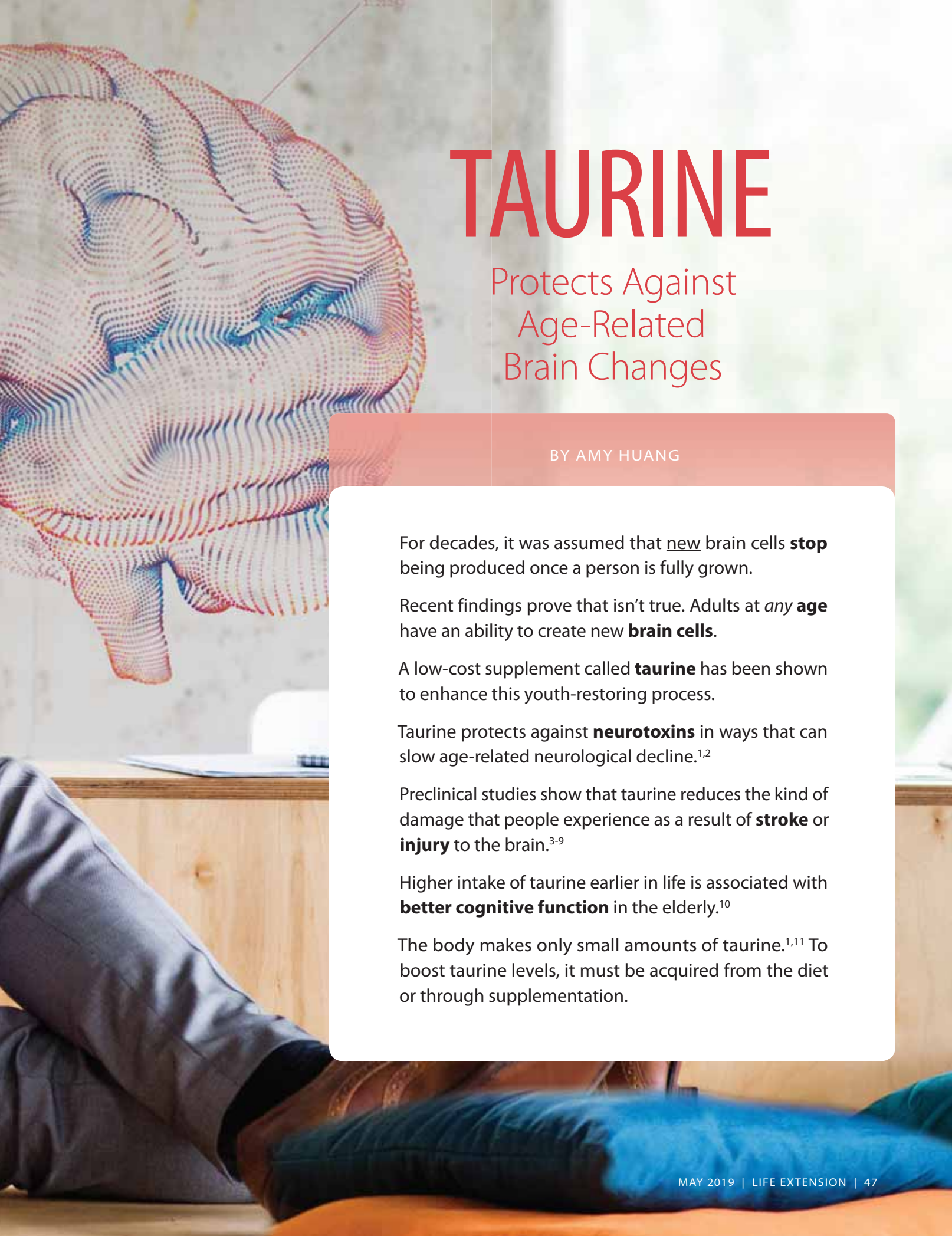
	Retail Price	Your Price
1 bottle	$36	**$27**
4 bottles		**$24** each

Item# 02208 • 30 vegetarian capsules

EpiCor® is a registered trademark of Embria Health Sciences, L.L.C.
L-92® is a registered trademark of Asahi Calpis Wellness Co., Ltd.

NON GMO LE CERTIFIED

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



TAURINE

Protects Against Age-Related Brain Changes

BY AMY HUANG

For decades, it was assumed that new brain cells **stop** being produced once a person is fully grown.

Recent findings prove that isn't true. Adults at *any* **age** have an ability to create new **brain cells**.

A low-cost supplement called **taurine** has been shown to enhance this youth-restoring process.

Taurine protects against **neurotoxins** in ways that can slow age-related neurological decline.[1,2]

Preclinical studies show that taurine reduces the kind of damage that people experience as a result of **stroke** or **injury** to the brain.[3-9]

Higher intake of taurine earlier in life is associated with **better cognitive function** in the elderly.[10]

The body makes only small amounts of taurine.[1,11] To boost taurine levels, it must be acquired from the diet or through supplementation.

The Functions of Taurine

Taurine is an amino acid that helps maintain healthy cells throughout the body.

It is critical for the peak functioning of **mitochondria**, the "power plants" that supply cells with energy.[12,13]

Mitochondrial function wanes with age, impairing cellular function and making it harder for cells to defend themselves from stress and injury.[14]

This is especially true in the brain,[15] one of the most metabolically active organs in the body.

Taurine also has many other ways it may help protect and optimize brain health, including:

- Stimulating new brain cell growth,[2,16,17]
- Protecting against excitotoxicity (harmful overactivity in the brain),[18]
- Defending against toxins that can damage the brain,[19-21]
- Minimizing brain damage caused by stroke and head injuries, and[3-9]
- Preserving normal cellular function and energy supply by regulating calcium, protecting cell membranes, and more.[3,22,23]

Through these mechanisms, taurine may help protect the aging brain against cognitive impairment, dementia, and damage from strokes, head injuries, and neurotoxins.

Neurogenesis: Keeping the Brain Tuned Up

Preclinical studies show that taurine boosts creation of new **brain cells**.[1,2] This is called **neurogenesis**, and it is a key to preserving healthy brain function as we age.

When neurogenesis occurs during brain development, it refers to brain cells growing, dividing, and maturing. But neurogenesis doesn't stop after development.

Throughout life, we must maintain healthy, functional brain cells. We also need to protect the **connections** *between* those brain cells. All our brain functions—from controlling movement to high-level cognitive tasks like speaking, learning, and remembering—require these vital connections.

Neurogenesis *dwindles* with age. As a result, our brains shrink. The critical neural connections then become diminished. This can start the slippery slope into cognitive impairment and dementia.

By encouraging the creation of new brain cells,[1] taurine could help combat age-related decline in cognitive function.

Several cell and animal studies show that taurine helps "wake up" brain stem cells, stimulates new brain cell production, and supports their survival.[1,2,16,17,24-26]

This type of effect has been observed in both young, developing brains *and* in older brains. In one study of middle-aged mice, taurine activated stem cells.[1] Significantly, this happened in the **hippocampus**, a brain region critically important for the formation of new memories. This has obvious ramifications in the fight against Alzheimer's and dementia.

In addition to activating stem cells, taurine produced new cells and supported their survival, while also reducing harmful inflammation in the brain.[1]

Defense Against Excitotoxicity

Excitotoxicity has long been known to contribute to the damage that occurs after traumatic brain injury and stroke.[27] More recently it has also been linked to the progression of *dementia* in the elderly.[28]

Excitotoxicity is the process by which brain cells are damaged or killed when certain receptors in the brain are *overactivated*. This is most often seen with the neurotransmitter **glutamate**.

Glutamate is critical for normal brain function. It sends signals between nerve cells and plays a role in learning and memory.

Overstimulation of brain cells by chronic, high levels of glutamate causes dysfunction and programmed cell death.[29]

Taurine protects against **excitotoxicity** by blocking and reducing the overstimulation caused by excess glutamate.[3,18,30] Normally, cells die soon after they're exposed to high concentrations of glutamate. But when pre-treated with taurine, cells survive under these conditions.

This is a profound finding given how important excitotoxicity is in the development of many common brain disorders.

Brain-Damaging Beta-Amyloid

Taurine's ability to defend against excitotoxicity and halt cell death makes it ideally suited to preventing age-related degeneration of the nervous system, including Alzheimer's and dementia.

Animal studies show that taurine also reduces 2 additional factors that contribute to cognitive decline and risk for dementia: the toxic effects of **beta-amyloid** accumulation and **inflammation**.[30-32]

In a study published in the journal *Neuropharmacology*, taurine protected rat brain cells from the toxicity normally induced by beta-amyloid deposits.[30]

Taurine Protects Brain Health

- **Taurine is critical for normal brain function.**
- **It helps maintain healthy mitochondrial energy supply, which is typically diminished with advancing age.**
- **It spurs the growth of new brain cells, even in old age.**
- **Maintaining adequate taurine levels may help reduce age-related threats to cognitive function, such as neurotoxins, oxidative stress, and inflammation.**
- **In preclinical studies, taurine has been shown to support brain function while shielding against dementia-associated changes and various forms of brain injury.**

What You Need to Know

At least some of this protective effect appears to be due to taurine's ability to directly bind to beta-amyloid. A study using a mouse model of Alzheimer's disease observed this amyloid-binding, which correlated with improvements in cognitive function on various tests.[31]

A rat model of cognitive decline also showed that taurine helped protect brain function, defending against oxidative stress, boosting neurotransmission, and reducing brain inflammation.[32]

Protection Against Dementia

All these studies showing taurine's protective effects suggest that supplementation with it could be a valuable preventive measure against Alzheimer's and dementia.

A group of researchers in South Korea explored the link between taurine and protection from dementia in the elderly.[10] They estimated the past intake of taurine in 40 older individuals with dementia and compared it with that of 37 healthy people of the same age.

What they found was that elderly people with dementia had a significantly lower level of taurine intake than healthy subjects did when they were younger. The average intake of taurine in healthy subjects was approximately **18% higher** than in those who developed dementia.[10]

This study also showed that the amount of taurine intake correlated with the degree of cognitive function. In other words, those who had the *highest* intake of taurine had the *best* scores on cognitive tests.[10]

In another study, on elderly women, **1,500 mg** of taurine daily helped reduce inflammation, protect the health of the blood-brain barrier, and improve cognitive test scores over 14 weeks.[33]

These studies indicate that taurine supports healthy brain function and may protect against Alzheimer's disease and dementia.

Diminishing the Impact of Stroke

Strokes can have devastating effects on cognition and brain function.

They can be generally divided into 2 major types: **ischemic stroke** and **hemorrhagic stroke**.[34]

Ischemic stroke is more common, and occurs when blood flow is reduced or blocked to a part of the brain, leading to cell death and loss of function.[34]

In an animal model of ischemic stroke, supplemental **taurine** *decreased* the volume of brain damage caused by a stroke by about **55%** compared to animals that did not receive treatment.[9]

Additionally, several markers of injury severity, including oxidative stress and energy production in the brain, were reduced in animals given supplemental taurine.

Hemorrhagic stroke refers to sudden, spontaneous bleeding into or around the brain. Although less common than ischemic stroke, it still affects many older individuals, particularly those with high blood pressure.[34]

A rat model of hemorrhagic stroke showed that taurine *protects* against the brain damage caused by this type of stroke as well.[8] Rats given taurine had reduced loss of function with hemorrhage and suffered less brain swelling and inflammation.

Reducing Damage Due to Head Injury

Head injuries are difficult on elderly individuals. Trauma from falls or other accidents can cause significant loss of brain function.

Several preclinical studies have demonstrated that taurine improves the outcomes of these types of injuries.[4-7,35]

In one study, taurine prevented brain cell damage after experimental head injury in rats.[7] The treated animals also experienced improvements in brain blood flow and enhanced mitochondrial function.

Several other animal studies have shown that taurine not only protects the brain from damage, but also improves function after a head injury.[4-6]

Reducing the Effects of Neurotoxins

Taurine may help protect the brain from **neurotoxins** that damage the nervous system.

One of the most common damaging compounds is **glucose**, especially at the high levels seen in **diabetes**. In animal models of diabetes, elevated blood sugar leads to inflammation, oxidative stress, and DNA damage in the brain.

In a recent study, experimental diabetes in rats caused all these harmful cellular changes in multiple areas of the brain.[36] But treatment with taurine *reduced* all these effects.

Taurine also protected the brains of animals exposed to the toxic effects of several compounds, including arsenic, volatile gases, and other known neurotoxins.[19-21]

Summary

Taurine is an amino acid that is critical to healthy cellular function, particularly in highly active tissues like the brain.

Remarkably, taurine appears capable of boosting the creation of new brain cells at any age.

Taurine also protects against toxicity, oxidative stress, and inflammation. As a result, taurine may help prevent age-related cognitive decline, dementia, and injury from stroke and head trauma.

Only small amounts of taurine are produced in the body. By supplementing with taurine, you can help maintain optimal levels necessary for prolonging peak cognitive function into old age.

Fortunately, taurine is not a bulky amino acid, meaning that **1,000 mg** can be obtained by taking just one capsule daily. ●

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. Gebara E, Udry F, Sultan S, et al. Taurine increases hippocampal neurogenesis in aging mice. *Stem Cell Res.* 2015 May;14(3):369-79.
2. Rak K, Volker J, Jurgens L, et al. Neurotrophic effects of taurine on spiral ganglion neurons in vitro. *Neuroreport.* 2014 Nov 12;25(16):1250-4.
3. Prentice H, Modi JP, Wu JY. Mechanisms of Neuronal Protection against Excitotoxicity, Endoplasmic Reticulum Stress, and Mitochondrial Dysfunction in Stroke and Neurodegenerative Diseases. *Oxid Med Cell Longev.* 2015;2015:964518.
4. Li XJ, Li S, Li XQ, et al. [Effects of taurine on the ultrastructure and P2X7 receptor expression in brain following traumatic brain injury in rats]. *Zhongguo Ying Yong Sheng Li Xue Za Zhi.* 2012 Jul;28(4):301-3, 8.
5. Su Y, Fan W, Ma Z, et al. Taurine improves functional and histological outcomes and reduces inflammation in traumatic brain injury. *Neuroscience.* 2014 Apr 25;266:56-65.
6. Sun M, Zhao Y, Gu Y, et al. Protective effects of taurine against closed head injury in rats. *J Neurotrauma.* 2015 Jan 1;32(1):66-74.
7. Wang Q, Fan W, Cai Y, et al. Protective effects of taurine in traumatic brain injury via mitochondria and cerebral blood flow. *Amino Acids.* 2016 Sep;48(9):2169-77.
8. Zhao H, Qu J, Li Q, et al. Taurine supplementation reduces neuroinflammation and protects against white matter injury after intracerebral hemorrhage in rats. *Amino Acids.* 2018 Apr;50(3-4):439-51.
9. Zhu XY, Ma PS, Wu W, et al. Neuroprotective actions of taurine on hypoxic-ischemic brain damage in neonatal rats. *Brain Res Bull.* 2016 Jun;124:295-305.
10. Bae MA, Gao R, Kim SH, et al. Past Taurine Intake Has a Positive Effect on Present Cognitive Function in the Elderly. *Adv Exp Med Biol.* 2017;975 Pt 1:67-77.
11. Wojcik OP, Koenig KL, Zeleniuch-Jacquotte A, et al. The potential protective effects of taurine on coronary heart disease. *Atherosclerosis.* 2010 Jan;208(1):19-25.
12. Hansen SH, Andersen ML, Cornett C, et al. A role for taurine in mitochondrial function. *J Biomed Sci.* 2010 Aug 24;17 Suppl 1:S23.
13. Jong CJ, Azuma J, Schaffer S. Mechanism underlying the antioxidant activity of taurine: prevention of mitochondrial oxidant production. *Amino Acids.* 2012 Jun;42(6):2223-32.
14. Sun N, Youle RJ, Finkel T. The Mitochondrial Basis of Aging. *Mol Cell.* 2016 Mar 3;61(5):654-66.
15. Navarro A, Boveris A. Brain mitochondrial dysfunction in aging, neurodegeneration, and Parkinson's disease. *Front Aging Neurosci.* 2010;2.
16. Li XW, Gao HY, Liu J. The role of taurine in improving neural stem cells proliferation and differentiation. *Nutr Neurosci.* 2017 Sep;20(7):409-15.
17. Shivaraj MC, Marcy G, Low G, et al. Taurine induces proliferation of neural stem cells and synapse development in the developing mouse brain. *PLoS One.* 2012;7(8):e42935.
18. Leon R, Wu H, Jin Y, et al. Protective function of taurine in glutamate-induced apoptosis in cultured neurons. *J Neurosci Res.* 2009 Apr;87(5):1185-94.
19. Guan H, Qiu Z, Zhou X, et al. Protection of Taurine Against Impairment in Learning and Memory in Mice Exposed to Arsenic. *Adv Exp Med Biol.* 2017;975 Pt 1:255-69.
20. Zhang X, Wang X, Zhang J, et al. Effects of Taurine on Alterations of Neurobehavior and Neurodevelopment Key Proteins Expression in Infant Rats by Exposure to Hexabromocyclododecane. *Adv Exp Med Biol.* 2017;975 Pt 1:119-30.
21. Zhang Y, Li D, Li H, et al. Taurine Pretreatment Prevents Isoflurane-Induced Cognitive Impairment by Inhibiting ER Stress-Mediated Activation of Apoptosis Pathways in the Hippocampus in Aged Rats. *Neurochem Res.* 2016 Oct;41(10):2517-25.
22. Ames BN. Prolonging healthy aging: Longevity vitamins and proteins. *Proc Natl Acad Sci U S A.* 2018 Oct 23;115(43):10836-44.
23. Bouckenooghe T, Remacle C, Reusens B. Is taurine a functional nutrient? *Curr Opin Clin Nutr Metab Care.* 2006 Nov;9(6):728-33.

24. Hernandez-Benitez R, Vangipuram SD, Ramos-Mandujano G, et al. Taurine enhances the growth of neural precursors derived from fetal human brain and promotes neuronal specification. *Dev Neurosci.* 2013;35(1):40-9.
25. Liu J, Wang HW, Liu F, et al. Antenatal taurine improves neuronal regeneration in fetal rats with intrauterine growth restriction by inhibiting the Rho-ROCK signal pathway. *Metab Brain Dis.* 2015 Feb;30(1):67-73.
26. Pasantes-Morales H, Ramos-Mandujano G, Hernandez-Benitez R. Taurine enhances proliferation and promotes neuronal specification of murine and human neural stem/progenitor cells. *Adv Exp Med Biol.* 2015;803:457-72.
27. Fujikawa DG. The role of excitotoxic programmed necrosis in acute brain injury. *Comput Struct Biotechnol J.* 2015;13:212-21.
28. Wang R, Reddy PH. Role of Glutamate and NMDA Receptors in Alzheimer's Disease. *J Alzheimers Dis.* 2017;57(4):1041-8.
29. Lewerenz J, Maher P. Chronic Glutamate Toxicity in Neurodegenerative Diseases-What is the Evidence? *Front Neurosci.* 2015;9:469.
30. Paula-Lima AC, De Felice FG, Brito-Moreira J, et al. Activation of GABA(A) receptors by taurine and muscimol blocks the neurotoxicity of beta-amyloid in rat hippocampal and cortical neurons. *Neuropharmacology.* 2005 Dec;49(8):1140-8.
31. Jang H, Lee S, Choi SL, et al. Taurine Directly Binds to Oligomeric Amyloid-beta and Recovers Cognitive Deficits in Alzheimer Model Mice. *Adv Exp Med Biol.* 2017;975 Pt 1:233-41.
32. Reeta KH, Singh D, Gupta YK. Chronic treatment with taurine after intracerebroventricular streptozotocin injection improves cognitive dysfunction in rats by modulating oxidative stress, cholinergic functions and neuroinflammation. *Neurochem Int.* 2017 Sep;108:146-56.
33. Chupel MU, Minuzzi LG, Furtado G, et al. Exercise and taurine in inflammation, cognition, and peripheral markers of blood-brain barrier integrity in older women. *Appl Physiol Nutr Metab.* 2018 Jul;43(7):733-41.
34. Available at: http://www.mayoclinic.org/diseases-conditions/stroke/symptoms-causes/syc-20350113. Accessed May 23, 2018.
35. Niu X, Zheng S, Liu H, et al. Protective effects of taurine against inflammation, apoptosis, and oxidative stress in brain injury. *Mol Med Rep.* 2018 Nov;18(5):4516-22.
36. Caletti G, Herrmann AP, Pulcinelli RR, et al. Taurine counteracts the neurotoxic effects of streptozotocin-induced diabetes in rats. *Amino Acids.* 2018 Jan;50(1):95-104.

FEED YOUR BRAIN

FOR OPTIMAL BRAIN HEALTH

Cognitex® Elite contains clinically studied brain-boosting nutrients in one advanced formula.

A new ingredient called **Sibelius™: Sage Extract** demonstrated improvement in attention and memory performance in healthy, older volunteers.

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

Sibelius™: Sage extract (leaf)	**333 mg**
AuroraBlue® Wildcrafted Blueberry Complex	**200 mg**
Ashwagandha extract	**125 mg**
Phosphatidylserine	**100 mg**
Uridine-5′-monophosphate	**50 mg**
Vinpocetine	**20 mg**

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

	Retail Price	Your Price
1 bottle	$58	**$43.50**
4 bottles		**$40 each**

Item #02397 • 60 tablets

	Retail Price	Your Price
1 bottle	$56	**$42**
4 bottles		**$38 each**

Item #02396 • 60 tablets

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

NON GMO

CAUTION: If you are taking anticoagulant or antiplatelet medications, or have a bleeding disorder, consult your healthcare provider before taking this product. Cognitex® Elite is available with and without pregnenolone. Those with active hormone-driven cancers should take Cognitex without pregnenolone.

SIBELIUS™ is a trademark of Sibelius Limited and used under license. CHRONOSCREEN™ is a trademark of Chronos Therapeutics Limited and used under license from Sibelius Limited. AuroraBlue® is a registered trademark of Denali BioTechnologies, 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 VERSATILE BENEFITS OF PYCNOGENOL®

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

Arterial Protect

1 DAILY

	Retail Price	Your Price
1 bottle	$44	**$33**
4 bottles		**$29 each**

Item #02004 • 30 vegetarian capsules

VenoFlow™

	Retail Price	Your Price
1 bottle	$52	**$39**
4 bottles		**$36 each**

Item #02102 • 30 vegetarian capsules

Pycnogenol®

French Maritime Pine Bark Extract

	Retail Price	Your Price
1 bottle	$64	**$48**
4 bottles		**$45 each**

Item #01637 • 60 vegetarian capsules

Arterial Protect

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

VenoFlow™

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

Pycnogenol®

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

For full product descriptions and to order Pycnogenol®, Arterial Protect, or VenoFlow™, call 1-800-544-4440 or visit www.LifeExtension.com

NON GMO LE CERTIFIED

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

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

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.

Taurine

Item #01827 • 90 vegetarian capsules
Retail Price is $13 • **Your Price is $9.75**
4 bottles are only $9 each

Boosts Brain Cell Regeneration & Supports Whole-Body Health

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**

NON GMO

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

Overlooked Dangers of Excess
FASTING INSULIN

BY SONIA WHITMAN

The public is largely aware of the dangers of high blood **sugar**.

Chronically elevated blood **glucose** levels damage almost every tissue in the body and accelerate degenerative aging.

A related condition that often goes undiagnosed is elevated **fasting insulin**.

Long *before* blood sugar rises, levels of the hormone **insulin** can be dangerously high.

Elevated **fasting insulin** is linked to a number of health problems including cancer, Alzheimer's, high blood pressure, and atherosclerosis.[1-8]

Not only is **fasting insulin** seldom checked for, but over-secreting of insulin by the pancreas can artificially lower blood glucose. This can allow a **diabetic** state to fester for decades before **glycemic control** is lost, and full-blown **type II diabetes** develops.

It doesn't need to be that way.

Fasting insulin can be checked by low-cost blood tests. When elevated, insulin can be reduced through diet, exercise, certain nutrients, and the AMPK-activating drug **metformin**.

What *Is* Elevated Fasting Insulin?

Insulin is a hormone made and secreted by the pancreas. It regulates carbohydrate, fat and protein metabolism, and helps cells absorb and process glucose from the bloodstream to keep glucose levels from getting too high.

Eating stimulates the secretion of insulin. Normally, its levels then drop off during the **fasting state**, when food hasn't been consumed for some time. This resting level of insulin is called **fasting insulin**.

But for many people, as they age, and gain weight and fat mass, the body stops responding to insulin as well as it should. This is referred to as **insulin resistance**. As cells become resistant to the effects of insulin, blood glucose levels rise, along with risk for type II diabetes.

Initially, there can be an extended period when the pancreas makes up for **insulin resistance** by pumping out *high* levels of insulin. In this state, called **hyperinsulinemia**, insulin levels remain high even between meals.

Glucose levels may remain normal, but insulin is still working overtime. This elevated blood insulin level has numerous negative effects on metabolism and leads to changes that can cause disease.[1-8]

The Dangers of High Fasting Insulin

Research has found that high fasting insulin, or **hyperinsulinemia**, is linked to a vast range of major health problems, including:

- High blood pressure,[7,9,10]
- Obesity,[2,10,11]
- Atherosclerosis,[12]
- Type II diabetes,[13,14]
- Cancer,[5,15,16]
- High triglycerides (which contribute to hardening of the arteries),[7,17-19]
- Low HDL cholesterol (the "good" cholesterol),[7,18,20]
- Polycystic ovary syndrome,[21]
- Gout,[22]
- Benign prostatic hypertrophy (prostate enlargement in men),[23]
- Migraine headaches,[24]
- Erectile dysfunction,[25]
- Skin tags,[26]
- Inner ear problems, including tinnitus, vertigo, and hearing loss,[27]
- Alzheimer's disease,[6] and
- Increased risk of heart attack and stroke.[28]

The list is shockingly long. And the medical literature supporting the connection between high fasting insulin and these conditions continues to grow.

As a whole, the research shows that unchecked high fasting insulin increases the risk for rapid aging of all tissues and numerous degenerative diseases that result.

Dangers of Elevated Fasting Insulin

- **Even in the absence of high blood sugar, elevated fasting insulin levels (or hyperinsulinemia) can have dire metabolic consequences that lead to many chronic conditions.**
- **Hyperinsulinemia often goes undiagnosed, because routine metabolic screening typically tests for markers of elevated glucose, *not* insulin levels.**
- **Regular testing of fasting insulin levels can help identify this problem before it is too late.**
- **If diagnosed, interventions that stimulate AMPK activity can help improve insulin sensitivity and reduce its levels, preventing potential long-term harm.**
- **Some ways to boost AMPK and negate the effects of insulin resistance include: exercise, improved diet, medication like metformin, and supplementation with *Gynostemma pentaphyllum* and hesperidin.**

What You Need to Know

Testing for Fasting Insulin Levels

Clearly, elevated fasting insulin is a serious problem. But few people know they have it.

It is *not* routine medical practice to screen for fasting insulin levels. As a result, insulin resistance and hyperinsulinemia usually go unnoticed until blood sugar rises or overt symptoms begin to show.

By that point, high fasting insulin may have done damage that can lead to disease and loss of function over time.

The solution is simple: ***Get tested***. Even people with normal glucose levels should talk to their doctors about having fasting insulin tested regularly.

A fasting insulin test is a helpful tool in the diagnosis of insulin resistance and type II diabetes and may save your life.

The hormone insulin is secreted primarily in response to the intake of carbohydrates. It helps the transport of glucose from the bloodstream into the cells.

Life Extension® believes an ideal fasting insulin level to be **<5 µIU/mL**.

Additional blood tests to screen for persistently high blood sugar include **hemoglobin A1c, fasting glucose**, and the **glucose tolerance test**.

The Link Between Fasting Insulin and AMPK

Treating—or, even better, *preventing*—high fasting insulin levels is vital.

Unfortunately, most medical treatments address the different symptoms and effects of hyperinsulinemia, not the root problem itself.

For example, doctors generally recommend antihypertensive medications to lower blood pressure, and statins to improve cholesterol. These medications help by treating the symptoms, but they don't address the high fasting insulin levels that caused the underlying problems in the first place.

A better approach would be to correct **insulin resistance** to keep **fasting insulin** in the normal range**.** Only then can a person prevent or correct the harmful effects of excess insulin.

Fortunately, there's an enzyme found in every cell in the body, called **AMP-activated protein kinase (AMPK)**, that can help get insulin levels back to normal.

When activated, AMPK improves metabolism, boosting cells' sensitivity to insulin and counteracting many of the detrimental effects discussed above, including weight gain and many age-related diseases.[8,29,30]

AMPK activation has several specific effects on metabolism, including:[8]

- Improved glucose transport into cells,
- Improved function of the mitochondria, the "power generators" of the cell,
- Enhanced breakdown of fats,
- Reduction of oxidative stress,
- Reduced inflammation, and
- Activation of **sirtuins**, proteins that regulate cellular health and are associated with life-span extension in many models.

The end result of these effects? Reduced insulin resistance and *lower* levels of fasting insulin.

The objective is to find ways to "amp up" AMPK's activity. The four known ways to do this are with exercise, dietary changes, medication, and natural supplements.

Activating AMPK with Exercise and Diet

We all know that getting regular physical **exercise** has many health benefits, like burning calories and toning muscles.

But one benefit is often overlooked: Exercise directly stimulates cells to *increase* **AMPK activity**.[31,32] This is why exercise is associated with weight loss and metabolic benefits *beyond* what can be accounted for simply by the number of calories burned.

The converse is also true. A **sedentary lifestyle** leads to *lower* AMPK activity,[8] and is well recognized as a risk factor for obesity, type II diabetes and metabolic syndrome.

The modern **Western diet** is also partly to blame for many of the metabolic diseases from which people suffer, including **hyperinsulinemia**. Diets that are high in calories, carbohydrates, and fats put a strain on the system and force insulin levels up, leading to insulin resistance and high fasting insulin levels.

Eating **healthier foods** and **fewer total calories** can go a long way towards improving metabolism and boosting AMPK activity. In fact, calorie restriction, either by total reduction in the number of calories consumed or by intermittent fasting, has been shown in research studies to be an activator of AMPK.[31,33]

For most people, though, making dramatic and consistent changes to diet and exercise is difficult. There are other options that can also be powerful AMPK activators.

Medication and AMPK

Metformin is a drug that, for years, has been used to control elevated blood glucose in patients with type II diabetes.

It works, in part, because it is a potent activator of AMPK, helping to correct underlying metabolic problems and reduce insulin resistance.[34-36]

For this reason, the medical applications of metformin have been expanding. It is now being used to treat more than just diabetes and is being hailed as a means to slow the aging process and reduce weight gain.[34,36,37]

Though it is derived from a compound found in the French lilac plant, it is a *synthetic* medication and requires a physician's prescription.

LifeExtension® has recommended metformin as an anti-aging drug since **1995**, and the scientific literature continues to support its many benefits. Some people, however, experience gastro-intestinal side effects and cannot take metformin. Others encounter problems persuading their doctor to prescribe metformin for its diabetes-prevention properties.

Using Plant Compounds to Boost AMPK

Fortunately, other plants contain *natural* compounds with similar AMPK-activating properties.

Gynostemma pentaphyllum is a plant native to parts of Asia. It is known as the "immortality herb" by some local cultures.

Several animal and cell culture studies have shown that ***G. pentaphyllum*** and its extracts are **activators** of **AMPK** and have related health benefits.[38-42]

For example, a study utilizing a mouse model of obesity found that by activating AMPK, *G. pentaphyllum* decreased body weight and cholesterol levels.[39]

More impressively, *human* studies have demonstrated metabolic and body fat improvements with ***G. pentaphyllum*** comparable to those seen with **metformin**.

A study published in the medical journal *Obesity* randomized 80 overweight or obese subjects to receive either **450 mg** per day of a *G. pentaphyllum* extract or a placebo.[41]

Over a 12-week period, several markers of body fat were *reduced* in those subjects receiving *G. pentaphyllum*. Total abdominal fat area, body weight, body fat mass, percent body fat, and body mass index were all reduced in the ***G. pentaphyllum*** group, compared to the **placebo**.

Although all excess body fat can have negative effects, **abdominal fat** has the strongest impact, significantly contributing to metabolic disease and all its harmful effects.[43] Total abdominal fat was reduced by **6.3%** over the 12-week period of this study.[41]

A compound found in citrus fruits called **hesperidin** has also been found to increase **AMPK** activity.[44-46]

A study of mice fed a high fat diet demonstrated that **hesperidin** supplementation significantly *reduced* body weight, body fat deposition, blood glucose, lipid levels, and insulin levels. It also reduced a measure of the degree of insulin resistance (the HOMA-IR index).[45]

In human studies, as well, hesperidin has demonstrated the benefits that come with AMPK stimulation.[44,46] In one study, published in the *Journal of Clinical Endocrinology & Metabolism*, patients with metabolic syndrome, randomized to receive **500 mg** of hesperidin per day, benefited from both improved blood vessel function and a reduction in circulating markers of systemic **inflammation**.[46]

By activating AMPK, both ***G. pentaphyllum*** and **hesperidin** can help bring high fasting insulin levels back under control.

Summary

The dangers of high blood glucose levels associated with metabolic syndrome and diabetes are well known.

But there is another related, yet often undiagnosed threat.

Insulin resistance and high levels of **fasting insulin**—even in the absence of high glucose—can wreak havoc on our metabolism and lead to numerous long-term effects, ranging from high blood pressure to cancer.

This condition is often missed during routine blood testing that typically measures only markers of elevated **glucose**, not **insulin**. Low-cost **fasting insulin** blood testing can remedy this.

If it's discovered, elevated fasting insulin can be corrected. Boosting the activity of the enzyme **AMPK** can help resolve metabolic abnormalities, improving insulin sensitivity and preventing the negative effects of high fasting insulin.

Exercise and dietary changes both help activate **AMPK**.

Medications such as **metformin**, and natural plant products, including ***G. pentaphyllum*** and **hesperidin**, have also been shown to have potent AMPK-activating effects.

Together, these interventions can help get high **fasting insulin** levels under control and prevent the downward spiral into chronic diseases, with which they are associated.

Fasting insulin has been added to the popular **Male** and **Female Blood Test Panels** that many readers of this magazine have done annually. Until **June 3, 2019**, the cost of these comprehensive test panels is reduced to only **$199**. ●

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. Crofts C, Schofield G, Zinn C, et al. Identifying hyperinsulinaemia in the absence of impaired glucose tolerance: An examination of the Kraft database. *Diabetes Res Clin Pract.* 2016 Aug;118:50-7.
2. Erion KA, Corkey BE. Hyperinsulinemia: a Cause of Obesity? *Curr Obes Rep.* 2017 Jun;6(2):178-86.
3. Reaven G. Syndrome X. *Curr Treat Options Cardiovasc Med.* 2001 Aug;3(4):323-32.

(References continue on page 64.)

Comprehensive Blood Tests at Low Super Sale Prices

The value of the **Male** and **Female Blood Panels** improves as more tests are added at no additional cost. Last year, **apolipoprotein B** was added to better measure **vascular** risk. This year, **fasting insulin** has been added to provide a clearer picture of one's metabolic status. If elevated, steps to reduce **fasting insulin** can help assist with **weight loss** and achieving better **glucose** control. See the huge number of parameters included in these test panels:

MALE PANEL

METABOLIC PROFILE

Glucose
NEW **Insulin**
Hemoglobin A1c
Kidney function tests: creatinine, BUN, uric acid, BUN/creatinine ratio
Liver function tests: AST, ALT, LDH, GGT, bilirubin, alkaline phosphatase
Blood minerals: calcium, potassium, phosphorus, sodium, chloride, iron
Blood proteins: albumin, globulin, total protein, albumin/globulin ratio

CARDIAC MARKERS

Apolipoprotein B (ApoB)
Homocysteine
C-Reactive Protein (high sensitivity)

LIPID PROFILE

Total Cholesterol
LDL (low-density lipoprotein)
HDL (high-density lipoprotein)
Triglycerides

COMPLETE BLOOD COUNT (CBC)

Red Blood Cell count including: hemoglobin, hematocrit, MCV, MCH, MCHC, RDW
White Blood Cell count including: lymphocytes, monocytes, eosinophils, neutrophils, basophils
Platelet count

CANCER MARKER

PSA (Prostate Specific Antigen)

HORMONES

Free and Total Testosterone
DHEA-S
Estradiol (an estrogen)
TSH (thyroid function)
Vitamin D (25-hydroxyvitamin D)

FEMALE PANEL

METABOLIC PROFILE

Glucose
NEW **Insulin**
Hemoglobin A1c
Kidney function tests: creatinine, BUN, uric acid, BUN/creatinine ratio
Liver function tests: AST, ALT, LDH, GGT, bilirubin, alkaline phosphatase
Blood minerals: calcium, potassium, phosphorus, sodium, chloride, iron
Blood proteins: albumin, globulin, total protein, albumin/globulin ratio

CARDIAC MARKERS

Apolipoprotein B (ApoB)
Homocysteine
C-Reactive Protein (high sensitivity)

LIPID PROFILE

Total Cholesterol
LDL (low-density lipoprotein)
HDL (high-density lipoprotein)
Triglycerides

COMPLETE BLOOD COUNT (CBC)

Red Blood Cell count including: hemoglobin, hematocrit, MCV, MCH, MCHC, RDW
White Blood Cell count including: lymphocytes, monocytes, eosinophils, neutrophils, basophils
Platelet count

HORMONES

Progesterone
Estradiol (an estrogen)
Free and Total Testosterone
DHEA-S
TSH (thyroid function)
Vitamin D (25-hydroxyvitamin D)

Lab Test Super Sale • March 25 – June 3, 2019.

Retail price: $400 • Your Price: $199

To obtain these comprehensive Male or Female Panels at these low prices, call 1-800-208-3444 or log on to www.LifeExtension.com/blood to order your requisition forms.

LifeExtension®
NATIONAL DIAGNOSTICS, INC.

Then–at your convenience–when you have the form, you can visit one of the blood-drawing facilities provided by LabCorp in your area or at the **Life Extension Nutrition Center** in Ft. Lauderdale.

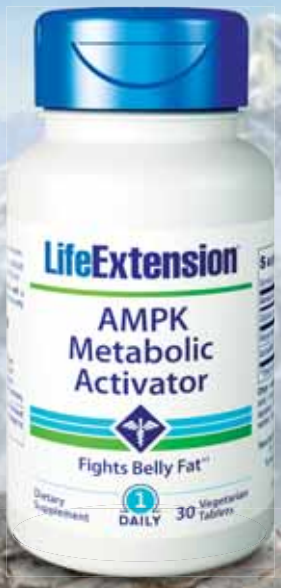
Blood testing services are available only in the continental United States and Anchorage, AK. Not available in Maryland. Restrictions apply for residents of MA, NY, NJ, RI, and PA.

4. Sarafidis PA, Nilsson PM. The metabolic syndrome: a glance at its history. *J Hypertens.* 2006 Apr;24(4):621-6.
5. Tsujimoto T, Kajio H, Sugiyama T. Association between hyperinsulinemia and increased risk of cancer death in nonobese and obese people: A population-based observational study. *Int J Cancer.* 2017 Jul 1;141(1):102-11.
6. Neumann KF, Rojo L, Navarrete LP, et al. Insulin resistance and Alzheimer's disease: molecular links & clinical implications. *Curr Alzheimer Res.* 2008 Oct;5(5):438-47.
7. Salonen JT, Lakka TA, Lakka HM, et al. Hyperinsulinemia is associated with the incidence of hypertension and dyslipidemia in middle-aged men. *Diabetes.* 1998 Feb;47(2):270-5.
8. Ruderman NB, Carling D, Prentki M, et al. AMPK, insulin resistance, and the metabolic syndrome. *J Clin Invest.* 2013 Jul;123(7):2764-72.
9. Ferrannini E, Haffner SM, Stern MP. Essential hypertension: an insulin-resistant state. *J Cardiovasc Pharmacol.* 1990;15 Suppl 5:S18-25.
10. Modan M, Halkin H, Almog S, et al. Hyperinsulinemia. A link between hypertension obesity and glucose intolerance. *J Clin Invest.* 1985 Mar;75(3):809-17.
11. Kahn BB, Flier JS. Obesity and insulin resistance. *J Clin Invest.* 2000 Aug;106(4):473-81.
12. Bonner G. Hyperinsulinemia, insulin resistance, and hypertension. *J Cardiovasc Pharmacol.* 1994;24 Suppl 2:S39-49.
13. Goldstein BJ. Insulin resistance as the core defect in type 2 diabetes mellitus. *Am J Cardiol.* 2002 Sep 5;90(5A):3G-10G.
14. Haffner SM, Stern MP, Mitchell BD, et al. Incidence of type II diabetes in Mexican Americans predicted by fasting insulin and glucose levels, obesity, and body-fat distribution. *Diabetes.* 1990 Mar;39(3):283-8.
15. Burnol AF, Morzyglod L, Popineau L. [Cross-talk between insulin signaling and cell proliferation pathways]. *Ann Endocrinol (Paris).* 2013 May;74(2):74-8.
16. Nilsen TI, Vatten LJ. Prospective study of colorectal cancer risk and physical activity, diabetes, blood glucose and BMI: exploring the hyperinsulinaemia hypothesis. *Br J Cancer.* 2001 Feb 2;84(3):417-22.
17. Godsland IF, Crook D, Walton C, et al. Influence of insulin resistance, secretion, and clearance on serum cholesterol, triglycerides, lipoprotein cholesterol, and blood pressure in healthy men. *Arterioscler Thromb.* 1992 Sep;12(9):1030-5.
18. Ko GT, Cockram CS, Woo J, et al. Obesity, insulin resistance and isolated low high-density-lipoprotein cholesterol in Chinese subjects. *Diabet Med.* 2001 Aug;18(8):663-6.
19. Mykkanen L, Kuusisto J, Haffner SM, et al. Hyperinsulinemia predicts multiple atherogenic changes in lipoproteins in elderly subjects. *Arterioscler Thromb.* 1994 Apr;14(4):518-26.
20. Karhapaa P, Malkki M, Laakso M. Isolated low HDL cholesterol. An insulin-resistant state. *Diabetes.* 1994 Mar;43(3):411-7.
21. Diamanti-Kandarakis E. Insulin resistance in PCOS. *Endocrine.* 2006 Aug;30(1):13-7.
22. Choi HK, Ford ES, Li C, et al. Prevalence of the metabolic syndrome in patients with gout: the Third National Health and Nutrition Examination Survey. *Arthritis Rheum.* 2007 Feb 15;57(1):109-15.
23. Vikram A, Jena G, Ramarao P. Insulin-resistance and benign prostatic hyperplasia: the connection. *Eur J Pharmacol.* 2010 Sep 1;641(2-3):75-81.
24. Fava A, Pirritano D, Consoli D, et al. Chronic migraine in women is associated with insulin resistance: a cross-sectional study. *Eur J Neurol.* 2014 Feb;21(2):267-72.
25. Yao F, Liu L, Zhang Y, et al. Erectile dysfunction may be the first clinical sign of insulin resistance and endothelial dysfunction in young men. *Clin Res Cardiol.* 2013 Sep;102(9):645-51.
26. Sari R, Akman A, Alpsoy E, et al. The metabolic profile in patients with skin tags. *Clin Exp Med.* 2010 Sep;10(3):193-7.
27. Kraft JR. Hyperinsulinemia: A Merging History with Idiopathic Tinnitus, Vertigo, and Hearing Loss. *Int Tinnitus J.* 1998;4(2): 127-30.
28. Pyorala M, Miettinen H, Laakso M, et al. Hyperinsulinemia and the risk of stroke in healthy middle-aged men: the 22-year follow-up results of the Helsinki Policemen Study. *Stroke.* 1998 Sep;29(9):1860-6.
29. Salminen A, Kaarniranta K. AMP-activated protein kinase (AMPK) controls the aging process via an integrated signaling network. *Ageing Res Rev.* 2012 Apr;11(2):230-41.
30. Towler MC, Hardie DG. AMP-activated protein kinase in metabolic control and insulin signaling. *Circ Res.* 2007 Feb 16;100(3):328-41.
31. Jeon SM. Regulation and function of AMPK in physiology and diseases. *Exp Mol Med.* 2016 Jul 15;48(7):e245.
32. Kjobsted R, Munk-Hansen N, Birk JB, et al. Enhanced Muscle Insulin Sensitivity After Contraction/Exercise Is Mediated by AMPK. *Diabetes.* 2017 Mar;66(3):598-612.
33. Canto C, Auwerx J. Calorie restriction: is AMPK a key sensor and effector? *Physiology (Bethesda).* 2011 Aug;26(4):214-24.
34. Diabetes Prevention Program Research G. Long-term safety, tolerability, and weight loss associated with metformin in the Diabetes Prevention Program Outcomes Study. *Diabetes Care.* 2012 Apr;35(4):731-7.
35. Hawley SA, Gadalla AE, Olsen GS, et al. The antidiabetic drug metformin activates the AMP-activated protein kinase cascade via an adenine nucleotide-independent mechanism. *Diabetes.* 2002 Aug;51(8):2420-5.
36. Yanovski JA, Krakoff J, Salaita CG, et al. Effects of metformin on body weight and body composition in obese insulin-resistant children: a randomized clinical trial. *Diabetes.* 2011 Feb;60(2):477-85.
37. Wang YW, He SJ, Feng X, et al. Metformin: a review of its potential indications. *Drug Des Devel Ther.* 2017;11:2421-9.
38. Dong C, Xie Z, Yu Y, et al. Discovery, synthesis, and structure-activity relationships of 20S-dammar-24-en-2alpha,3beta,12beta,20-tetrol (GP) derivatives as a new class of AMPKalpha2beta1gamma1 activators. *Bioorg Med Chem.* 2016 Jun 15;24(12):2688-96.
39. Gauhar R, Hwang SL, Jeong SS, et al. Heat-processed Gynostemma pentaphyllum extract improves obesity in ob/ob mice by activating AMP-activated protein kinase. *Biotechnol Lett.* 2012 Sep;34(9):1607-16.
40. Nguyen PH, Gauhar R, Hwang SL, et al. New dammarane-type glucosides as potential activators of AMP-activated protein kinase (AMPK) from Gynostemma pentaphyllum. *Bioorg Med Chem.* 2011 Nov 1;19(21):6254-60.
41. Park SH, Huh TL, Kim SY, et al. Antiobesity effect of Gynostemma pentaphyllum extract (actiponin): a randomized, double-blind, placebo-controlled trial. *Obesity (Silver Spring).* 2014 Jan;22(1):63-71.
42. Wang J, Ha TKQ, Shi YP, et al. Hypoglycemic triterpenes from Gynostemma pentaphyllum. *Phytochemistry.* 2018 Nov;155: 171-81.
43. Matsuzawa Y, Shimomura I, Nakamura T, et al. Pathophysiology and pathogenesis of visceral fat obesity. *Obes Res.* 1995 Sep;3 Suppl 2:187s-94s.
44. Ohara T, Muroyama K, Yamamoto Y, et al. Oral intake of a combination of glucosyl hesperidin and caffeine elicits an anti-obesity effect in healthy, moderately obese subjects: a randomized double-blind placebo-controlled trial. *Nutr J.* 2016 Jan 19;15:6.
45. Pu P. [Protection mechanisms of hesperidin on mouse with insulin resistance]. *Zhongguo Zhong Yao Za Zhi.* 2016 Sep;41(17):3290-5.
46. Rizza S, Muniyappa R, Iantorno M, et al. Citrus polyphenol hesperidin stimulates production of nitric oxide in endothelial cells while improving endothelial function and reducing inflammatory markers in patients with metabolic syndrome. *J Clin Endocrinol Metab.* 2011 May;96(5):E782-92.

CONQUER BELLY FAT WITH AMPK

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

ITEM # 02207 • 30 vegetarian tablets
Retail price $38 • **Your Price is $28.50**
4 bottles $24 each



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

1 DAILY

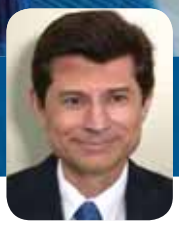
ActivAMP® is a registered trademark of Gencor.

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

NON GMO

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

AGE REVERSAL UPDATE



BY WILLIAM FALOON

This article describes a wish list I am working on for this year's **Revolution Against Aging and Death** conference (RAADfest 2019).

I also distinguish between the two full time jobs I have, so that you understand the difference between **Life Extension**® and the **Age-Reversal Network**.

Most of you support **Life Extension** by utilizing our **lab test** services along with science-based **nutrient** formulas.

Proceeds are contributed to other, entirely distinct organizations to help fund activities related to combatting **government malfeasance** and supporting **biomedical research**.

I support both of these activities because inappropriate bureaucratic actions hinder lifesaving advances.

A growing number of our supporters want to do more than delay aging and reduce disease risks. They want to participate in **clinical trials** and/or self-experiment (under physician supervision) with groundbreaking techniques that demonstrate **rejuvenation** effects in lab animals and in small, proof-of-concept **human** studies.

For these individuals, a public benefit group called **Age-Reversal Network** has been formed. Its mission is to identify, evaluate, and **validate** regenerative medicine interventions that appear to be working and detect those that are not.

The **Age-Reversal Network** consists of dedicated physicians, scientists, and lay people who recognize that it may now be possible to enable old people to at least partially grow biologically younger.

Indicators of age-reversal are determined by **clinical measures** (such as lowered blood pressure), **aging biomarkers** (such as reduced inflammation) and **symptomatic improvements** (such as better sleep/greater exercise endurance).

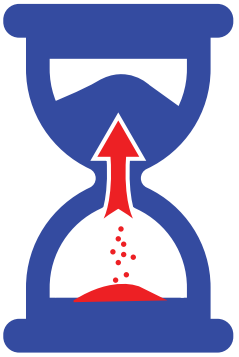
People interested in receiving free email **Age-Reversal Updates** can register at: www.age-reversal.net/join

For those who want to wait for more concrete evidence, your support of **Life Extension** enables me to contribute more funding to **age-reversal** research groups, while availing yourself to **nutritional** protocols based on our 39-year commitment to longer, healthy lifespans.

A side benefit to the age-reversal research is the design of **nutrient formulas** that have similar regenerative mechanisms as those being demonstrated in human studies.

Working two full-time jobs is challenging. The prospect of regaining youthful functionality, however, has become a relentless passion for me. We are so close to meaningful success. The thought of squandering time on something like a vacation is impossible to contemplate.

This article provides updates on age-reversal interventions and an unprecedented plan by the **Age-Reversal Network** to launch a **clinical trial** this year designed to keep study participants alive and functional for an **indefinite** period.



The Forever Man

"Bill Faloon has pursued immortality for decades. Now he's got lots of company. What does science have to say?"

—May 5, 2018

Chase, Bill, and Chance Faloon

The Concept of Age Management

In **1980**, the first edition of ***Anti-Aging News*** was published. This newsletter provided information about ways of slowing degenerative aging processes.

While the media ridiculed this notion, a study published in **2018** documented an almost **4-year delay** in the **rate** of **biological aging** that occurred in the period of **1988** to **2010**.

This study found that the **degree** of **age delay** had a lot to do with **modifiable health behaviors**, many that were suggested in early publications of ***Anti-Aging News***.

This means people like you, who engage in healthy lifestyle choices, are likely to be degenerating at a far slower rate than the national average **age delay** of **4 years**.

Prospect of Human Age-Reversal

From **1980-2014**, groups I work with focused on disease prevention, identifying better treatments, and slowing specific aging mechanisms.

Beginning in **2014**, a convergence of published studies indicated that it might be possible to reverse many aspects of **biological aging**.

This was demonstrated in a series of **parabiosis** studies whereby the circulatory systems of old mice were joined together with young mice. Consistent results documented systemic rejuvenation along with lifespan increases in longer studies.

ScienceDaily March 16, 2018

Men *decreased*
biological age by **4.29 years**

Women *decreased*
biological age by **3.63 years**

2018 study found **degree** of **age delay** has a lot to do with **modifiable** health behaviors.

(Benefit found in men and women aged 60-79 years from **1988** to **2010**.)

Morgan E. Levine, Eileen M. Crimmins. **Is 60 the New 50? Examining Changes in Biological Age Over the Past Two Decades.** *Demography*, 2018; DOI:10.1007/s13524-017-0644-5.

While human studies to emulate these parabiosis findings are in planning phases, a number of other interventions have emerged that are easier to administer and far less costly.

At **RAADfest 2018**, I announced a sequential order of age-reversal interventions based on animal data and findings from small, human proof-of-concept studies.

RAADfest 2018 attendees were provided with a printed booklet to guide them step-by-step on a logical approach to emulate animal studies that were revealing age delay, age-reversal, and in some cases, improvements in healthy survival.

For the first time in history, people had a roadmap to potential systemic rejuvenation interventions.

Challenges in Implementing the Interventions

The problem for those who wanted to follow the sequential order of interventions was finding physicians to prescribe the medications and oversee the patients, identifying affordable sources of the medications, and collecting consistent baseline and follow-up data.

Collection and analysis of these data is critical to monitor how effectively these interventions are working on larger groups of maturing people with differing underlying age-related pathologies.

I had hoped that physicians and participants would follow as much as possible the guidelines disseminated in the **RAADfest 2018 booklet**, along with the two RAADfest 2018 presentations I made.

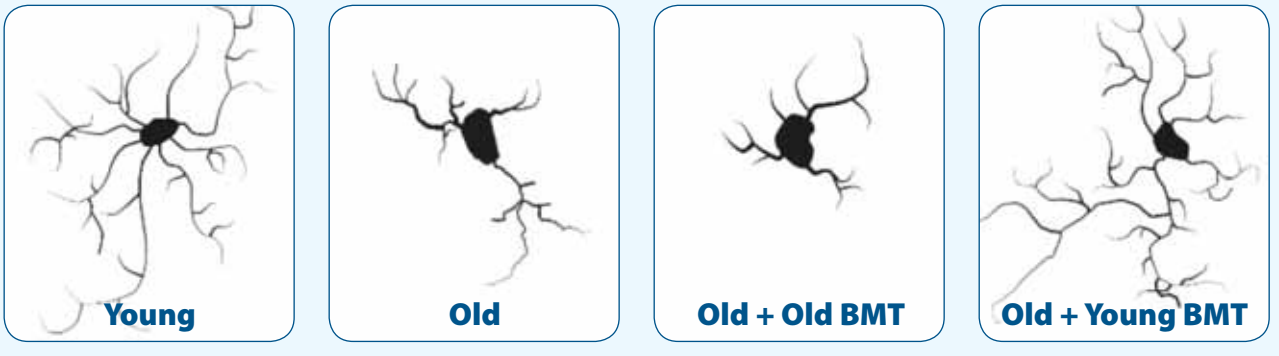
Medical Xpress

February 20, 2019

Study Finds Young Bone Marrow *Rejuvenates* Aging Mouse Brains

A new study found that transplanting the bone marrow of young laboratory mice into old mice prevented cognitive decline in the old mice, preserving their memory and learning abilities.

This supports an emerging model attributing cognitive decline partly to the aging of blood cells produced in bone marrow.



BMT = Bone Marrow Transplant

Microglia in brains of old mice have fewer/shorter branches than young mice.

Microglia of old mice who received bone marrow transplants from young mice resembled those of young mice; transplants from older mice didn't have that effect.

Credit: Cedars-Sinai / Communications Biology

https://medicalxpress.com/news/2019-02-young-bone-marrow-rejuvenates-aging.html?fbclid=IwAR2AVwOOZv_57_rQgHumPX1tuOeUlDzDCt2AMSdCTGuViQCxBb5MBIMSZ-g

Instead, many physicians and participants used some of the recommendations we freely distributed while omitting others. Gaining access to affordable sources was a challenge and there were often no qualified physicians in locations where participants resided.

So we had to go back to the drawing board to accelerate implementation of an intensive study of interventions that may help rejuvenate elderly individuals and save their lives.

The **clinical trial** I describe next is not yet confirmed, but represents what dedicated groups are seeking to accomplish this year based on favorable results from human proof-of-concept studies.

Please know that full-time scientists, as well as numerous volunteers at the **Age-Reversal Network,** are working around the clock to turn what you're about to read into reality this year!

Metformin Pioneer Advocates for Senolytics

Senolytics are "absolutely ready" for clinical trials, says **Dr. Nir Barzilai**, founding director of the Institute for Aging Research at the Albert Einstein College of Medicine.

"I think senolytics are drugs that could come soon and be effective in the elderly now, even in the next few years."

British Heart Foundation

February 8, 2019

Newcastle University Scientists are Killing Zombie Cells to Reverse Age-Related Damage in the Heart

"... **senescent cells** – also known as zombie cells – form in the heart during aging and lead to heart failure."

"Newcastle scientists, in collaboration with researchers in the Mayo Clinic... have not only discovered how this process takes place in the heart, but also how it can be reversed or treated."

First-Ever, Multi-Modal, Human Age-Reversal Study

A confluence of scientific findings has enabled the **Age-Reversal Network** to help formalize a **clinical trial** concept whereby the **regenerative** effects of a series of protocols will be evaluated over an extended time period.

This **human** study is seeking institutional review board approval to initiate a sequential order of plausible age-reversal interventions and to collect data on each subject to assess clinical measures and aging biomarkers.

At **RAADfest 2019**, we expect that those interested in participating can meet with study physicians from around the United States (and other countries).

In many cases, those who enroll can begin the first of several interventions during the **RAADfest 2019** conference that will be held in Las Vegas on October 3-6, 2019.

Funding is being raised to enable the first 50 subjects to participate at a very low cost. The reason a minimum enrollment fee is being assessed is to ensure that people continue in the program. When considering the value of the medications and blood tests provided to study subjects, this nominal deposit represents a huge cost savings.

After the initial 50 subjects are enrolled, the remainder will have to **self-fund** their own costs of participating in this clinical trial until more donations are received. Please know we are scouring the Internet pharmacies for the lowest cost sources of quality interventions and paying the costs of assaying them for purity and potency.

This article provides details about this clinical trial and what you will learn at this year's **RAADfest**.

RAADfest Annual Conference
Revolution Against Aging and Death
October 3-6, 2019
Las Vegas, Nevada
Register at: WWW. RAADFEST.COM

American Heart Association.

NAD+ May Improve Heart Function

"Stabilizing the intracellular NAD+ level represents a promising therapeutic strategy to improve myocardial bioenergetics and cardiac function."

"In this issue of *Circulation*, Diguet et al report exciting data suggesting that supplementation with a NAD+ precursor, nicotinamide riboside, reduces cardiac dysfunction in preclinical models of heart failure."

—May 21, 2018

In 2001, the government banned stem cell research in any facility that received federal funding. This stopped most stem cell research.

Life Extension sought to overturn this federal ban, but did not win this battle. We must never again allow the government to interfere with lifesaving biomedical research.

The Perpetual Clinical Trial

After nearly 5 years of persistent advocacy, it became clear that a formal network of physicians was needed to initiate a meaningful long-term clinical study. This requires IRB (institutional review board) approval for the various interventions that will be studied, along with a broad range of datasets to measure rejuvenation efficacy.

This type of multi-center study is the *only* way we can validate our evolving sequential order of age-reversal interventions that include:

- **AMPK** activation (along with suppressing excess **mTORC1**)
- Restoring youthful **NAD+** levels
- Eliminating **senescent cells** (senolytic therapy)
- Rapamycin (**autophagy** inducer)
- Stem cell **exosome** factors from several sources (biologics)
- Additional interventions (as we validate them in pilot studies)

There are now a variety of options to accomplish Steps 1 through 5 of the interventions listed on the previous page.

We've established a new charity to raise funding for the first 50 study subjects. While I and a few others continue to financially support several research initiatives, the costs of this unprecedented **Perpetual Clinical Trial** will require tax deductible contributions from those with the wherewithal to do so.

Please know that there are no salaried employees or other overhead expenses that typically eat up a substantial portion of a charity's budget. I donate my time as well as my personal monies to accelerate these research endeavors.

The significance of this research is so profound that physicians are donating their time, along with their office overhead to enable these projects to advance.

JAMA® *Journal of the American Medical Association*

September 17, 2018

JAMA Network™

Scientific Discovery and the Future of Medicine

Aging, Cell Senescence, and Chronic Disease: Emerging Therapeutic Strategies

"…many human pathologic conditions are associated with the presence of **senescent cells**."

"Interventions aimed at **eliminating** those **senescent cells**, commonly called **senolytic**, have also been shown to improve health and extend life in various mouse disease models.

"If senolytics are shown to be safe and effective in humans, they could transform care of older adults and patients with multiple chronic diseases."

January 7, 2019

Mayo Clinic, Wake Forest, and University of Texas Sciences Center

First Human Senolytic Findings Published

"Researchers have published findings from a safety and feasibility clinical trial on the **removal of senescent cells** from a small group of patients with **pulmonary fibrosis**.

The researchers used a drug called a senolytic—**dasatinib** plus **quercetin**, an open-label drug, to clear the senescent cells."

Jamie N. Justice, Anoop M. Nambiar, Tamar Tchkonia, Nathan K. LeBrasseur, Rodolfo Pascual, Shahrukh K. Hashmi, Larissa Prata, Michal M. Masternak, Stephen B. Kritchevsky, Nicolas Musi, James L. Kirkland. **Senolytics in idiopathic pulmonary fibrosis: Results from a first-in-human, open-label, pilot study.** *EBioMedicine*, 2019; DOI: 10.1016/j.ebiom.2018.12.052

We've reached a point, however, whereby a formalized study is needed with hard costs built in to ensure we deliver quality medications and meticulously measure the results in the initial study group of 50 aging humans.

We call it "The Perpetual Clinical Trial" because there is no upper limit to how long we will attempt to restore youthful functionality in elderly individuals. In addition to the 50 initial study subjects, we expect many more will join this study group on a self-funded basis.

I ask those with the wherewithal to prioritize this charitable endeavor and send a tax-deductible check to:

Human Age-Reversal Project
300 NE 20th St. Apt. 409
Boca Raton, FL 33431

Most of you reading this, like me, are aging and cannot wait for others to do a multi-center clinical trial involving a sequential order of age-reversal interventions. These therapies have demonstrated degrees of efficacy in proof-of-concept studies that I and a few others have helped support over the past several years.

What We Plan for RAADfest 2019

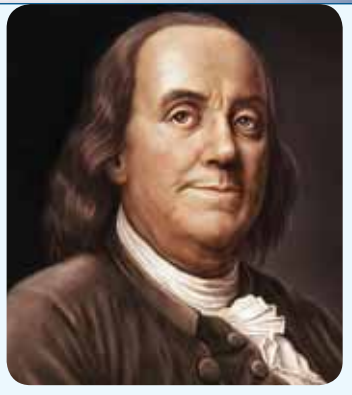
I have a track record of taking on ambitious projects that sometimes succeed, like defeating the **FDA** and other bureaucracies in what were considered "impossible to win" court cases.

I also helped initiate and push through federal legislation to protect consumer access to low-cost dietary supplements.

My plan for this year's RAADfest is to have age-reversal interventions available to attendees during the morning and evening periods. This includes physician consultations, NAD^+ patches or infusions, physician-determined prescriptions for metformin (AMPK activator), dasatinib (senolytic), rapamycin (autophagy inducer) and other regenerative interventions.

There may even be physicians able to administer stem cell exosomes during the breaks at the conference.

The **Age-Reversal Network** is carefully evaluating several options that include umbilical cord stem cells and/or umbilical cord plasma/exosomes, laboratory harvested exosomes, and more. We seek to validate what appears to be working from those therapies that have not yet demonstrated efficacy.



Prophetic Letter

Benjamin Franklin, in a 1780 letter to scientist Joseph Priestly said of the future:

"All diseases may by sure means be prevented or cured, not excepting that of old age, and our lives lengthened at pleasure even beyond the (current) standard…"

So at this year's **RAADfest**, you will see live, on-stage presentations by physicians and scientists on the cutting edge of rejuvenation research and hopefully gain access to some of these interventions during the conference.

The challenge of organizing and coordinating this program is enormous. It's never been attempted with a large group like this.

The benefits of RAADfest attendees gaining immediate access to potential age-reversal interventions (instead of just watching presentations about them) are too important to delay. I want RAADfest attendees to not only learn about a wealth of lifesaving information, but to have the option of utilizing some of these approaches while at RAADfest.

I next describe how you can register to attend the **RAADfest 2019** event. For those who cannot attend but want to keep informed, I suggest you enroll to receive free email updates at the Age-Reversal Network website:

www.age-reversal.net

How to Register for RAADfest 2019

What distinguishes **RAADfest** from other scientific conferences is keeping the group of attendees, speakers, physicians/scientists together throughout most of the event.

This includes free organic lunches and dinner where the group moves from the lecture hall to a dining room for one-on-one interactions. We don't want anyone to feel lost in the crowd. We are ALL in this together.

Several registration packages are offered for RAADfest. Each package provides extraordinary value that includes several organic meals, lodging on site, as well as other attractive extras. Not to mention the exceptional information and experience that RAADfest offers. ●

RAADfest Annual Conference
Revolution Against Aging and Death
October 3-6, 2019 • Las Vegas, Nevada
Register at: **WWW. RAADFEST.COM**

Save an additional 15% off of current pricing for all *Life Extension Magazine*® readers. Use code: LEF.
Offer good until April 30, 2019.

Just go to **www.raadfest.com** to register. Or you can call: **1-480-345-6554.**

NAD+ Cell Regenerator

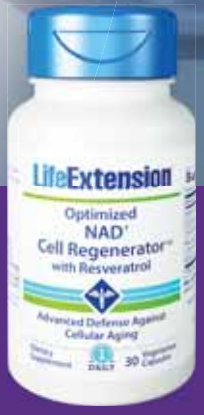
TURN ON YOUR CELLULAR ENERGY

NAD+ levels **plummet** with **age** but increase in response to **nicotinamide riboside**.

Optimized NAD+ Cell Regenerator™ combines **250 mg** of **nicotinamide riboside** with **resveratrol** and other **plant extracts**.

For those already taking resveratrol, we also offer **NAD+ Cell Regenerator™** that provides **250 mg** of **nicotinamide riboside**.

The only **online** source of these **NAD+** formulas is **LifeExtension.com** (or by calling 1-800-544-4440).



Optimized NAD+ Cell Regenerator™
Item #02148 • 30 vegetarian capsules

	Retail Price	Your Price
1 bottle	$54	*

NAD+ Cell Regenerator™
Item #02144 • 30 vegetarian capsules

	Retail Price	Your Price
1 bottle	$48	*

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

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

NON GMO LE CERTIFIED

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

COMBAT Senescent Cells and AGING

New Science of *Senolytics*!

Senescent cells are old cells that no longer divide but they emit factors that *accelerate* aging.

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

A new formula called **Senolytic Activator** provides a highly ***absorbable*** form of **quercetin phytosome** and black tea **theaflavins** 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***.

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

NON GMO

Item #02301 • 24 vegetarian capsules
Retail Price is $24 • **Your Price is $18**
4 boxes are only $16 each
(Each box lasts three months.)

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.

Shipping available to most states!

THE WELLNESS CENTER AT
POST HASTE
A Compounding Pharmacy

Vitamins
Functional Medicine
Hyperbaric Oxygen
Organic
Homeopathic
Living GMO Free
Chelation Therapy
Asyra
Weight Loss
Nutrition
Stem Cells

THINK

RETAIL PHARMACY

- *Accepts major insurance plans*
- *Durable Medical Equipment and supplies*
- *Vitamins and supplements*
- *Kosher and organic products*
- *Alkaline water*
- *Custom orthotics*

COMPOUNDING

- *Bio-identical hormone replacement*
- *Erectile dysfunction meds*
- *Topical anesthetics*
- *Gynecological preparations*
- *Hemorrhoid treatments*
- *Custom veterinary meds*

20% OFF
*your next cash RX when you refer a new RX customer!**
**Some restrictions apply*

(877) 877-9700
Phone: (954) 989-6524
Fax: (866) 892-3432
4401 Sheridan St.
Hollywood, FL 33021
www.PostHastePharmacy.com

About Health in a Different Light

BY JOHN VERONA

Proton Pump Inhibitors Raise Risk of Liver Cancer

For decades, people have been taking **proton pump inhibitor** drugs (PPIs) like Prilosec OTC® and Nexium® to treat heartburn, acid reflux, ulcers, and other related ailments.

But now a new study establishes a disturbing link between taking those drugs and the rate of developing ***liver cancer***.[1]

In a shocking finding, individuals' PPI use was associated with an **80%** increased risk of liver cancer, compared with people who did not use PPIs.[1]

There have been other ominous findings about this drug category previously. Studies have shown that PPIs can reduce nutrient absorption, cause bacterial overgrowth, and are associated with increased risk of cardiovascular, kidney, and neurodegenerative brain diseases.[2-6]

The new findings are the most alarming yet. While PPIs, which reduce the production of stomach acid, have a role in short-term symptom management, the list of troubling issues linked to their *long-term* use is growing. Now liver cancer has been added to that list.

In this Research Update, we review the new epidemiological study to see precisely what the researchers found, and we explore *safe* alternatives to relieve symptoms.

Fast Facts on Liver Cancer

The incidence of primary liver cancer (not metastatic from another malignancy) has recently increased frighteningly, both in the U.S. and the U.K.[20,21]

Primary liver cancers are now the fifth leading cancer in men and the ninth in women.[22]

The disease has discouragingly low, 5-year survival rates of about **15%** in the U.S. and **8%** in the U.K.[23,24] Like with most other cancers, therefore, trying to prevent it is a vastly superior option to attempting to cure it.

Study Links PPI Use to Liver Cancer

Many scientists have become concerned about potential adverse effects of PPIs. Recent animal studies have shown increased stomach cancer risk and the potential for liver damage.[7-9]

In another animal study, PPI use demonstrably promoted liver cancer in rats.[10] So cancer epidemiologists—scientists who study diseases within populations, searching for patterns and causes—teamed up in the United Kingdom and Texas to conduct a study of the impact of PPI use on liver cancer in people.

Of course, scientists can't expose people to a substance they believe may cause cancer. What the researchers did was combine 2 proven epidemiological techniques to examine associations between PPI use in humans and the risk of liver malignancies. This let them cross-check their data and made the overall study exceptionally thorough and strong.[1]

In the first part, a *case-control study* was carried out. Using this method, scientists identify people with a disease (in this case, primary liver cancer), then select control subjects without the disease. They then compare each group's exposure to a potential risk factor (in this instance, PPI drugs).[1]

The participants in this study were 434 people with confirmed cases of liver cancer and 2,013 control subjects. The groups were carefully matched for age, gender, and a primary care physician, assuring the reliability of any findings.[1]

The second part was a *prospective cohort study*. Using this method, a very large group of people is identified, and wide-ranging data are collected about their health. In this way, associations between specific exposures (such as PPI use) can be identified among those who do or do not ultimately develop the particular disease (primary liver cancer).[1]

A link between PPIs and liver cancer was demonstrated in *both* parts of the study.

In the case-control study, PPI use was associated with an ***80% increased risk*** of liver cancer. The strongest PPI drug-specific association, with an **83%** increased risk of liver cancer[1] was with ***omeprazole***, most commonly sold as Prilosec® or Zegerid®.

In the prospective cohort study, which looked at nearly 500,000 participants, those individuals who had used PPIs nearly ***doubled their risk*** of liver cancer compared with people who had never used them.[1]

Potential Mechanisms Linking PPI Use to Liver Cancer

Even the strongest epidemiological studies cannot determine ***causality***. Does exposure to drug X **cause** disease Y?

The main study we review here does not *prove* that PPIs cause liver cancer. But it does establish a close connection between exposure to the drugs and development of the cancer.

Evidence that Proton Pump Inhibitors Pose Health Threats

More than a quarter of a century ago, people with gastroesophageal reflux disease (GERD, or heartburn) thought they'd found a true "magic medicine" in new ***proton pump inhibitor*** (PPI) drugs.

Since then, PPIs have been FDA-approved for a total of 6 different stomach-related disorders, and by July 2018, about 15 million Americans, annually, used a PPI.[25]

PPIs were originally meant for episodic (now and again) use—never for the chronic, long-term applications adopted by many men and women.

Now that people have been exposed to PPIs for years, some of the drugs' darker sides are beginning to emerge. Among them are:

- Reduced nutrient absorption related to lower stomach acid[6]
- Excessive secretion of the stomach hormone ***gastrin***, associated with cancer promotion[26]
- Overgrowth of intestinal bacteria related to lower stomach acid levels[6,13,27]

The study highlighted in this Research Update is a large, controlled evaluation of PPI use specifically in liver cancer patients. Its results should be concerning to anyone who uses PPIs on a regular basis.

Since we can't do direct experiments to prove causality in humans, we must rely on laboratory and animal studies to demonstrate credible mechanisms for any link.

Here is what we know from such basic scientific studies about PPIs and liver cancer risk:[1]

- Direct experiments in rats show that PPIs can promote liver tumors.[10]
- Long-term PPI use can cause excessive secretion of ***gastrin***, a stomach-produced hormone that has known, cancer-inducing effects, especially on liver tissue.[11,12]
- By reducing stomach acid, PPIs can permit the overgrowth of bacteria and other microorganisms in the stomach that may cause the formation of carcinogenic compounds.[13,14]

Safer Alternatives to Treat Stomach Issues

In 2013, an estimated 15 million Americans used PPIs.[15] Considering the association of PPIs with increased incidence of liver cancer—and the tragically high death rate associated with that cancer—it's wise to consider less potentially harmful alternatives.

Studies have shown that supplements containing ***deglycyrrhizinated licorice*** and a ***zinc-carnosine*** compound protect the stomach from acid damage, while ***raft-forming alginates*** help to protect the esophagus against acid/reflux erosion.[16-19]

Licorice root and **zinc-carnosine** are used to treat both ulcers and heartburn, and they actively promote healing of the stomach's lining. **Raft-forming alginates** block acids, enzymes, bile and foods from entering the esophagus and causing painful and damaging effects. All 3 supplements have an excellent safety record and have been used for decades to help with stomach and esophagus problems.

Proton pump inhibitors are intended to be used for a short period of time. However, many individuals use them regularly for years, and this creates a challenging dilemma for those with severe esophageal reflux.

If you are considering alternative therapies, do not discontinue PPIs without physician guidance. Discuss and review any alternative therapies with your physician for a successful transition.

Summary

Heartburn hurts, and people who suffer from it will try just about anything to get relief.

The most common medications available to heartburn sufferers over-the-counter in the U.S., proton pump inhibitors (PPIs), are often used inappropriately, and come with a growing list of potentially adverse effects.

A new and thorough study from the U.K. has shown a shocking increase in liver cancer risk associated with PPI use.

That comes on top of previous studies associating PPIs with heart disease, dementia, and kidney disorders, along with the disruption of healthy intestinal bacteria. Caution is clearly advised in pursuing relief through long-term PPI use.

Alternatives to PPIs can be found in flavonoid-rich **deglycyrrhizinated licorice extracts**, **zinc-carnosine**, and protective **raft-forming alginates**. The benefits of all these alternatives are supported by scientific evidence and should be discussed with your physician. ●

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. Tran KT, McMenamin UC, Hicks B, et al. Proton pump inhibitor and histamine-2 receptor antagonist use and risk of liver cancer in two population-based studies. *Aliment Pharmacol Ther.* 2018 Jul;48(1):55-64.
2. Davis TME, Drinkwater J, Davis WA. Proton Pump Inhibitors, Nephropathy, and Cardiovascular Disease in Type 2 Diabetes: The Fremantle Diabetes Study. *J Clin Endocrinol Metab*. 2017 Aug 1;102(8):2985-93.
3. Gomm W, von Holt K, Thome F, et al. Association of Proton Pump Inhibitors With Risk of Dementia: A Pharmacoepidemiological Claims Data Analysis. *JAMA Neurol*. 2016 Apr;73(4):410-6.
4. Sukhovershin RA, Cooke JP. How May Proton Pump Inhibitors Impair Cardiovascular Health? *Am J Cardiovasc Drugs.* 2016 Jun;16(3):153-61.
5. Tai SY, Chien CY, Wu DC, et al. Risk of dementia from proton pump inhibitor use in Asian population: A nationwide cohort study in Taiwan. *PLoS One.* 2017;12(2):e0171006.
6. Corsonello A, Lattanzio F, Bustacchini S, et al. Adverse Events of Proton Pump Inhibitors: Potential Mechanisms. *Curr Drug Metab.* 2018;19(2):142-54.
7. Cheung KS, Chan EW, Wong AYS, et al. Long-term proton pump inhibitors and risk of gastric cancer development after treatment for Helicobacter pylori: a population-based study. *Gut.* 2018 Jan;67(1):28-35.
8. Brusselaers N, Wahlin K, Engstrand L, et al. Maintenance therapy with proton pump inhibitors and risk of gastric cancer: a nationwide population-based cohort study in Sweden. *BMJ Open.* 2017 Oct 30;7(10):e017739.
9. Llorente C, Jepsen P, Inamine T, et al. Gastric acid suppression promotes alcoholic liver disease by inducing overgrowth of intestinal Enterococcus. *Nat Commun*. 2017 Oct 16;8(1):837.
10. Hayashi H, Shimamoto K, Taniai E, et al. Liver tumor promoting effect of omeprazole in rats and its possible mechanism of action. *J Toxicol Sci*. 2012;37(3):491-501.
11. Fossmark R, Sagatun L, Nordrum IS, et al. Hypergastrinemia is associated with adenocarcinomas in the gastric corpus and shorter patient survival. *APMIS*. 2015 Jun;123(6):509-14.
12. Caplin M, Khan K, Savage K, et al. Expression and processing of gastrin in hepatocellular carcinoma, fibrolamellar carcinoma and cholangiocarcinoma. *J Hepatol.* 1999 Mar;30(3):519-26.
13. Thorens J, Froehlich F, Schwizer W, et al. Bacterial overgrowth during treatment with omeprazole compared with cimetidine: a prospective randomised double blind study. *Gut*. 1996 Jul;39(1):54-9.
14. Lewis SJ, Franco S, Young G, et al. Altered bowel function and duodenal bacterial overgrowth in patients treated with omeprazole. *Aliment Pharmacol Ther.* 1996 Aug;10(4):557-61.
15. Lazarus B, Chen Y, Wilson FP, et al. Proton Pump Inhibitor Use and the Risk of Chronic Kidney Disease. *JAMA Intern Med.* 2016 Feb;176(2):238-46.
16. Inaba T, Ishikawa S, Toyokawa T, et al. Basal protrusion of ulcers induced by endoscopic submucosal dissection (ESD) during treatment with proton pump inhibitors, and the suppressive effects of polaprezinc. *Hepatogastroenterology.* 2010 May-Jun;57(99-100):678-84.
17. Larkworthy W, Holgate PF. Deglycyrrhizinized liquorice in the treatment of chronic duodenal ulcer. A retrospective endoscopic survey of 32 patients. *Practitioner.* 1975 Dec;215(1290):787-92.
18. Mahmood A, FitzGerald AJ, Marchbank T, et al. Zinc carnosine, a health food supplement that stabilises small bowel integrity and stimulates gut repair processes. *Gut.* 2007 Feb;56(2):168-75.
19. Sweis R, Kaufman E, Anggiansah A, et al. Post-prandial reflux suppression by a raft-forming alginate (Gaviscon Advance) compared to a simple antacid documented by magnetic resonance imaging and pH-impedance monitoring: mechanistic assessment in healthy volunteers and randomised, controlled, double-blind study in reflux patients. *Aliment Pharmacol Ther*. 2013 Jun;37(11):1093-102.
20. Ladep NG, Khan SA, Crossey MM, et al. Incidence and mortality of primary liver cancer in England and Wales: changing patterns and ethnic variations. *World J Gastroenterol.* 2014 Feb 14;20(6):1544-53.
21. White DL, Thrift AP, Kanwal F, et al. Incidence of Hepatocellular Carcinoma in All 50 United States, From 2000 Through 2012. *Gastroenterology.* 2017 Mar;152(4):812-20 e5.
22. Ferlay J, Soerjomataram I, Dikshit R, et al. Cancer incidence and mortality worldwide: sources, methods and major patterns in GLOBOCAN 2012. *Int J Cancer.* 2015 Mar 1;136(5):E359-86.
23. Momin BR, Pinheiro PS, Carreira H, et al. Liver cancer survival in the United States by race and stage (2001-2009): Findings from the CONCORD-2 study. *Cancer.* 2017 Dec 15;123 Suppl 24:5059-78.
24. Lepage C, Capocaccia R, Hackl M, et al. Survival in patients with primary liver cancer, gallbladder and extrahepatic biliary tract cancer and pancreatic cancer in Europe 1999-2007: Results of EUROCARE-5. *Eur J Cancer.* 2015 Oct;51(15):2169-78.
25. Available at: https://www.drugwatch.com/proton-pump-inhibitors/. Accessed 19 September, 2018.
26. Dacha S, Razvi M, Massaad J, et al. Hypergastrinemia. *Gastroenterol Rep (Oxf).* 2015 Aug;3(3):201-8.
27. Lo WK, Chan WW. Proton pump inhibitor use and the risk of small intestinal bacterial overgrowth: a meta-analysis. *Clin Gastroenterol Hepatol.* 2013 May;11(5):483-90.

Innovative.

Clinically Studied.

Industry Leading.

Superior Probiotics from Jarrow Formulas®

The proper balance of microflora in the intestines is crucial for health and well-being. **Jarrow Formulas®** probiotic dietary supplements are designed to maintain a healthy balance of these microflora to maximize your digestive and immune system.*

Jarrow Formulas® is a probiotic pioneer and has a complete line of probiotic products, including **Jarro-Dophilus EPS®**.

For full product description or to order Jarro-Dophilus® EPS call 1-800-544-4440 or visit www.LifeExtension.com

Jarro-Dophilus EPS® 5 Billion Per Capsule 60 Veggie Caps
Item # 00056 Retail Price $23.95 Your Price $17.96

Jarro-Dophilus EPS® 5 Billion Per Capsule 120 Veggie Caps
Item # 21201 Retail Price $41.95 Your Price $31.46

www.Jarrow.com

Jarrow® FORMULAS

* 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.

© 2019 Jarrow FORMULAS®

Metabolically Active FOLATE

Supports Cardiovascular Health

Folate helps maintain homocysteine levels within the normal range,[1] thereby promoting cardiovascular health.[2] Folate also supports neurotransmitter synthesis—which, in turn, helps maintain cognitive abilities.[3]

However, not everyone has sufficient activity of the ***enzyme*** required to convert folate to its biologically active form, **5-methyltetrahydrofolate**, or **5-MTHF**.[4,5]

5-MTHF requires no enzymatic conversion to become metabolically active[6]—providing maximum support for both cardiovascular and cognitive health.

Optimized Folate provides metabolically active **5-MTHF** folate in **1,000 mcg** or **5,000 mcg** strengths.

References

1. *Am J Clin Nutr.* 2006 Apr;83(4):842-50.
2. *Am J Ther.* 2014; Epub Nov 17.
3. *Innov Clin Neurosci.* 2011 Jan;8(1):19-28.
4. *Am J Hum Genet.* 2002 Mar;70(3):758-62.
5. *Coll Antropol.* 2004 Dec;28(2):647-54.
6. *Br J Pharmacol.* 2004 Mar;141(5):825-30.

Optimized Folate (1,000 mcg)

Item #01939 • 100 vegetarian tablets

	Retail Price	Your Price
1 bottle	$15	**$11.25**
4 bottles		**$10 each**

High Potency Optimized Folate (5,000 mcg)

Item #01913 • 30 vegetarian tablets

	Retail Price	Your Price
1 bottle	$18	**$13.50**
4 bottles		**$12 each**

For full product description and to order either of these **Optimized Folate** formulas, call **1-800-544-4440** or visit **www.LifeExtension.com**

NON GMO LE CERTIFIED

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.

Maintain Youthful HOMOCYSTEINE LEVELS

FOR BRAIN, HEART, AND HEARING HEALTH

Homocysteine Resist supports healthy levels of homocysteine, an unfavorable amino acid that can increase with normal aging.

Item #02121 • 60 vegetarian capsules
Retail Price is $26 • **Your Price is $19.50**
4 bottles are only $17.50 each

Just <u>one</u> daily capsule of **Homocysteine Resist** provides:

5-MTHF (activated folate)	5,000 mcg
Methylcobalamin (activated vitamin B12)	1,000 mcg
Pyridoxal 5'-phosphate (activated vitamin B6)	100 mg
Riboflavin (vitamin B2)	25 mg

1 DAILY

NON GMO

For full product description and to order **Homocysteine Resist**, 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.

Power Up Your Passion

SEXUAL HEALTH SUPPORT FOR MEN

1 DAILY

	Retail Price	Your Price
1 bottle	$24	**$18**
4 bottles		**$16 each**

Item # 02209 • 30 vegetarian capsules

A **ginger-like** root extract found in new **Male Vascular Sexual Support** promotes **blood flow** and supports **sexual response**.

Each capsule provides **100 mg** of **KaempMax™**, which is super-standardized ***Kaempferia parviflora***.

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

NON GMO

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

SCOTT FOGLE, ND

New Test Offered for Annual Lab Test Sale

Last year, **Life Extension®** changed the name of the **Blood Test Super Sale** to the **Annual *Lab* Test Sale**.

We made this change because we offer diagnostic tests that go *beyond* **blood tests**, including urine, saliva, allergy, and even DNA tests.

In this interview, Dr. Scott Fogle explains the benefits of an innovative ***new*** test being offered during this year's **Annual Lab Test Sale**.

LE: What new test is being offered this year, Dr. Fogle?

Dr. Fogle: This year we're offering the **Comprehensive Stool Analysis with Parasitology**, a test that is growing in popularity with forward-thinking clinicians across the country. It provides actionable information and a deeper insight into a person's **gastrointestinal tract (GI)**.

LE: Does this have a connection to the growing trend of using prebiotics and probiotics for supporting GI health?

Dr. Fogle: Yes, but it's important to note that prebiotics and probiotics are beneficial not just for good GI health, but for whole body and mind health. The area of probiotic science is exploding with new research every week, and there are even entire medical/scientific conferences on the topic. Each year we learn more that can help people with GI-related issues, as well as those with conditions that seem to be unrelated.

LE: Why is finding out about gut health so important?

Dr. Fogle: The health of your gut goes far beyond digestion. Around 400 B.C., Hippocrates was credited with saying, ***"Death sits in the bowels."*** He also stated that, ***"Bad digestion is the root of all evil."*** Modern research is bringing those ideas into the 21st century.

In 2011, Jeremy Nicholson, PhD, said that, ***"Almost every sort of disease has a gut bug connection."***

For example, research has connected imbalances in microflora of the gut not just to "leaky gut" but also to "leaky brain," which occurs when the blood-brain barrier is not as tight and protective as it should be. Gut-health issues have also been tied to hypertension, vascular diseases, diabetes, autoimmunity, inflammation, asthma, eczema, depression, anxiety, fatigue, food sensitivities, and more.

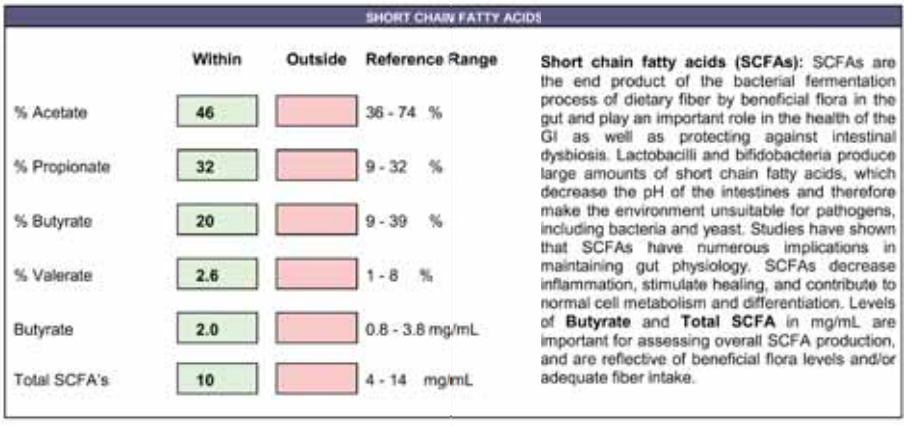
Simply put, gut health is an important part of any program for optimal wellness.

LE: We hear a lot about ***dysbiosis*** nowadays, which is a term indicating imbalances in your intestinal microbes. Does this new test provide information about it?

Dr. Fogle: Yes, this test can identify potential dysbiosis to see if there's not enough good, healthy microflora compared to potentially harmful microflora.

The body needs to be in a balanced state. That concept applies not only to hormones and neurotransmitters, but to your gut microflora as well. If your gut is out of balance, you will not feel your best.

LE: Beyond looking at intestinal flora imbalances, what else can this test reveal?



SHORT CHAIN FATTY ACIDS

	Within	Outside	Reference Range
% Acetate	46		36 - 74 %
% Propionate	32		9 - 32 %
% Butyrate	20		9 - 39 %
% Valerate	2.6		1 - 8 %
Butyrate	2.0		0.8 - 3.8 mg/mL
Total SCFA's	10		4 - 14 mg/mL

Short chain fatty acids (SCFAs): SCFAs are the end product of the bacterial fermentation process of dietary fiber by beneficial flora in the gut and play an important role in the health of the GI as well as protecting against intestinal dysbiosis. Lactobacilli and bifidobacteria produce large amounts of short chain fatty acids, which decrease the pH of the intestines and therefore make the environment unsuitable for pathogens, including bacteria and yeast. Studies have shown that SCFAs have numerous implications in maintaining gut physiology. SCFAs decrease inflammation, stimulate healing, and contribute to normal cell metabolism and differentiation. Levels of **Butyrate** and **Total SCFA** in mg/mL are important for assessing overall SCFA production, and are reflective of beneficial flora levels and/or adequate fiber intake.

Dr. Fogle: The **Comprehensive Stool Analysis with Parasitology** test looks at digestive and absorptive insufficiencies, inflammation, short-chain fatty acids, mucosal protective secretory IgA immunoglobulin, red blood cells, white blood cells, occult blood, and acidity (pH).

LE: Why are **short-chain fatty acids** important?

Dr. Fogle: Few people know about these powerful compounds. The **Comprehensive Stool Analysis with Parasitology** test identifies the key short-chain fatty acids, which include acetate, propionate, valerate, and butyrate.

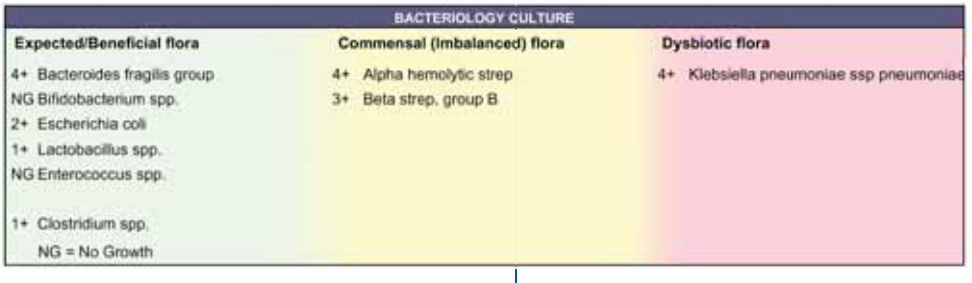
Currently, **butyrate** is thought to be the most important short-chain fatty acid. It acts as fuel for the cells lining your GI tract. It mediates microbial-host crosstalk, which means it gives your body instructions on how to keep your GI tract healthy. It regulates mucosal barrier integrity and function which, when lost, set the stage for leaky gut. It also mediates the release of anti-inflammatory cytokines.

All these important functions make short-chain fatty acids key compounds that should be measured periodically in order to maintain optimal bowel health. If the ratios of the different short-chain fatty acids are off, it is an indication that your intestinal microflora balance is off. And if your total short-chain fatty acid level is low, it points to probable dysbiosis.

LE: If someone has low short-chain fatty acid levels, what is the best thing that can help?

Dr. Fogle: Fiber! That is the fuel which good bacteria use to make short-chain fatty acids. A healthy diet of fruits, vegetables, and complex carbohydrates can provide that fiber. If your diet does not have enough high-fiber foods, it is important to consider adding a prebiotic, which is a type of fiber that feeds good bacteria. I recommend a specialized prebiotic like **xylooligosaccharides (XOS)** to preferentially feed the good bacteria.

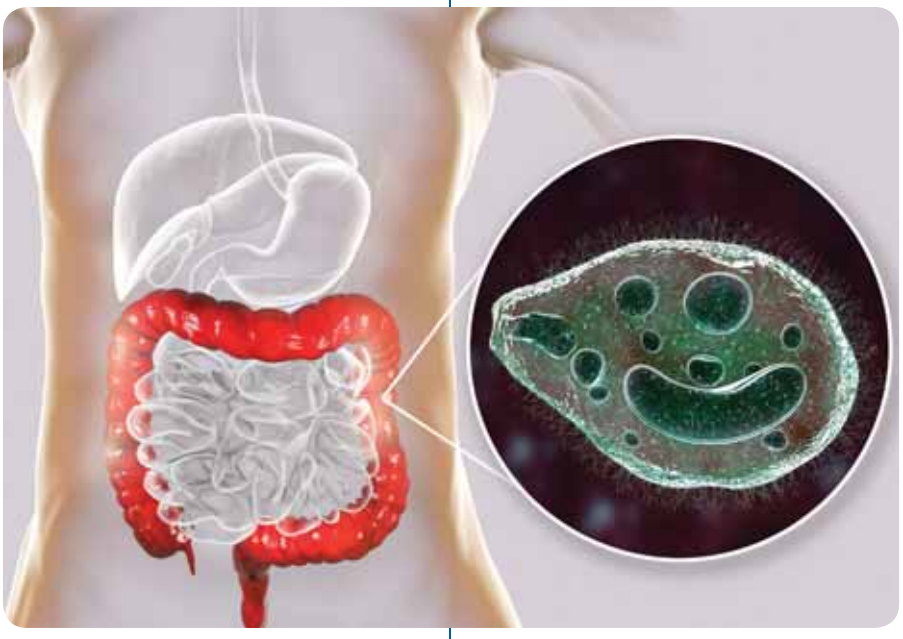
LE: How are these microbes cultured to make sure they are identified properly?



BACTERIOLOGY CULTURE

Expected/Beneficial flora	Commensal (Imbalanced) flora	Dysbiotic flora
4+ Bacteroides fragilis group	4+ Alpha hemolytic strep	4+ Klebsiella pneumoniae ssp pneumoniae
NG Bifidobacterium spp.	3+ Beta strep. group B	
2+ Escherichia coli		
1+ Lactobacillus spp.		
NG Enterococcus spp.		
1+ Clostridium spp.		

NG = No Growth



Dr. Fogle: Many labs only use 3 different growth conditions. But the lab we partner with uses advanced microbiology testing, which cultivates microbes using 10 different growth conditions. This includes 5 aerobic (including one with enrichment broth for enteric pathogens), 3 anaerobic (for *Bifidobacteria, Lactobacilli, Bacteroides, Clostridium* etc.), microaerophilic (for low oxygen microbes like Campylobacter), and finally, 170 species of yeast and 65 species of Candida. This advanced yeast and Candida testing is especially appreciated by those concerned about the impact yeast and Candida have on their health.

LE: Does this test check for parasites as well?

Dr. Fogle: Yes. Parasites are all around us, and some people are more susceptible to them than others. **The Comprehensive Stool Analysis with Parasitology** tests for the main 50 species of parasites, such as *Blastocystis hominis, Entamoeba, Giardia,* and *Cryptosporidium.*

LE: Does the test evaluate how well a person's immune system is able to protect against bad gut bugs?

Dr. Fogle: The **Comprehensive Stool Analysis with Parasitology** tests levels of sIgA, which is an immunoglobulin that prevents pathogens from entering the body. It's considered the body's first line of defense.

The gut needs the most **sIgA** (secretory immunoglobulin A) because it is exposed to so many different viruses, bacteria, parasites, yeast, and fungus. That's why about **80%** of total body **sIgA** is in the **GI tract**. The sIgA binds to pathogenic invaders, trapping them in GI mucus so they can be excreted from the body. It also reduces the body's inflammatory responses to pathogenic bacteria and allergens.

LE: What causes low levels of sIgA?

Dr. Fogle: Stress. Under chronic stress, sIgA decreases and is no longer around to act as a first line defense against pathogens. It is also unable to help control inflammatory responses in the bowel. This is one of the reasons why stress can contribute to GI issues.

LE: Does the test include markers specific to gut inflammation?

Dr. Fogle: Yes, it includes 3 markers that correlate to inflammation specific to the GI tract. The first is lysozyme, an inflammatory marker that can become very elevated in inflammatory bowel disease. Lysozyme may also be elevated in irritable bowel syndrome and celiac disease. It is not specific enough to be a diagnostic marker, though it does provide helpful information.

IMMUNOLOGY

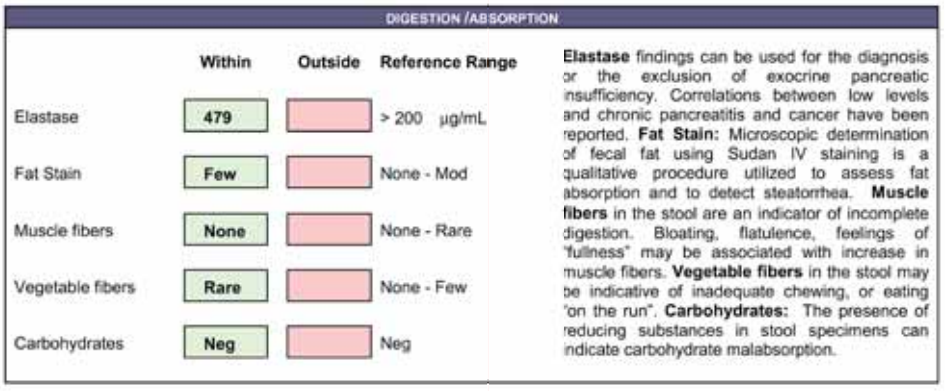
	Within	Outside	Reference Range
Secretory IgA*		19.2	51 - 204mg/dL

Secretory IgA* (sIgA) is secreted by mucosal tissue and represents the first line of defense of the GI mucosa and is central to the normal function of the GI tract as an immune barrier. Elevated levels of sIgA have been associated with an upregulated immune response.

INFLAMMATION

	Within	Outside	Reference Range
Lysozyme*	100		<= 600 ng/mL
Lactoferrin	< 0.5		< 7.3 µg/mL
White Blood Cells	None		None - Rare
Mucus	Neg		Neg

Lysozyme* is an enzyme secreted at the site of inflammation in the GI tract and elevated levels have been identified in IBD patients. **Lactoferrin** is a quantitative GI specific marker of inflammation used to diagnose and differentiate IBD from IBS and to monitor patient inflammation levels during active and remission phases of IBD. **White Blood Cells** (WBC): in the stool are an indication of an inflammatory process resulting in the infiltration of leukocytes within the intestinal lumen. WBCs are often accompanied by mucus and blood in the stool. **Mucus** in the stool may result from prolonged mucosal irritation or in a response to parasympathetic excitability such as spastic constipation or mucous colitis.



DIGESTION /ABSORPTION

	Within	Outside	Reference Range
Elastase	479		> 200 µg/mL
Fat Stain	Few		None - Mod
Muscle fibers	None		None - Rare
Vegetable fibers	Rare		None - Few
Carbohydrates	Neg		Neg

Elastase findings can be used for the diagnosis or the exclusion of exocrine pancreatic insufficiency. Correlations between low levels and chronic pancreatitis and cancer have been reported. **Fat Stain:** Microscopic determination of fecal fat using Sudan IV staining is a qualitative procedure utilized to assess fat absorption and to detect steatorrhea. **Muscle fibers** in the stool are an indicator of incomplete digestion. Bloating, flatulence, feelings of "fullness" may be associated with increase in muscle fibers. **Vegetable fibers** in the stool may be indicative of inadequate chewing, or eating "on the run". **Carbohydrates:** The presence of reducing substances in stool specimens can indicate carbohydrate malabsorption.

Two additional markers, lactoferrin and calprotectin, are increased in inflammatory bowel disease but not in irritable bowel syndrome. They can help differentiate between inflammatory bowel disease (in which case all 3 markers are high), versus pathogen-induced inflammation (where just lysozyme would be high).

LE: Why do older people seem to struggle with digestion?

Dr. Fogle: It is true that as we age digestion abilities diminish. The same thing happens when we are under stress. Digestion is a lot of work and consumes a lot of energy. As we age and when we are dealing with chronic stress, our bodies produce less energy in the form of adenosine triphosphate (ATP). As a result, we lose digestive power, and it starts to show up in specific markers that can be measured. A similar idea applies to the complex digestive enzymes that come from the pancreas.

LE: What are the digestive markers on this test?

Dr. Fogle: The **Comprehensive Stool Analysis with Parasitology** test includes several markers of digestion. The first is **elastase**, which provides information about your pancreas' ability to make the enzymes needed for good digestion.

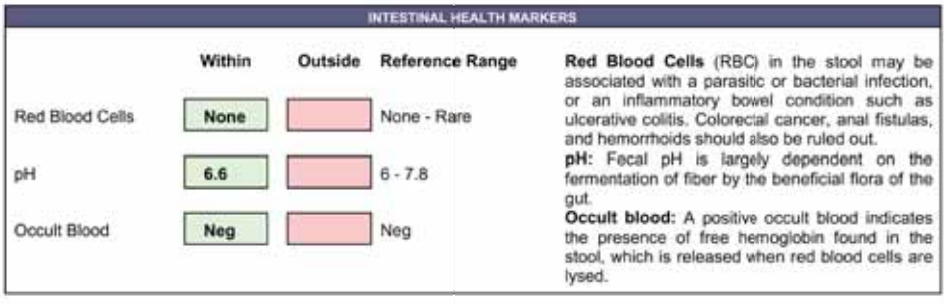
The **fat stain test** reveals your ability to break down and absorb fat.

The presence of **muscle fibers** in the stool indicates incomplete digestion and can correlate with symptoms of bloating, flatulence, and feelings of fullness. It can also hint at poor hydrochloric acid and pepsin production in the stomach.

The presence of **vegetable fibers** in the stool may indicate a lack of proper chewing, which is an important part of digestion. Humans don't make the cellulose enzymes, and in order to break up the cellulose fibers in plants we must rely on chewing food thoroughly.

High carbohydrates indicate a carbohydrate malabsorption issue since carbohydrates should be easily absorbed in the upper GI tract. If they are present, it indicates probable damage to the microvilli of the small intestine.

LE: Are any other tests included?



INTESTINAL HEALTH MARKERS

	Within	Outside	Reference Range
Red Blood Cells	None		None - Rare
pH	6.6		6 - 7.8
Occult Blood	Neg		Neg

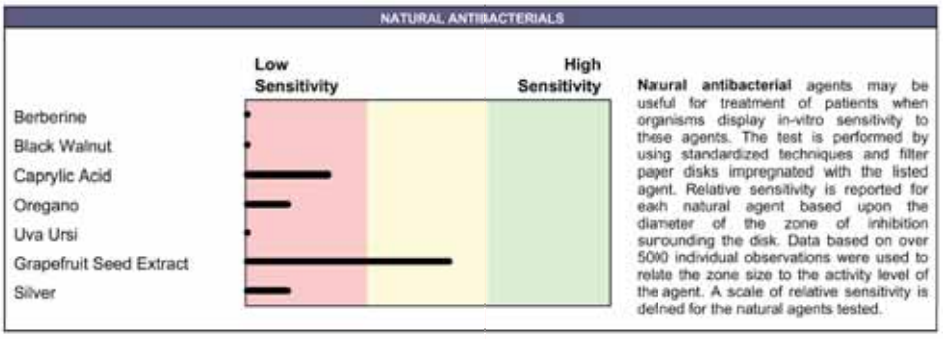
Red Blood Cells (RBC) in the stool may be associated with a parasitic or bacterial infection, or an inflammatory bowel condition such as ulcerative colitis. Colorectal cancer, anal fistulas, and hemorrhoids should also be ruled out.
pH: Fecal pH is largely dependent on the fermentation of fiber by the beneficial flora of the gut.
Occult blood: A positive occult blood indicates the presence of free hemoglobin found in the stool, which is released when red blood cells are lysed.

Dr. Fogle: The **Comprehensive Stool Analysis with Parasitology** tests for the presence of red blood cells and occult blood in the stool, which can be connected to something as simple as hemorrhoids or as serious as cancer. Red blood cells in the stool often relate to active bleeding in the lower bowel, such as a hemorrhoid or overstraining during a bowel movement. Occult blood tends to be more of a serious issue as it indicates a problem higher up in the GI tract.

This test also checks pH levels, which can provide information about transit time, which is the time it takes food to move through the GI tract. If a person's pH is low (meaning the stool is more acidic), and if the consistency of the stool is loose and watery, it likely means food is moving too quickly through the GI tract. In order to determine the underlying cause, a follow-up test, like the Food Safe Allergy Test, can help identify foods or spices to which the body may be responding inappropriately.

A low pH does not provide optimal digestion because the pancreatic enzymes do not work well in acidic conditions. Fast transit time can also affect the microflora of the GI tract, especially if it is an ongoing issue. Because of this, a low pH can be associated with too many bowel movements in a day.

LE: What is the most innovative aspect of this test?



Dr. Fogle: I appreciate all the information this test provides, but if I had to pick one aspect, it would be the sensitivity testing for the pathogens found. If a pathogen is found, the lab tests which medications and natural substances can kill it and those to which the pathogen is resistant.

This allows people to work with their healthcare providers to create targeted, clinical interventions that will be the most efficient at getting rid of specific pathogens. Without sensitivity testing, doctors can only guess at the best course of action.

I've found that doctors are much more willing to try natural ingredients after seeing the results of sensitivity testing for pathogens. This can be a big help for people wanting to try an alternative approach to treating their ongoing GI issues.

LE: It is impressive that this one, comprehensive stool analysis yields so much information.

Dr. Fogle: It really is an amazing amount of information. Our senior wellness specialists here at **Life Extension** can help provide information on how to create a wellness plan based on the results of the test. In more serious situations, they can provide information that will help you have a meaningful and productive conversation with your healthcare provider in order to be able to create a targeted, clinical intervention plan.

The bottom line is that we want people to have powerful information they can use to promote their vital health and longevity, and the **Comprehensive Stool Analysis with Parasitology** test helps accomplish that goal. ●

To order the Comprehensive Stool Analysis w/Parasitology x1 test, call 1-800-208-3444 or visit www.LifeExtension.com

Item #LC100083
Retail: $500
Your price: $375
Lab Test Sale price: $281.25

Lab Test Super Sale.
March 25-June 3, 2019

Dr. Scott Fogle is the Executive Director of Clinical Information and Laboratory Services at Life Extension®, where he oversees scientific and medical information as well as its laboratory division.

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

A THERAPEUTIC FOOT MASSAGE WITH EVERY STEP

RELIEVE PAIN & IMPROVE YOUR HEALTH NOW!

TAKE THE 14 DAY KENKOH CHALLENGE

Kenkoh®

The Original Massage Sandal

MASSAGE IMPROVES CIRCULATION
University of Miami Miller School of Medicine

MASSAGE AIDS MUSCLE RECOVERY AND SPEEDS RECOVERY TIMES
McMaster University, Ontario

A DAILY FOOT MASSAGE LOWERS BLOOD PRESSURE AND LOWERS TRIGLYCERIDE LEVELS
Pusan National University, South Korea

CHAI
CHAMPAGNE

ESSENCE
BLACK

SPIRIT
ROSE

KENKOH
INSOLE

SERENITY 2
DARK BROWN

BALANCE
BLACK

LEM.DiscoverKenkoh.com 1-866-599-2976

EAT TO BEAT DISEASE:
The New Science of How Your Body Can Heal Itself

By William W. Li, M.D.

In his new book, ***EAT TO BEAT DISEASE: The New Science of How Your Body Can Heal Itself***, William W. Li, M.D. focuses on how food can be used as medicine to prevent and even treat disease.

Dr. Li's interest in preventing and curing disease began with his work on **angiogenesis**, or the creation of new blood vessels.

Early in his career, he studied how angiogenesis helps cancer thrive by supplying it with nourishing blood. Before long, he and other researchers realized that angiogenesis isn't just a factor in cancer.

In fact, angiogenesis is a player in a huge range of diseases, including heart disease, stroke, diabetes, Alzheimer's, obesity, and more. Controlling blood vessel formation, therefore, might prevent many diseases.

This thinking led Dr. Li to look at the underlying causes of disease—and how to treat or eliminate them by having people activate their body's own health defense systems.

Dr. Li is a graduate of Harvard College and the University of Pittsburgh School of Medicine. He is well known for his TED Talk, "Can We Eat to Starve Cancer?" which has garnered more than 11 million views to-date. Dr. Li has also appeared on "The Dr. Oz Show," CNN and NPR, and has published articles in journals including the *New England Journal of Medicine* and *The Lancet*.

In this exclusive ***Life Extension***® interview, Dr. Li discusses the five major defense systems humans rely on to prevent disease and how a healthy diet can support each one.

—JON VANZILE

LE: In your book, you've identified five "defense systems" that help protect people from birth until old age. What are they and how do they work?

Dr. Li: When I teach about diet and health, I use the analogy that the body is like a medieval fortress, protected by a host of clever defenses that heal the body from within. The five defense systems I'm referring to are **angiogenesis**, **regeneration**, the **microbiome**, **DNA protection**, and **immunity**.

LE: We write a lot about how nutrients can support these systems in ***Life Extension Magazine®***. Let's take them one by one. First, angiogenesis—how does it support health?

Dr. Li: Inside you, there are about 60,000 miles of blood vessels whose job it is to deliver oxygen and nutrients to cells. Angiogenesis is the process of creating new blood vessels. If you've ever scraped your knee badly enough to bleed and form a scab, and if that scab was pulled off too early, you have seen angiogenesis unfolding before your eyes. In the area under the scab, which is bright red and glistening, thousands of new blood vessels were growing in the wound to restore the injured tissue. Their growth is stimulated by angiogenic growth factors that are released as soon as the injured tissue begins to bleed. These angiogenic growth factors stimulate blood vesssels to start sprouting and forming tubes. The new tubes become capillaries and eventually new vessels.

The angiogenesis defense system constantly senses where and when more vessels are needed to keep organs healthy and functioning, so control over angiogenesis needs to be perfect to optimize health. Unfortunately, over the course of a lifetime, many factors can derail this defense and encourage many diseases. In cancer, for example, some cancers release huge amounts of the same growth factors involved in wound healing. Once the blood vessels sprout into the small cluster of cancer cells, a tumor can grow exponentially. Other diseases encouraged by ***improper*** **angiogenesis** include inflammatory conditions such as autoimmune diseases, age-related macular degenaration, psoriasis, and even obesity.

LE: Let's talk about regeneration. What is it?

Dr. Li: Regeneration is the process by which old, worn out tissues are naturally replenished by new tissues. This is crucial to grow and maintain your organs. Regeneration relies on stem cells, which are immature, pluripotent cells that can form any organ in the body. We know they are vital during fetal formation, but they also play a critical role throughout adult life, quietly regenerating most organs as we age. Besides aging, stem cells are also vulnerable to common factors that assault our bodies throughout life, including tobacco smoke, alcohol, air pollution, high blood cholesterol, and others.

LE: Next up is the microbiome. We hear a lot about how probiotics can help support a healthy microbiome, or gut flora. Can you explain how the microbiome is a critical element in protecting against disease?

Dr. Li: In this age of ever-expanding identities, here's a new one. You are no longer simply human—you're a "holobiont." Technically, this means you are an organism that functions as an assemblage of multiple species that are mutually beneficial. In this case, that means your body is actually a

highly complex ecosystem that includes 39 trillion bacteria, teeming inside and on your body's surface. Most of these are beneficial bacteria that form a complex biological system, or microbiome, that interacts with your cells and organs in many ways. Some gut bacteria, like *Lactobaccillus*, have hormonal functions and can even produce brain neurotransmitters that influence mood. Others release metabolites that protect us from diabetes, while still others control the growth of abdominal fat, reduce stress and anxiety, influence angiogenesis, and support sexual fitness and social behavior. Today, the microbiome is recognized as one of the most exciting and revolutionary areas in medical research, and microbiome diversity is an important hallmark of health.

LE: The fourth defense system you write about is DNA defense. How does this one work?

Dr. Li: Your DNA is the source code that keeps you alive and healthy. Unfortunately, DNA is quite fragile. Every day, your DNA sustains more than 10,000 naturally occurring, damaging events. This ranges from breaks in the strand that occur as a matter of chance, side effects from destructive processes like inflammation, or the result of toxic chemicals we breathe in, eat, or absorb. Whatever way it happens, each error has the potential to derail our DNA and wreak havoc on our health.

LE: So, how can eating a healthful diet support our DNA?

Dr. Li: Antioxidants are desirable substances that neutralize free radicals and protect your cells. Many foods contain bioactive chemicals with antioxidant properties. For example, vitamin C, found in citrus or kiwi, is a popular vitamin with antioxidant properties. But protecting your DNA with antioxidants from food is only one part of protecting your genetic code. Other foods can trigger additional protective health defenses that are naturally hardwired in our DNA. These foods switch certain genes "on" or "off."

LE: The last defense you mention is our immune system, which seems closely related to many of the concepts we've already discussed. Can you explain why a healthy immune system is so critical?

Dr. Li: A strong immune system not only helps you avoid the common cold, it can also protect you against cancer. Our immune system is one of the best-known health-defense systems. It fights off bacteria and viruses, and prevents us from getting sick. But if your immune system is weakened and unable to do its job, you are vulnerable. Today, we're learning to harness the incredible power of the immune system to help defeat diseases like cancer with immunotherapy. New research is showing that food, too, can powerfully influence our immune defenses.

LE: Do you have any pointers to help people put all this together?

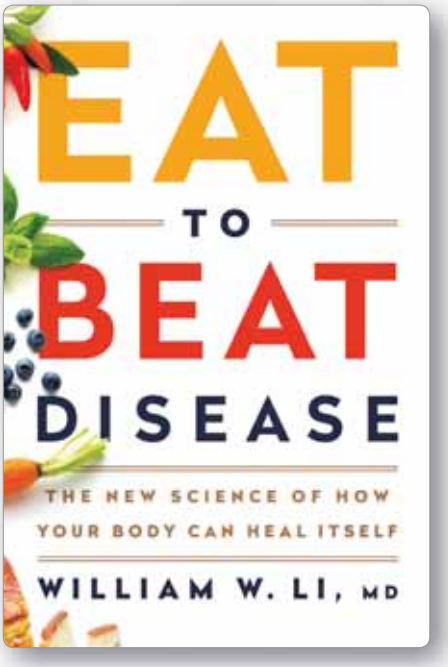
Dr. Li: Every single day, you are making choices that can tilt the odds in your favor for living longer and better, without illness. My approach isn't based on elimination, restriction, or deprivation, but rather, it is based on eating the foods you like best. In my book, I've developed something called the **5x5x5 framework** that will help you eat to beat disease. In simple terms, it's a strategy to support the five health-defense systems by eating up to five times a day and incorporating a minimum of five health-supporting foods into the meals and snacks you already eat. This is not a weight-loss plan and it's not a prescription. It's an adaptable framework to whatever diet plan you're currently following, or it works if you don't follow a plan at all. ●

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

Adapted from *EAT TO BEAT DISEASE: The New Science of How Your Body Can Heal Itself* by William W. Li, M.D. Copyright © 2019 by William W. Li, MD. Used by arrangement with Grand Central Publishing. All rights reserved.

To order a copy of *Eat to Beat Disease: The New Science of How Your Body Can Heal Itself* call 1-800-544-4440 or visit www.LifeExtension.com

Item #34151
Retail Price $32
Your Price $24



BY LAURIE MATHENA

Radishes

It is said that thousands of years ago the laborers who built the Egyptian pyramids were paid in radishes, and that the ancient Greeks offered gold replicas of radishes in tribute to the god Apollo. But today, it is the radish's health benefits that are especially valuable.

These crunchy, zesty root vegetables contain fiber, folate, and carotenoids, a variety of vitamins and minerals, and much more. These and other nutrients are responsible for many health benefits associated with radishes.

Anti-Cancer Properties

Epidemiological studies show that high intake of cruciferous vegetables like radishes is associated with a lower incidence of **lung** and **colorectal cancer**.[1]

Radishes contain phytochemicals called isothiocyanates, which have potent anti-cancer properties. Lab and animal studies have shown that isothiocyanates protect cells from DNA damage, induce cell death through apoptosis (cell suicide), inhibit tumor blood vessel formation, inhibit tumor cells from spreading, and help inactivate carcinogens.[2]

One specific isothiocyanate, called sulforaphane, has been found to inhibit **prostate**,[3] **colon**,[4] **breast**,[5] and **ovarian cancer**.[6]

Stomach Protection

Folk medicine has long used radishes for the treatment of **gastric ulcers**. More recent research has confirmed that radish juice can help prevent gastric ulcers by strengthening the mucosal barrier,[7] while an extract of radish leaves was shown to help heal ulcers in rats with peptic ulcer disease.[8]

At just **12 calories** per **½ cup** serving, radishes make the perfect crunchy snack. Enjoy them raw with a healthy dip, add them to salads, or roast them in the oven topped with pepper and sea salt.

References

1. *Pharmacol Res.* 2007 Mar;55(3):224-36.
2. Available at: https://www.cancer.gov/about-cancer/causes-prevention/risk/diet/cruciferous-vegetables-fact-sheet. Accessed February 25, 2019.
3. *Cancer Prev Res (Phila).* 2015 Aug;8(8):712-9.
4. *Colorectal Dis.* 2004 Jan;6(1):28-31.
5. *Drug Discov Today.* 2004 Nov 1;9(21):908.
6. *Acta Obstet Gynecol Scand.* 2007 Oct;86(10):1263-8.
7. *Famacia.* 2008;56(2):204-14.
8. *Saudi Pharm J.* 2011 Jul;19(3):171-6.

LifeExtension

Lab Test

MARCH 25 — JUNE 3, 2019

ANNUAL SUPER SALE

1-2-3 EASY
How it works:

ORDER

Call **1- 800-208-3444** toll-free or visit **LifeExtension.com/blood**

DRAW

For blood tests, take your form to a local lab. Collect at home for saliva, breath, etc.

REVIEW

Go over results **for free** with our Wellness Specialists by calling **1-800-226-2370**. You may wish to review them with your doctor as well.

IT'S THAT SIMPLE! DON'T DELAY! CALL TODAY!

For Our Local Customers:

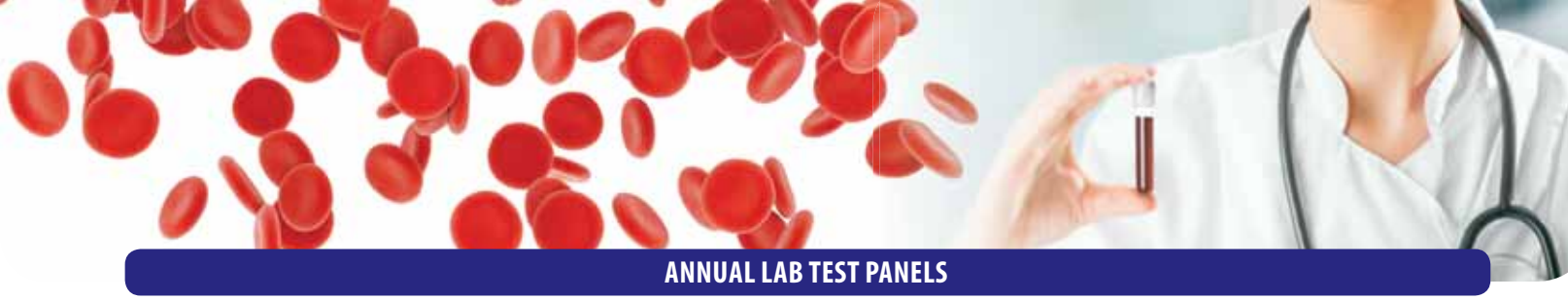
For those residing in the Ft. Lauderdale, Florida, area, blood draws are also performed at the Life Extension Nutrition Center from 9 am to 2 pm Monday through Saturday. Simply purchase the blood test and have it drawn with no wait! Our address is:

5990 NORTH FEDERAL HIGHWAY, FT. LAUDERDALE, FL, 33308-2633

Terms and Conditions

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

	RETAIL PRICE	SUPER SALE PRICE
MALE AND FEMALE PANELS		
○ **MALE PANEL — *NOW WITH INSULIN SCREENING!* (LC322582)** **CBC/Chemistry Profile** • DHEA-S • PSA (prostate-specific antigen) Homocysteine • C-Reactive Protein (high-sensitivity) • ApoB • Free Testosterone • Total Testosterone • Estradiol • TSH for thyroid function Vitamin D (25-hydroxyvitamin D) • Hemoglobin A1c • Insulin	$400	$199
○ **FEMALE PANEL— *NOW WITH INSULIN SCREENING!* (LC322535)** **CBC/Chemistry Profile** • DHEA-S • Estradiol • Homocysteine • ApoB C-Reactive Protein (high-sensitivity) • Progesterone • Free Testosterone Total Testosterone • TSH for thyroid function • Vitamin D (25-hydroxyvitamin D) Hemoglobin A1c • Insulin	$400	$199
WHAT'S NEW FOR 2019		
○ **NEUROTRANSMITTER PANEL – COMPREHENSIVE (LC100085)** Serotonin, Dopamine, Epinephrine, Norepinephrine, GABA, Glutamate, Glycine, Histamine, PEA, DOPAC, 3-MT, Normetanephrine, Metanephrine, 5-HIAA, Tryptamine, Tyrosine, Tyramine and Taurine. Not available in NY.	$393.33	$221.25
○ **COMPREHENSIVE STOOL ANALYSIS W/PARASITOLOGY X1 (LC100083)** Key Markers of this panel have been grouped into 6 actionable areas: Digestion/Absorption, Microbiome health, Inflammation, Immune Response, Intestinal Health Markers, Infection and Pathogenic bacteria, yeast and Parasites. Antimicrobial susceptibility testing is also performed when appropriate to facilitate treatment.	$500	$281.25
○ **CHOLINESTERASE, RBC (LC007286)** **Are organophosphate and/or carbamate insecticides making you sick?** Cholinesterase is irreversibly inhibited by organophosphate insecticides and reversibly inhibited by carbamate insecticides.	$65.33	$36.75
○ **GI PATHOGEN PROFILE (LC100084)** Uses advanced genetic level testing to identify the 22 most common problematic GI viruses, parasites, and bacteria, especially for diarrheal illnesses. This test is designed for acute and sudden development of GI problems, such as after traveling.	$526.66	$296.25
CONDITION SPECIFIC TESTS		
○ **PATHWAY FIT® DNA WEIGHT MANAGEMENT** (LC100067)** Your DNA holds the blueprint to how your body responds to both food and exercise.	$398.66	$224.25
○ **NEUROTRANSMITTER BASIC PANEL** (LC100058)** Serotonin, Dopamine, Epinephrine, Norepinephrine, GABA, Glutamate, Glycine, Histamine and PEA. Alterations in these nine neurotransmitters play a significant role in contributing to symptoms such as cognitive disorders, depression, anxiety, diminished drive, fatigue and sleep difficulties, craving, addictions, pain and more. Not available in NY.	$265.33	$149.25
○ **TOXIC METALS PANEL (FECAL)** (LC100076)** The results of fecal elemental analysis can help you identify and eliminate dietary exposure to toxic metals, while also assessing the body's natural excretion of metals. The panel tests Antimony, Arsenic, Beryllium, Bismuth, Cadmium, Copper, Lead, Mercury, Nickel, Platinum, Thallium, Tungsten, and Uranium.	$226.66	$127.50
○ **OMEGA-3 INDEX COMPLETE** (LC100066)** Beneficial for everyone! People not taking omega-3/fish oil should check their baseline omega-3 index to see if it is in the desirable or concerning range. Those taking omega-3/fish oil supplements should take the test to see if they need to adjust their dosage. You want to target a range of **8%-12%** for your omega-3 index score.	$132	$74.25



ANNUAL LAB TEST PANELS

	RETAIL PRICE	SUPER SALE PRICE
○ **APOE GENETIC TEST FOR ALZHEIMER'S AND CARDIAC RISK** (LC100059)**	$198.66	$111.75
Apolipoprotein E (ApoE) is an important regulator of cholesterol and triglyceride levels in your blood and supports lipid transport and injury repair in your brain. Genetically, E4 is the strongest risk factor for developing late onset Alzheimer's disease. According to the National institute of Health, inheriting a single copy of ApoE4 increases the risk of Alzheimer's disease by about three-fold. Inheriting two copies increases the risk by about 12-fold. In fact, almost 40% of AD patients have inherited an E4 allele.		
○ **FOOD SAFE ALLERGY TEST – BASIC** (LCM73001)**	$264	$148.50
This test measures delayed (IgG) food allergies for 95 common foods.		
○ **FOOD SAFE ALLERGY TEST – EXTENDED** (LCM73002)**	$264	$148.50
This test measures delayed (IgG) food allergies to an additional 95 foods.		
○ **FOOD SAFE ALLERGY TEST – COMBO** (LCM73003)**	$500	$281.25
This test measures delayed (IgG) food allergies to all 190 foods found in our Basic and Extended panels.		

WHOLE BODY HEALTH

○ **MALE ELITE PANEL (LC100016)***	$766.66	$431.25
CBC/Chemistry Profile • Free and Total Testosterone Total Estrogens • Estradiol • DHEA-S • Progesterone • Pregnenolone DHT • FSH • LH • TSH • Free T3 • Free T4 • Reverse T3 • Free and Total PSA IGF-1 • SHBG • Vitamin D 25-OH • hs-CRP, ferritin • Homocysteine Insulin • Hemoglobin A1c • Cortisol • ApoB		
○ **MALE COMPREHENSIVE HORMONE PANEL (LC100010)***	$398.66	$224.25
CBC/Chemistry Profile • DHEA-S, Estradiol • DHT • PSA Pregnenolone • Total and Free Testosterone • SHBG • TSH • Free T3		
○ **MALE BASIC HORMONE PANEL (LC100012)**	$100	$56.25
DHEA-S • Estradiol • Total and Free Testosterone • PSA		
○ **INSULIN FASTING (LC004333)**	$39.87	$24.42
Helpful to assess insulin resistance.		
○ **NMR LIPOPROFILE® (LC123810)**	$132	$74.25
The NMR Lipoprofile® directly measures LDL particle size and number as well as HDL particle number, total cholesterol, and triglycerides. It also provides a calculation of one's risk of insulin resistance by assessing abnormalities in lipoprotein markers.		
○ **ADVANCED OXIDIZED LDL PANEL*(LC100035)**	$380	$213.75
This panel looks at vascular inflammatory biomarkers, beginning with lifestyle choices to the development of metabolic and cardiovascular disease as well as the formation of vulnerable plaque. The panel contains the following tests: F2-Isoprostanes, Myeloperoxidase and Oxidized LDL.		

This is NOT a complete listing of LE blood test services.
Call **1-800-208-3444** for additional information.

Blood tests available in the continental United States only. Restrictions apply in NY, NJ, RI, and MA. Not available in Maryland. Kits not available in Pennsylvania.

	RETAIL PRICE	SUPER SALE PRICE
○ **FEMALE ELITE PANEL (LC100017)***	$766.66	$431.25
CBC/Chemistry Profile • Free and total Testosterone • Total Estrogens Estradiol • Estrone • DHEA-S • Progesterone • Pregnenolone • DHT • FSH LH • TSH • Free T3 • Free T4 • Reverse T3 • IGF-1 • SHBG • Vitamin D 25-OH hs-CRP • Ferritin • Homocysteine • Insulin • Hemoglobin A1c • Cortisol • ApoB		
○ **FEMALE COMPREHENSIVE HORMONE PANEL (LC100011)***	$398.66	$224.25
CBC/Chemistry Profile • DHEA-S, Estradiol • Total Estrogens • TSH Free T3 • Progesterone • Pregnenolone • Total and Free Testosterone • SHBG		
○ **FEMALE BASIC HORMONE PANEL (LC100013)**	$100	$56.25
DHEA-S • Estradiol • Total and Free Testosterone • Progesterone		
○ **WEIGHT LOSS PANEL-COMPREHENSIVE (LC100028)**	$366.66	$206.25
CBC/Chemistry Profile • DHEA-S • Free andTotal Testosterone Estradiol • Progesterone • Cortisol, TSH • Free T3 • Free T4 Reverse T3 • Insulin • Hemoglobin A1c • Vitamin D 25-hydroxy C-reactive protein (high sensitivity) • Ferritin		
○ **HEALTHY AGING PANEL-COMPREHENSIVE (LC100026)***	$332	$186.75
CBC/Chemistry Profile • C-reactive protein (high sensitivity) Vitamin B12 • Folate • Homocysteine • Vitamin D 25-hydroxy • Hemoglobin A1c TSH • Free T3 • Free T4 • Ferritin • Urinalysis • Fibrinogen • Insulin		

CBC/CHEMISTRY PROFILE

These **CBC/Chemistry** tests are included in the popular **Male** and **Female Panels**, and other panels on this page so you don't have to order them separately.

CARDIOVASCULAR RISK
Total Cholesterol • HDL Cholesterol • LDL Cholesterol • Triglycerides
Cholesterol/HDL Ratio • Estimated CHD Risk • Glucose

LIVER FUNCTION
AST (SGOT) • ALT (SGPT) • LDH • Total Bilirubin • Alkaline phosphatase

KIDNEY FUNCTION
BUN • Creatinine • BUN/Creatinine Ratio • Uric Acid

BLOOD PROTEINS
Total Protein • Albumin • Globulin • Albumin/Globulin Ratio

BLOOD COUNTS
Red Blood Cell Count • White Blood Cell Count • Eosinophils
Neutrophils (Absolute) • Lymphs (Absolute) • Eos (Absolute) • Baso (Absolute)
RDW • Monocytes (Absolute) • Monocytes • Lymphocytes • Platelet Count
Hemoglobin • Hematocrit • MCV • MCH • MCHC • Neutrophils

BLOOD MINERALS
Calcium • Potassium • Sodium • Chloride • Iron

The retail price for the **CBC/Chemistry Profile** alone is **$47**, but drops to **$26** during the **Blood Test Super Sale**. **(LC381822)**

LE YOUR HEALTHY REWARDS

With **Your Healthy Rewards**, you earn **LE Dollars** back on every purchase you make — including blood tests! For details, see **www.LifeExtension.com/Rewards**

* This test requires samples to be shipped to the lab on dry ice for customers using a Blood Draw Kit and will incur an additional $35 charge. If the customer is having blood drawn at a LabCorp facility, this extra charge does not apply.

** This test is packaged as a kit.

LifeExtension®
LE PUBLICATIONS, INC.
PO BOX 407198
FORT LAUDERDALE, FLORIDA 33340-7198

WHAT'S INSIDE

Visit us at **www.LifeExtension.com**

LifeExtension® Magazine