



The Science of a Healthier Life™

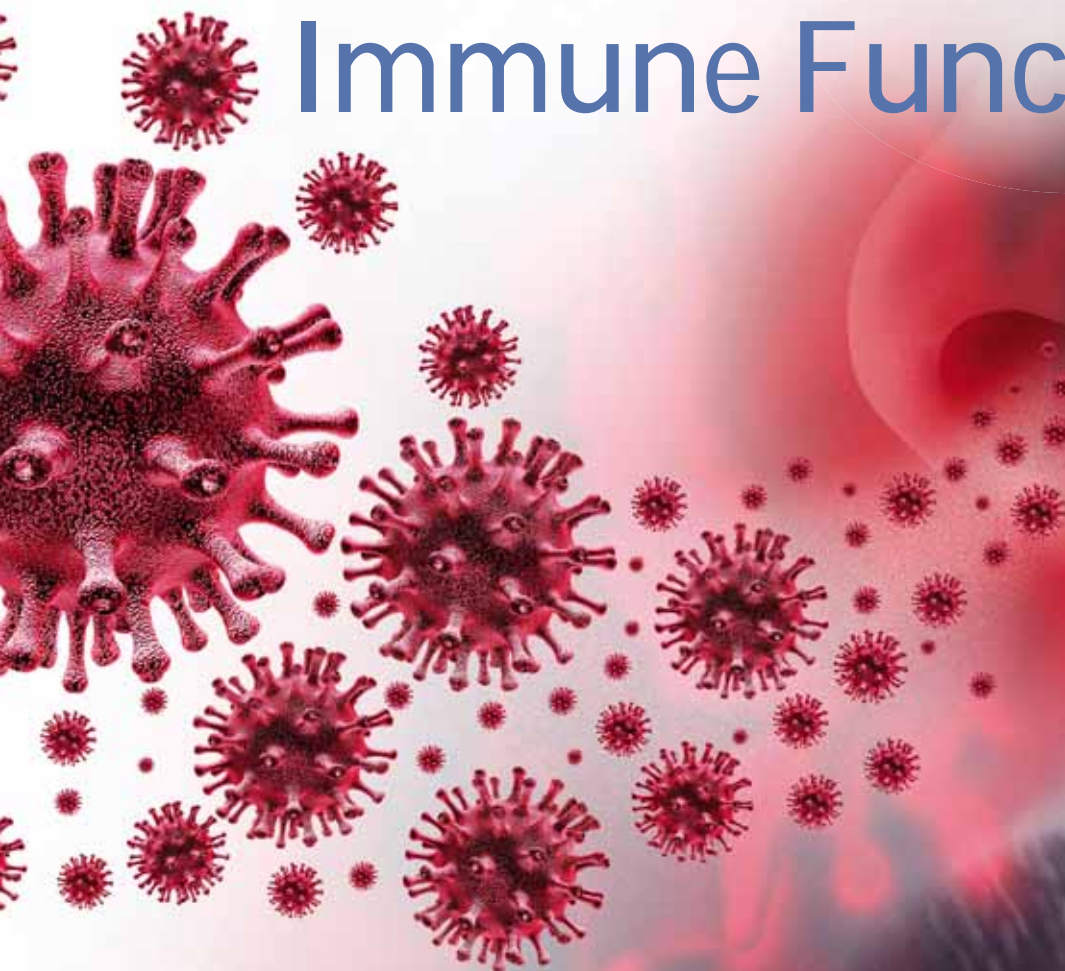
LifeExtension.com

July 2020

FEATURE ARTICLES

- 7 COVID-19: What to Ask Your Doctor
- 28 Anti-Aging Effects of Lithium
- 36 When Immune Function "Falls off a Cliff"
- 48 Impact of DHEA on Longevity
- 58 Combat Immune Senescence
- 71 Leukemia Patient Case Report
- 78 Stress Can Increase Infection Risk

The Science of Youthful Immune Function



PLUS: Many COVID-19 Tests Yield Misleading Results



BROAD-SPECTRUM IMMUNE SUPPORT

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

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



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

Item #01681 • 300 mg, 60 capsules
1 bottle **\$45** • 4 bottles **\$40** each
(Two-Month Supply)

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

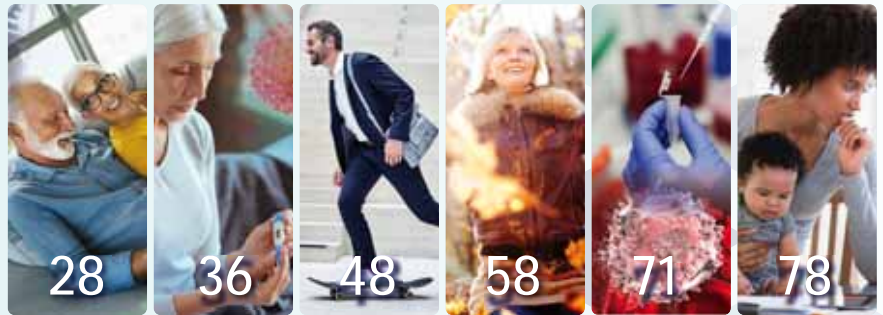
REPORTS

7 ON THE COVER

WHAT DOCTORS MAY CONSIDER IF COVID-19 SYMPTOMS WORSEN

There are currently available therapies to discuss with physicians that may reduce the risk of a **SARS-CoV-2** patient requiring ventilator support.

We also discuss COVID-19 **tests** that are not the panacea portrayed by the media and government.



28 LITHIUM: CRITICAL FOR OVERALL HEALTH

By inhibiting the *enzyme* GSK-3, **lithium** can promote longevity, slow brain aging, and improve health parameters.

36 WHEN IMMUNE FUNCTION "FALLS OFF A CLIFF"

Standardized botanicals have been shown to improve protective immune factors while reducing **pro-inflammatory** cytokines such as **interleukin-6** (IL-6).

48 DHEA PROMOTES QUALITY OF LIFE

Low levels of the hormone **DHEA** are associated with systemic aging and mortality. DHEA replacement can improve quality of life and reduce degenerative risks.

58 NATURAL APPROACHES TO IMPROVE IMMUNE FUNCTION

Three **plant-based compounds** can improve immune function by several complementary mechanisms to combat **immune senescence**.

71 CASE REPORT: LEUKEMIA PATIENT ACHIEVES COMPLETE REMISSION

Personalized **precision immunotherapy** results in complete remission in a terminal leukemia patient.

78 REDUCE THE ADVERSE EFFECTS OF STRESS

Ongoing stress triggers **high levels** of **cortisol**, which can **weaken** immune function.

DEPARTMENTS

19 IN THE NEWS

Blood pressure meds best taken at night; extra virgin olive oil benefits the brain; lactoferrin may combat cancer; obesity-related cancers seen at younger ages; even light exercise boosts longevity.

89 SUPER FOODS

Technically a fruit, pecans are rich in protein and healthy fats, including oleic acid. Human and lab studies show they can reduce LDL and total cholesterol and may cut the risk of breast cancer.



We Have a New Look

Our new bottles and labels include important product details (dosages, cautions, all ingredients). Life Extension has always provided extensive labeling information. As regulations require a minimum text size on product labels, some bottles are larger than others.

And, as always, our bottles are 100% recyclable.

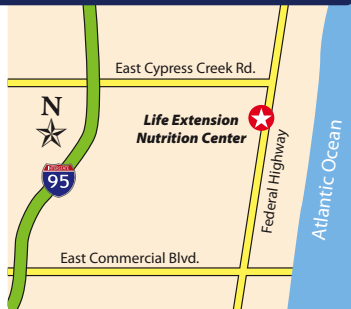


These statements have not been evaluated by the Food and Drug Administration. This product is not intended to diagnose, treat, cure, or prevent any disease.

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

Visit the Life Extension® Nutrition Center Store

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



Nutrition Center of Florida, Inc., 5990 North Federal Highway,
Fort Lauderdale, FL 33308-2633 • Phone: 954-766-8144

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



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

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

Editorial

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

Chief Medical Officer

Steven Joyal, MD

Chief Scientific Officer

Andrew Swick, MS, PhD

Scientific Advisory Board

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

Contributors

Michael Downey • William Faloon • Sarah Lewis
Dipnarine Maharaj, MD, FACP • Laurie Mathena
Jason Meyers • Stephanie Myers

Advertising

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

Senior Director of Sales and Business Development

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

Circulation & Distribution

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

Customer Service: 800-678-8989 • Email: customerservice@LifeExtension.com

Wellness specialists: 800-226-2370 • Email: wellness@LifeExtension.com

Life Extension® Magazine values your opinion and welcomes feedback.

Please mail your comments to *Life Extension Magazine*, Attn:

Letters to the Editor, PO Box 407198, Fort Lauderdale, FL 33340

or email us: LEmagazine@LifeExtension.com

LIFE EXTENSION (ISSN 1524-198X) Vol. 26, No. 7 ©2020 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.

**Low-Cost
Biologically
Active**

B COMPLEX

Enzymatically Active Vitamins

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

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

Item #01945 • 60 vegetarian capsules

1 bottle \$9

4 bottles \$8 each



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

Reference

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

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

MEDICAL ADVISORY BOARD

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Professor Francesco Marotta, MD, PhD, of Montepapaleone 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.



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



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



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



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



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



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



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

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



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



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



Michael D. Ozner, MD, FACC, FAHA, is a board-certified cardiologist who specializes in cardiovascular disease prevention. He serves as medical director for the Cardiovascular Prevention Institute of South Florida and is a noted national speaker on heart disease prevention. Dr. Ozner is also author of *The Great American Heart Hoax*, *The Complete Mediterranean Diet* and *Heart Attack Proof*. For more information visit www.drozner.com.



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



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



Garlic

SUPPORTS HEALTHY IMMUNE FUNCTION

Science has shown that **garlic**, rich in **allicin**, supports immune function on multiple fronts, for example:^{1,2}

- Promotes healthy immune cell function
- Supports immune T cells and immunoglobulin production
- Promotes protective macrophages
- Maintains cellular detoxification
- Modulates cytokine production

Easy to take **Optimized Garlic** is standardized to contain 10,000 ppm of allicin potential.



Item #01394 • 200 vegetarian capsules

1 bottle **\$18.75**

4 bottles \$15.75 each

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

References

1. *J Immunol Res.* 2015; 2015: 401630.
2. *Cytometry.* 2002 Aug 1;48(4):209-15.



The COVID-19 Conundrum

*The media have generated thousands of stories,
but omitted some critical details...*



WILLIAM FALOON

The disease caused by the **SARS-CoV-2 virus** is called **COVID-19**.

On some days more Americans **die** from **COVID-19** than *any* other illness. Those with significant disease are in need of better **treatment** options.

As I was writing this article, there remained a lack of high-quality, rigorous data about **validated** treatments, especially for severe COVID-19 disease.

This dearth of knowledge prompted me to work around-the-clock to identify therapies that may reduce the risk of a patient worsening to **severe** or **critical** stage COVID-19 disease.

Avoiding Mechanical Ventilation

During the initial COVID-19 outbreak, the media focused on the **shortage** of hospital **ventilators**.

It was as if intubation using **mechanical ventilators** would result in favorable patient outcomes or outright cures.

The reality is that large numbers of severe COVID-19 hospitalized patients did not survive the **ventilator**. It merely delayed death by several weeks.

Those who survived often suffered significant **organ damage**.

The purpose of this editorial is to convey possible strategies for a symptomatic COVID-19 patient to discuss with their physician.

These experimental tactics, if successful, might enable severe COVID-19 patients to avoid disease progression and invasive **mechanical ventilation**.

I also describe why COVID-19 **tests** are not the panacea the government and media often portray them to be.



Unreliable Testing

The lay public and medical professionals have been misled and confused by relentless reports about **testing** for the **virus** that causes COVID-19 disease.

We at **Life Extension®** were inundated in early **March 2020** with proposals from accredited laboratories to offer **PCR** (polymerase chain reaction) **tests** to our readers, aimed at detecting acute COVID-19 infection.

Credentialed labs also proposed that we offer **blood tests** to detect **antibodies** to the **SARS-CoV-2** virus.

We rejected all these **tests** because of concern that these tests might not be accurate.

Our apprehensions have been borne out.

The initial **PCR** screening tests involved sticking a swab deep into the **sinuses** and back of the **throat** (nasopharyngeal swab).

Another collection method involved testing samples of **saliva** in a cup. The objective of collecting these samples was to use **PCR** analysis to detect the presence of the SARS-CoV-2 **virus**.

Although **PCR** is a validated technology, preliminary research by experts in lab testing suggest that up to **30%** of results with **PCR** tests are **false-negative**.^{1,2}

This is in a large degree due to inadequate **specimen collection**, but also related to reagent issues, machine testing peculiarities, and a variety of other problems.

The consequence of such a high **false-negative** rate is that many symptomatic persons were told they were not infected with the novel coronavirus when they really were.

The **antibody** blood tests were also suspect. Reasons include **false-positive** test results caused by other common cold coronaviruses (cross-reactivity with the test).³

LabCorp now offers a vastly improved **IgG** antibody test you can order yourself on their website for as low as **\$10-12** depending on your health insurance. As you'll read next, we don't know what the practical value of these **antibody** tests will be.

Do SARS-CoV-2 Antibodies Confer Immunity?

There is lack of medical consensus as to whether a positive **IgG** antibody test indicates **long-term immunity** that might protect against a future (whether new or relapsed) **COVID-19** infection.^{4,5}

What **immunity** means *after* infection with the SARS-CoV-2 virus is not clear at the time of this writing.

Questions linger, such as: Will recovered patients have **immunity**? And if so, will it last a few months? A year? Can patients infected once with COVID-19 be infected again, despite having had a **positive IgG antibody** test?

These are but some of several unknowns related to COVID-19 immunity at the time of writing this editorial.

False-positive test results are especially worrisome with blood **antibody** tests because this conveys a false sense of security (i.e. presence of immunity) when in fact the individual may still be at risk for infection, or re-infection, with COVID-19.





We were concerned about inaccurate **false-negative PCR** results during screening for acute infection. Even with improved SARS/Cov-2 **antibody** tests, we worry about **misinterpreting** the results when attempting to identify individuals who have developed **immunity**.

We await solid data as to how effective having **antibodies** to the **SARS-CoV-2 virus** is at conferring long-term **immunity** against **COVID-19** disease.

Startling Data Published in *JAMA*

Severe COVID-19 patients placed on mechanical **ventilators** have high **mortality** rates. Those who survive ventilator support often encounter systemic **co-morbidities** along with muscle atrophy.

A study published in *JAMA* summarized the demographics, co-morbidities, and outcomes of 5,700 COVID-19 patients hospitalized during the first pandemic wave in New York City.⁶

This study found that **24.5%** of patients who received mechanical **ventilation** **died** and most remained hospitalized.

When the study was released, the following data were reported about

patients who needed mechanical **ventilation**:

- **72%** remained hospitalized
- **1 out of every 4** died
- Only **3.3%** were discharged from the hospital at time of publication

Those who survive prolonged **ventilator** support often suffer damage to their kidneys, heart, brain, and lungs.^{7,8}

These **systemic** injuries are likely inflicted by a combination of:⁹

- The **SARS-CoV-2 virus**
- Pro-inflammatory **cytokine storm**
- **Hyper-coagulation** of blood
- Mechanical **ventilation** and long hospitalization

Better treatments are desperately needed to decrease the risk and progression of severe infection and reduce the need for invasive **mechanical ventilation**.

As I was finalizing this editorial, an article was published in the *Wall Street Journal* on **May 11, 2020** titled:

“Some Doctors Pull Back on Using Ventilators to Treat Covid-19”

This article described different hospital treatment options, including having patients lie on their front side (prone position) to receive non-invasive **high flow oxygen** in lieu of mechanical **ventilation**.

Life Extension® added this suggestion to our **“Respiratory Support Protocol”** on **April 16, 2020** that you can view at:

www.LifeExtension.com/immune

Challenge to Keep You Informed

I wrote several versions of this editorial describing studies suggesting novel strategies to potentially avoid progression to severe disease with COVID-19.

My problem is that as fast as I write something of value, new data emerge. And due to the novelty of this SARS coronavirus, there is a lack of high-quality, rigorous, peer-reviewed data on which I normally insist.

But these are not “normal” times.

Thousands of lives are lost daily to this global pandemic.



Advances in our understanding of how to better treat COVID-19 with **experimental interventions** could spare many lives—particularly if the understanding and interventions came sooner rather than later.

In lieu of printing these rapidly evolving **treatment options**, these insights are available on another website: age-reversal-covid.net

Some information on this website discusses what one might do if progression from “**mild/moderate**” to “**severe/critical**” COVID-19 disease occurs.

The objective of these postings is to provide updates that can be discussed with treating physicians.

Much of the information about COVID-19 is subject to radical change as new and better-quality data emerge.

Why COVID-19 is Different

Back in the 1980s-1990s, **Life Extension®** fought a multi-decade battle with the **FDA** to force the approval of an **anti-viral** drug called **ribavirin**.

When **ribavirin** was combined with **interferon-alpha**, treatment outcomes in **hepatitis C** patients markedly improved. Today’s **hepatitis C** drugs (like Sovaldi®) are curing over **95%** of patients.

Yet, when these drugs were approved in **2013-2014**, most still relied on co-administration of **ribavirin**.

More recent **hepatitis C protocols** are combining Sovaldi® with newer drugs (in lieu of ribavirin) to eradicate hepatitis C.

We have no financial interest in **ribavirin**. We identified its efficacy in the early **1980s** and relayed this information to our supporters.

The FDA did not approve **ribavirin** until **1998**. Our efforts to accelerate approval of **ribavirin** may have saved thousands of American lives.

The challenge with **COVID-19** is there are no historic data sets to make definitive treatment suggestions like there were for **ribavirin**.

We are, instead, dealing with a rapidly changing series of experimental COVID-19 interventions with no tightly controlled studies to substantiate them.

New Website to Help Keep You Updated

The emergency nature of the COVID-19 pandemic mandates an **open flow** of information from researchers and doctors practicing on the front lines treating COVID-19 patients.

Scattered reports from these doctors are revealing potential opportunities to spare the lives of severe and critical COVID-19 patients.

Yet the media only lightly describe these data or overlook them.

This motivated me to create a new website that discusses potential COVID-19 treatment options in lay language.

The objective is to provide physicians with concise information and enlighten COVID-19 patients about potential therapies to discuss with their physicians.

Please know this is not a “news” website. It serves as a channel to disseminate biomedical data.

If something about COVID-19 is widely reported in the media, it might not get on this website right away because the data are already in the public domain.

Those interested in viewing these reports can visit:

age-reversal-covid.net

LabCorp Offers Tests Direct to Consumers

LabCorp is offering **SARS/Cov-2 antibody** blood tests direct to the public at a very low price if you have health insurance or other forms of medical coverage. There is some bureaucracy to navigate that you can review on:

www.labcorp.com/antibody-testing

Life Extension does NOT sell these **antibody** tests. They are available direct from **LabCorp**, but most of the public cannot distinguish between these **validated** tests and some others that may not yet be thoroughly studied.

This **COVID-19 antibody** test can be ordered through your doctor, either in-person or through a telemedicine program if offered by your health plan or employer, or through some employee wellness plans.

The test can also be requested using an independent telemedicine physician service accessible at LabCorp's special website: www.labcorp.com/antibody-testing

(Article continues on next page.)

COVID-19 Symptoms

You've likely read about the initial symptoms of today's novel coronavirus (COVID-19) pandemic.

The Centers for Disease Control and Prevention currently lists them as:¹⁰

- Fever
- Cough
- Shortness of breath or difficulty breathing
- Chills
- Repeated shaking with chills
- Muscle pain
- Headache
- Sore throat
- New loss of taste or smell

Some people may display no symptoms (asymptomatic) yet still be capable of infecting others.

Those who experience symptoms sometimes describe COVID-19 as the worst viral infection they have ever encountered.

The miseries of COVID-19 disease can involve fluctuating periods of fever, often worse at night, as well as shortness of breath and extreme fatigue that may last for two weeks or longer. These sufferings are being reported by people with so-called "mild to moderate" disease that does not require hospitalization.

For "severe" and "critical" COVID-19 disease, hospitalization is required.

Some reports in the medical literature at the time of this writing suggest relapses of initial infection, which implies some patients may not fully clear the viral infection for a long time, yet remain infectious.



Once the test order is placed, your antibody blood draw can be done at nearly 2,000 LabCorp patient service centers.

As I wrote earlier, however, we don't yet know what the practical value of a positive IgG **antibody** test to the COVID-19 virus is as it relates to **immunity**.

If you choose to have this COVID-19 antibody test, consider at the same visit to LabCorp having your blood drawn for the **Male or Female Blood Test Panel**. We've extended the annual sale so you can obtain these comprehensive blood tests that cost over **\$2,000** at most commercial labs for only **\$224**.

To order any test (except COVID-19 PCR and antibody tests) direct from **Life Extension**, call **1-800-208-3444** or log on to **www.LifeExtension.com/blood**

In This Month's Issue...

Fascinating human and animal data reveal **anti-aging** effects in response to **low-dose** intake of the mineral **lithium**.



The first article in this month's issue describes an array of benefits that have been discovered about **lithium's** ability to slow **brain aging** and enhance one's feeling of wellbeing.

Back in 1981, **Life Extension®** published the first of dozens of articles about the longevity-enhancing potential of **DHEA**. The article on page 48 expounds on an abundance of published data revealing DHEA's systemic health benefits.

What I like about **lithium** and **DHEA** is they are **low-cost** and can readily be added to one's personal health program.

On the flip side, the article on page 71 describes the enormous challenges a **leukemia** patient went through after undergoing brutal conventional treatments but ends on a happy note we hope you'll appreciate.

For decades we've published articles about the adverse impact of **immune senescence**. Two articles in this month's issue discuss **non-drug** approaches to help circumvent certain aspects of age-related immune decline.

Nothing in these articles is meant to imply any kind of preventative effect against **SARS-CoV-2**, for which there is insufficient information to make science-based recommendations, based on **Life Extension's** strict evidence-based publication criteria.

For longer life,

William Faloon, Co-Founder
Life Extension®

References

1. Available at: <https://www.bloomberg.com/news/articles/2020-04-11/false-negative-coronavirus-test-results-raise-doctors-doubts>. Accessed May 4, 2020.
2. Available at: <https://www.livescience.com/covid19-coronavirus-tests-false-negatives.html>. Accessed May 4, 2020.
3. Available at: <https://www.idsociety.org/globalassets/idsa/public-health/covid-19/idsa-covid-19-antibody-testing-primer.pdf>. Accessed May 4, 2020.
4. Available at: <https://www.who.int/news-room/commentaries/detail/immunity-passports-in-the-context-of-covid-19>. Accessed May 4, 2020.
5. Available at: <https://www.businessinsider.com/coronavirus-antibodies-cant-guarantee-long-term-immunity-who-said-2020-4>. Accessed May 4, 2020.
6. Richardson S, Hirsch JS, Narasimhan M, et al. Presenting Characteristics, Comorbidities, and Outcomes Among 5700 Patients Hospitalized With COVID-19 in the New York City Area. *JAMA*. 2020.
7. Available at: <https://www.uptodate.com/contents/physiologic-and-pathophysiologic-consequences-of-mechanical-ventilation#H23>. Accessed May 4, 2020.
8. Bilotta F, Giordano G, Sergi PG, et al. Harmful effects of mechanical ventilation on neurocognitive functions. *Critical Care*. 2019;23(1):273.
9. Available at: https://www.washingtonpost.com/health/coronavirus-destroys-lungs-but-doctors-are-finding-its-damage-in-kidneys-hearts-and-elsewhere/2020/04/14/7ff71ee0-7db1-11ea-a3ee-13e1ae0a3571_story.html. Accessed May 6, 2020.
10. Available at: <https://www.cdc.gov/coronavirus/2019-ncov/symptoms-testing/symptoms.html>. Accessed May 1, 2020.



Tap the Power of N-Acetyl-L-Cysteine

TO BOOST GLUTATHIONE LEVELS

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

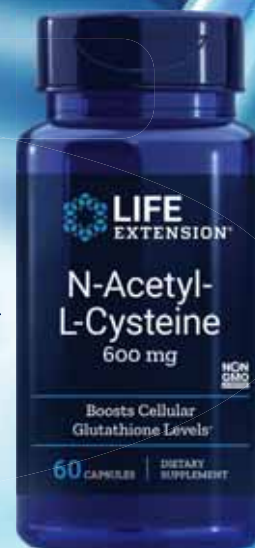
Item #01534 • 60 capsules

1 bottle **\$10.50**

4 bottles \$9.25 each

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

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



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

Road Trip!

NON-STOP

*"Thanks,
Ultra Prostate
Formula."*

Ultra Prostate Formula can help:

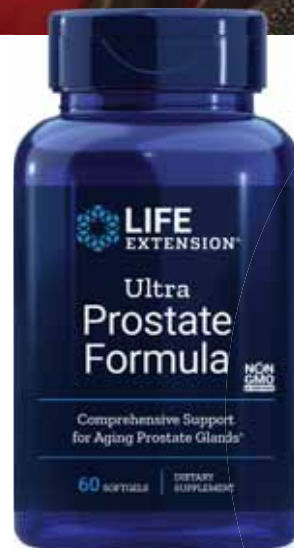
- Support healthy urination
- Promote healthy prostate size and function
- Encourage healthy inflammatory response
- Help inhibit PSA activity

Item #02029 • 60 softgels

1 bottle **\$28.50**

4 bottles \$26.25 each

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



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

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.

COMPREHENSIVE **FISH OIL** PROTECTION

Super Omega-3 provides
higher EPA/DHA potencies
PLUS olive oil polyphenols
and **sesame lignans**
to extend the stability of
DHA in the blood.



BEST SELLING SUPER OMEGA-3 FORMULA

Item #01982 • 120 softgels

1 bottle **\$24**

4 bottles \$21 each



IFOS™ certification mark is a registered trademark of Nutrasource Diagnostics, Inc. These products have been tested to the quality and purity standards of the IFOS™ program conducted at Nutrasource Diagnostics, Inc. Dosage and Use

For full product description and to order **Super Omega-3 EPA/DHA with Sesame Lignans & Olive Extract**, 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.

Super Selenium *Supports* HEART *and* BRAIN HEALTH

Linked to Longevity

Selenium's longevity power comes from its ability to offer powerful protection throughout the body, including heart support, brain support, and healthy cell division.^{1,2}

Super Selenium Complex has *three different forms of selenium*—each of which uniquely acts along a different pathway to support healthy cell division.

- Sodium selenite
- L-selenomethionine
- Selenium-Methyl L-Selenocysteine

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



Item #01778 • 100 vegetarian capsules

1 bottle **\$10.50**

4 bottles \$9 each

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

CAUTION: If you are taking anticoagulant or antiplatelet medications, or have a bleeding disorder, consult your healthcare provider before taking this product.

References

1. *Biol Trace Elem Res.* 2004 Oct;101(1):73-86.
2. *Biol Trace Elem Res.* 2011 Sep;142(3):274-83



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.

Higher Potency at
Discount Pricing

NAD⁺ Cell Regenerator

TURN ON YOUR CELLULAR ENERGY

Optimized NAD⁺ Cell Regenerator™
combines **300 mg** of **nicotinamide
riboside** with **resveratrol** and other
plant extracts.

For those already taking resveratrol, we
also offer **NAD⁺ Cell Regenerator™**
that provides **300 mg** of **nicotinamide
riboside**.

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



NAD⁺ Cell Regenerator™
Item #02344 • 30 vegetarian capsules
.....
1 bottle *

Optimized NAD⁺ Cell Regenerator™
Item #02348 • 30 vegetarian capsules
.....
1 bottle *



* 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

NIAGEN® is a 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.

MAINTAIN A HEALTHY *POST-INFLAMMATORY* RESPONSE

PRO-RESOLVING MEDIATORS

Specialized **Pro-Resolving Mediators (SPMs)** support a healthy relationship with inflammatory factors for whole-body health.

SPMs help:

- **REMOVE:** Support the body's natural process for clearing cellular debris.
- **RESTORE:** Help balance cytokines in the body.
- **RENEW:** Promote the regeneration of healthy tissues.

Specialized **Pro-Resolving Mediators (SPMs)** are derived from polyunsaturated fatty acids found in highly refined, marine-oil concentrate.



Item #02223 • 30 softgels

1 bottle **\$21**

4 bottles \$19 each



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

In the News



Blood Pressure Medicine More Effective when Taken at Night

What time of day a patient takes blood pressure medicine can have an impact on its effectiveness, according to a study published in the *European Heart Journal*.*

In the Hygia Chronotherapy Trial, researchers looked at data from more than 19,000 patients, comparing the results of people who took blood pressure drugs in the morning to those who took them at night.

Patients were followed for an average of more than six years, during which their ambulatory blood pressure was checked over a 48-hour period at least once a year.

Compared to patients who took their medication in the morning, those who took it at bedtime had **better-controlled** blood pressure and showed the following benefits:

- 1) **56% reduced** risk of dying from **heart or blood vessel** problems
- 2) **49% reduced** risk for **stroke**
- 3) **34% reduced** risk for **myocardial infarction**
- 4) **42% reduced** risk of for **heart failure**
- 5) **40% reduced** need of coronary re-stenting

Editor's Note: "Routine ingestion by hypertensive patients of [one or more] prescribed blood pressure-lowering medications at bedtime, as opposed to upon waking, results in improved [ambulatory blood pressure] control...and, most importantly, markedly diminished occurrence of major cardiovascular disease events," the study concluded.

* *Eur Heart J.* 2019 Oct 22. pii: ehz754.

Extra Virgin Olive Oil Benefits the Brain

Research conducted at Temple University's Lewis Katz School of Medicine indicates a brain benefit for supplemental extra virgin olive oil in older mice. The study was published in the journal *Aging Cell*.*

Previously, positive effects were found for olive oil in mice that were genetically engineered to develop the amyloid deposits that characterize Alzheimer's disease.

The new study evaluated the oil's effects in mice engineered to develop defective tau proteins in the brain which block the communication of brain cells in Alzheimer's disease. "Remarkably, tau pathology strictly correlates with the severity of dementia," the authors stated.

Beginning at six months of age, until the age of one year, the mice were fed a diet either with or without extra virgin olive oil. At the end of the study, mice that received the olive oil demonstrated better memory and cognition in comparison with the control group of mice, as well as a reduction in harmful tau deposits.

Additionally, treated animals' synapses, which are the connections between brain cells, showed increased activity.

Editor's Note: Olive oil is known for its many health benefits, including an ability to help protect against cardiovascular disease and mild cognitive impairment.

* *Aging Cell*. 2020 Jan; 19(1): e13076.





Lactoferrin Boosts Immunity to Fight Cancer

Lactoferrin has numerous anti-cancer activities.

One key way it helps prevent the development of cancer and inhibit cancer growth is by boosting the body's **adaptive immune response**, according to a study published in the journal *Biomolecules*.*

Adaptive immunity, also called acquired immunity, is an immune response to a specific pathogen that enhances the body's response to future encounters with that pathogen. For example, it's what prevents a person from contracting the measles after they've already had it.

In addition to boosting adaptive immunity, lactoferrin works in the following ways to help combat cancer:

- It promotes cell proliferation and migration in healthy cells, while inhibiting proliferation and migration in cancerous cells.
- It crosses the blood-brain barrier, making it an ideal carrier for chemotherapeutics designed to treat brain tumors.
- It is highly bioavailable.
- It selectively targets cells involved in tumor proliferation, survival, migration, invasion, and metastasis.

Editor's Note: According to the study authors, "The use of nutraceuticals as natural compounds corroborating anti-cancer standard therapy is emerging as a promising tool for their relative abundance, bioavailability, safety, low-cost effectiveness, and immuno-compatibility with the host."

* *Biomolecules*. 2020 Mar 15;10(3).

Rise in Obesity-Related Cancers Seen at Younger Ages

Cancers associated with obesity, once typically diagnosed at higher rates in people over 65, are now on the rise in younger people, according to a study published in *JAMA Network Open*.*

Researchers studied more than **6 million** cancer cases in the Surveillance Epidemiology and End Results (SEER) database from the years 2000 to 2016.

The results revealed a shift in obesity-associated cancers to people in both the 20-to-49-year-old age group and in the 50-to-64-year-old age group. The greatest increase occurred in the 50-to-64-year-old group.

In 50-to-64-year-olds, the **increase** in the number of obesity-associated cancers ranged from **25.3%** in non-Hispanic white women to **197.8%** in Hispanic men.

Editor's Note: Obesity increases cancer risk by multiple mechanisms that include chronic inflammation, elevated glucose/fasting insulin and hormone imbalances. The authors of this study stated that "some of the greatest increases [were] observed for liver and thyroid cancers [in] all sex- and race/ethnicity- specific strata."

* *JAMA Network Open*, 2019; 2 (8): e199261.



Even Light Physical Activity Increases Longevity

Increasing your amount of physical activity—regardless of intensity—can increase your lifespan, according to a study published in the *BMJ*.^{*} Even light activity—such as walking or washing dishes—can have longevity benefits.

Researchers analyzed data from 36,383 adults with a mean age of 62.6 years. The data came from studies that tracked activity using motion sensors for up to one week, and that followed individuals for a median follow-up of 5.8 years.

The researchers categorized physical activity according to light, moderate, and intense, and they divided individuals according to most active and least active.

Results showed that the **25%** most active people had a **60%-70%** lower risk of death compared to the **25%** least active people. Moreover, sitting for **9.5 hours** a day or more (not counting night-time sleep) was tied to a statistically significant increased risk of death.

Editor's Note: Government guidelines recommend a minimum of **150** minutes of moderate exercise or **75** minutes of vigorous exercise per week.

^{*} *BMJ*. 2019;366:l4570.



ZINC ACETATE LOZENGES

Zinc helps fortify the **immune** system.^{1,2}

When needed, **zinc lozenges** can be important for strengthening the body's natural defenses.³⁻⁵

Enhanced Zinc Lozenges is an "ionic formula" that delivers **18.5 mg** of zinc (acetate) in peppermint flavor lozenge.

Zinc lozenges should be taken as needed. They are not for daily use.

References

1. *Adv Nutr.* 2013 Mar 1;4(2):176-90.
2. Available at: <https://lpi.oregonstate.edu/mic/minerals/zinc>. Accessed May 12, 2020.
3. *J Infect Dis.* 2008 Mar 15;197(6):795-802.
4. *Ann Intern Med.* 2000 Aug 15;133(4):245-52.
5. *Open Respir Med J.* 2011;5:51-8.



Item #01961 • 30 vegetarian lozenges

1 bottle \$9



* Limited Supplies Available. One bottle will be initially shipped with the balance to follow upon our re-supply.

For full product description and to order
Enhanced Zinc Lozenges, 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.

Does your multivitamin measure up?



Two-Per-Day beats Centrum® in 10 ways!

Get The Maximum Potency From Your Multivitamin!

Life Extension®'s **Two-Per-Day** formulas are the highest potency multivitamins. Compared to **Centrum® Silver®** Adults 50+, **Two-Per-Day** provides:

**Centrum®
Can't
Compete**

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

Life Extension®'s **Two-Per-Day** contains superior forms of nutrients such as **5-MTHF** that is almost **7 times more bioavailable** than **folic acid**. These **bio-active** nutrients provide the body with greater biological **activity**, which is especially important as people age.

Two-Per-Day Capsules

Item #02314 • 120 capsules
(Two-month supply)

1 bottle **\$18**

4 bottles \$16 each

*(Just 30 cents a day or less
when 4 bottles are purchased)*

Two-Per-Day Tablets

Item #02315 • 120 tablets
(Two-month supply)

1 bottle **\$17.25**

4 bottles \$15.50 each



For full product description and to order
Two-Per-Day Capsules or Tablets,
call **1-800-544-4440** or visit **Life Extension.com**

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.



NEW PROBIOTIC BLEND FOR EVEN BETTER INTESTINAL HEALTH

FORTIFY YOUR INTESTINAL FLORA

DUAL ENCAPSULATION
DELIVERY



FLORASSIST® GI with Phage Technology now provides **seven** strains of probiotics *plus* **four** types of **phages** in one daily **dual encapsulated** vegetarian capsule.

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

Item #02125 • 30 liquid vegetarian capsules
1 bottle **\$24.75**
4 bottles \$22.50 each



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

Increase AMPK to Better Manage Body Weight

Most people today consume too many excess calories.

This results in **mTOR** constantly running at high gear, which is a factor in unwanted **fat storage**.

Studies show that increasing **AMPK** activity turns down excess **mTOR**.¹

Reduce Cell Fat Storage

Scientific studies show that increasing **AMPK** activity can encourage cells to store less fat and burn it as energy.^{2,3}

AMPK Metabolic Activator was formulated based on data showing reduced **belly fat** in response to just one of its ingredients (*Gynostemma pentaphyllum*).³

AMPK Metabolic Activator is a dual-nutrient formula designed to support healthy AMPK cellular activation.

References

1. *Anticancer Agents Med Chem*. 2013 Sep;13(7):967-70.
2. *Nutr J*. 2016;15:6.
3. *Obesity (Silver Spring)*. 2014;22(1):63-71.



Item #02207 • 30 vegetarian tablets

1 bottle **\$28.50**

4 bottles \$24 each

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



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

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

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 person wearing a bright yellow shirt is sitting on a grey couch, reading a newspaper. The newspaper has a large circular graphic on the front page. The person's hands are visible, holding the paper. The background is slightly blurred, showing a window and some indoor plants.

LITHIUM: A Critical Mineral for Overall Health

BY SARAH LEWIS

For decades, research has suggested that **lithium** has unique health benefits.

It may help prevent cognitive decline^{1,2} and may slow the aging process.³⁻⁵

Much of lithium's impact is due to its *inhibition* of an enzyme in the body known as **glycogen synthase kinase-3** (GSK-3).

GSK-3 **overactivity** has been tied to rapid aging and risk for chronic diseases.

Studies suggest that **GSK-3 inhibition** is largely responsible for lithium's ability to protect brain function and extend lifespan.³

Lithium may *inhibit* cellular senescence, an effect that has been shown to *increase* longevity in preclinical studies.⁶⁻⁸

Even at low doses, lithium intake has been associated with *decreased* all-cause mortality in humans and *increased* longevity in roundworms.⁹

Two studies have found that individuals living in areas with even modest, low levels of lithium in the drinking water tend to *live longer*.^{9,10}

Small, daily **lithium** doses (around **1,000 mcg**) may be an effective way to slow aging and cognitive decline.

Brief History of Lithium

The element **lithium** is believed to have been created just minutes after the Big Bang, even before the stars and galaxies began to form.¹¹

On Earth, it's found in nearly all rocks. As water flows over and through rock formations and subsoil, it picks up small amounts of lithium.

For thousands of years, when people drank from natural bodies of water, they took in tiny doses of lithium.

Over time, water that had the highest-lithium concentrations became recognized for its health promoting properties. People even traveled hundreds of miles, making pilgrimages to lithium-rich springs.

For instance, **Lithia Springs** in Georgia, an area of naturally abundant lithium in the water, became a draw for people from all over the country. Prominent figures, from Mark Twain to at least four U.S. presidents, made trips to the springs specifically to drink the water.

In the last century, high doses of lithium—*thousands* of times higher than those in water—were found to be an effective treatment for bipolar disorder and depression.

And in recent years, scientists have made discoveries that help explain lithium's wide-ranging benefits.

Slowing Aging

One of the most important ways lithium benefits the body is by inhibiting the activity of a powerful regulatory enzyme called **glycogen synthase kinase-3 (GSK-3)**.³⁻⁵

GSK-3 controls several important functions in cells.

But **overactivity** of **GSK-3**, which occurs frequently with age, may be harmful.

Too much **GSK-3 activity** could rob cells of the ability to defend themselves against many of the ravages of time.^{4,12-17}

In fact, increased GSK-3 activity correlates with more rapid aging of many tissues and the body as a whole.^{15,17} The impact is so great, GSK-3 can be thought of as an **age-accelerating enzyme**.

Excess GSK-3 activity may also raise the risk for chronic disorders of older age, including type II diabetes, Alzheimer's, mood disorders, cancer, and others.^{4,12-14,16}

The link between **GSK-3** and **aging** and **disease** is so strong that since the 1970s researchers have been developing medications to reduce GSK-3 activity.

These scientists believe that a compound that reduces GSK-3 activity may be effective against age-related disorders such as **type II diabetes**.

Since lithium *reduces* GSK-3 overactivity at low doses, numerous age-related health problems could potentially safely be reduced without resorting to high-potency lithium drugs.³⁻⁵

Studies suggest that **GSK-3 inhibition** is largely responsible for lithium's ability to protect brain function.³

Lithium May Extend Longevity

In addition to the well-known positive effects on mood,¹⁸ lithium has also been linked with longer overall **longevity**.

Two studies have found that individuals living in areas with even modest, low levels of lithium in the drinking water tend to **live longer**.^{9,10}

This pattern has also been observed in people taking high-dose lithium for medical reasons. They generally have **lower mortality rates**, including **lower** rates of **death** due to **cardiovascular disease**.^{19,20}

Studies in animals have supported these findings and have helped identify the potential biological mechanisms by which lithium extends longevity.

For example, studies in fruit flies and the roundworm *C. elegans* show that **high doses** of **lithium** supplementation lead to longer lifespan.^{3,6,9} The median survival of



the animals in one of these studies was increased by as much as **46%**.⁶

These effects were seen at **very high doses**, but even at low doses, **lithium** has been shown to modestly increase lifespan in *C. elegans*.⁹

Scientists believe lithium may promote longevity by protecting cellular genetic material from age-related deterioration. It may do this in three main ways:⁶⁻⁸

- Lithium may help maintain longer **telomeres**, structures associated with DNA health and longer life, as seen in long-term, high-dose treatment.
- Lithium regulates genes related to healthy DNA structure.
- Lithium may offer protection from **cellular senescence**, when elderly cells cease functioning properly but won't die off. These senescent cells are major contributors to age-related ailments and faster aging.

These mechanisms pack a powerful punch against premature aging and degenerative illnesses.

Lithium and the Brain

In **2018**, researchers studying lithium levels in different counties in Texas discovered that rates of death from **Alzheimer's disease** were **higher** in areas with **low** levels of lithium in the water.¹⁰

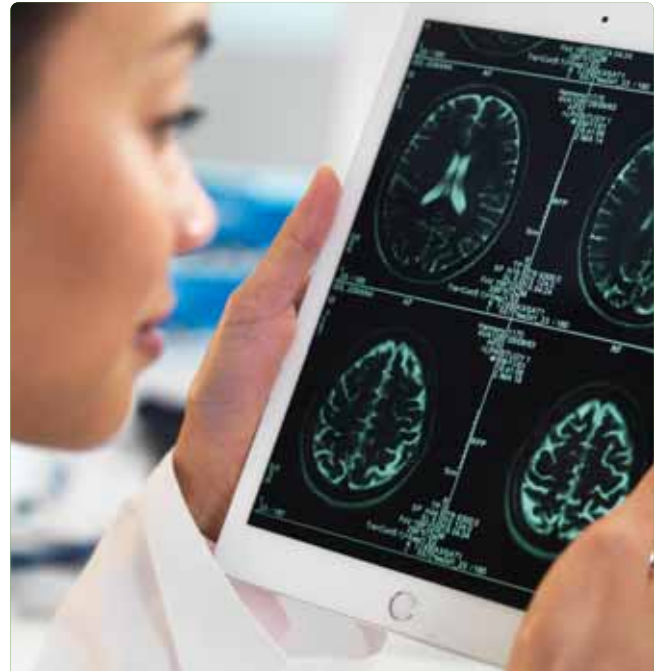
This came on the heels of a Danish study that found that **higher** long-term lithium intake from drinking water may be associated with a lower risk of being diagnosed with dementia.²¹

Clinical studies of lithium in the treatment of dementia show similarly encouraging results.

In one study, a micro-dose of just **300 mcg** of lithium daily **significantly decreased cognitive decline** in Alzheimer's patients compared to a placebo.²²

A recent review found that cognitive function of individuals with **early-stage dementia** remained more stable in those given lithium than in those who took a placebo.²³

In addition to reducing the elevated **GSK-3 activity** associated with Alzheimer's, one preclinical study showed that lithium reduces the build-up of **beta-amyloid**, the abnormal protein that accumulates and forms plaques in the brains of Alzheimer's patients.²⁴



WHAT YOU NEED TO KNOW

The Wide-Ranging Benefits of Lithium

- **Lithium** is a trace mineral found in the earth's crust, and therefore in some, but not all, drinking water.
- Studies suggest that GSK-3 inhibition is also largely responsible for lithium's ability to protect brain function and extend lifespan.
- Even at low doses, lithium intake has been associated with **decreased** all-cause mortality in humans and **increased** longevity in roundworms.
- Lithium plays a critical role, from slowing the aging process to protecting the brain and improving mental health, and more.
- Small daily doses of lithium may be an effective way to slow aging and cognitive decline and extend life.

Other Biological Effects

Research has revealed many other biological effects in those using long-term, high-dose lithium treatment for medical conditions.⁵

- It reduces cell death and improves cellular resilience and plasticity.
- It increases the activity of multiple beneficial neurotransmitters in the brain.
- It has balancing effects on the circadian rhythm and hormonal function.
- It increases **brain-derived neurotrophic factor**, an important signaling molecule in the brain that protects brain cells and augments their function.

Scientists continue to discover new benefits of lithium all the time.

Summary

Lithium, an often-overlooked trace mineral, may help slow the aging process, extend lifespan, reduce risk for chronic diseases, and slow the worsening of cognitive decline.

Research shows that low doses of lithium ranging from **300 mcg** to around **1,000 mcg** daily may have a beneficial impact on mental and physical health and possibly increase longevity. •

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. Matsunaga S, Kishi T, Annas P, et al. Lithium as a Treatment for Alzheimer's Disease: A Systematic Review and Meta-Analysis. *J Alzheimers Dis*. 2015;48(2):403-10.
2. Forlenza OV, Radanovic M, Talib LL, et al. Clinical and biological effects of long-term lithium treatment in older adults with amnesic mild cognitive impairment: randomised clinical trial. *Br J Psychiatry*. 2019 Apr 5:1-7.
3. Castillo-Quan JI, Li L, Kinghorn KJ, et al. Lithium Promotes Longevity through GSK3/NRF2-Dependent Hormesis. *Cell Rep*. 2016 Apr 19;15(3):638-50.
4. Saraswati AP, Ali Hussaini SM, Krishna NH, et al. Glycogen synthase kinase-3 and its inhibitors: Potential target for various therapeutic conditions. *Eur J Med Chem*. 2018 Jan 20;144:843-58.
5. Won E, Kim YK. An Oldie but Goodie: Lithium in the Treatment of Bipolar Disorder through Neuroprotective and Neurotrophic Mechanisms. *Int J Mol Sci*. 2017 Dec 11;18(12).
6. McColl G, Killilea DW, Hubbard AE, et al. Pharmacogenetic analysis of lithium-induced delayed aging in *Caenorhabditis elegans*. *J Biol Chem*. 2008 Jan 4;283(1):350-7.
7. Squassina A, Pisanu C, Congiu D, et al. Leukocyte telomere length positively correlates with duration of lithium treatment in bipolar disorder patients. *Eur Neuropsychopharmacol*. 2016 Jul;26(7):1241-7.
8. Zmijewski JW, Jope RS. Nuclear accumulation of glycogen synthase kinase-3 during replicative senescence of human fibroblasts. *Aging Cell*. 2004 Oct;3(5):309-17.
9. Zarse K, Terao T, Tian J, et al. Low-dose lithium uptake promotes longevity in humans and metazoans. *Eur J Nutr*. 2011 Aug;50(5):387-9.
10. Fajardo VA, Fajardo VA, LeBlanc PJ, et al. Examining the Relationship between Trace Lithium in Drinking Water and the Rising Rates of Age-Adjusted Alzheimer's Disease Mortality in Texas. *J Alzheimers Dis*. 2018;61(1):425-34.
11. Available at: <https://physicsworld.com/a/big-bang-ruled-out-as-origin-of-lithium-6/>. Accessed April 9, 2020.
12. Henriksen EJ, Dokken BB. Role of glycogen synthase kinase-3 in insulin resistance and type 2 diabetes. *Curr Drug Targets*. 2006 Nov;7(11):1435-41.
13. Hooper C, Killick R, Lovestone S. The GSK3 hypothesis of Alzheimer's disease. *J Neurochem*. 2008 Mar;104(6):1433-9.
14. Jope RS, Roh MS. Glycogen synthase kinase-3 (GSK3) in psychiatric diseases and therapeutic interventions. *Curr Drug Targets*. 2006 Nov;7(11):1421-34.
15. Lei P, Ayton S, Bush AI, et al. GSK-3 in Neurodegenerative Diseases. *Int J Alzheimers Dis*. 2011;2011:189246.
16. Zhang Y, Huang NQ, Yan F, et al. Diabetes mellitus and Alzheimer's disease: GSK-3beta as a potential link. *Behav Brain Res*. 2018 Feb 26;339:57-65.
17. Zhou J, Force T. Focusing the spotlight on GSK-3 in aging. *Aging (Albany NY)*. 2013 Jun;5(6):388-9.
18. Available at: <https://www.nytimes.com/2014/09/14/opinion/sunday/should-we-all-take-a-bit-of-lithium.html>. Accessed April 16, 2020.
19. Ahrens B, Grof P, Moller HJ, et al. Extended survival of patients on long-term lithium treatment. *Can J Psychiatry*. 1995 Jun;40(5):241-6.
20. Cipriani A, Pretty H, Hawton K, et al. Lithium in the prevention of suicidal behavior and all-cause mortality in patients with mood disorders: a systematic review of randomized trials. *Am J Psychiatry*. 2005 Oct;162(10):1805-19.
21. Kessing LV, Gerds TA, Knudsen NN, et al. Association of Lithium in Drinking Water With the Incidence of Dementia. *JAMA Psychiatry*. 2017 Oct 1;74(10):1005-10.
22. Nunes MA, Viel TA, Buck HS. Microdose lithium treatment stabilized cognitive impairment in patients with Alzheimer's disease. *Curr Alzheimer Res*. 2013 Jan;10(1):104-7.
23. Wittenberg SM, Toxopeus KA, Schulte PFJ. [Lithium and its protective effect in Alzheimer's disease]. *Tijdschr Psychiatr*. 2017;59(9):559-63.
24. Sofola-Adesakin O, Castillo-Quan JI, Rallis C, et al. Lithium suppresses Abeta pathology by inhibiting translation in an adult *Drosophila* model of Alzheimer's disease. *Front Aging Neurosci*. 2014;6:190.

ABSORB MORE QUERCETIN

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

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

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

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



Item #02302 • 30 vegetarian capsules
1 bottle \$9 • 4 bottles \$8 each

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

* Supplier Internal Study. Data on File. 2017



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.



2



ways to save

VIP AUTOSHIP

Never run out of
supplements again

CUSTOMIZE YOUR AUTOSHIP

You're in control. Make changes anytime to items, delivery day, address and frequency.

FREE SHIPPING

Free shipping on any size AutoShip order to any US address regardless of order size.

LOWEST PRICE

Sale or no sale, AutoShip customers get the lowest prices.

NO COMMITMENT NECESSARY

AutoShip is complimentary and can be canceled at any time.

LifeExtension.com/VIPAutoShip

PREMIER PREMIUM REWARDS



FREE

Unlimited
Shipping



4%

Back On
Purchases



\$50 Instant Credit

Use now or
save for later.



Worry-Free

No auto-enrollment.
Cancel anytime.

JOIN PREMIER TODAY!

ONLY \$49.95 PER YEAR.

LifeExtension.com/YourPremier

Call 1-855-874-9088 | Please Use Code **REWARD**

Premier service expires 12 months after date of purchase or renewal and can only be renewed 6 months after Premier purchase or renewal. Includes FREE standard delivery (3 to 5 business days) to any mailing address within the United States, excluding U.S. territories. Discounts on non-standard and international shipping also available. International customers pay \$59.95 for Premier. During checkout, redeem LE Dollars (one is equal to \$1 U.S. Dollar) to purchase products, blood tests, sale items, and shipping fees. Copyright ©2020 Life Extension®. All rights reserved.

LITHIUM

The Brain & Body Element

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

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

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

References

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



Lithium

(1,000 mcg of lithium per tiny cap)

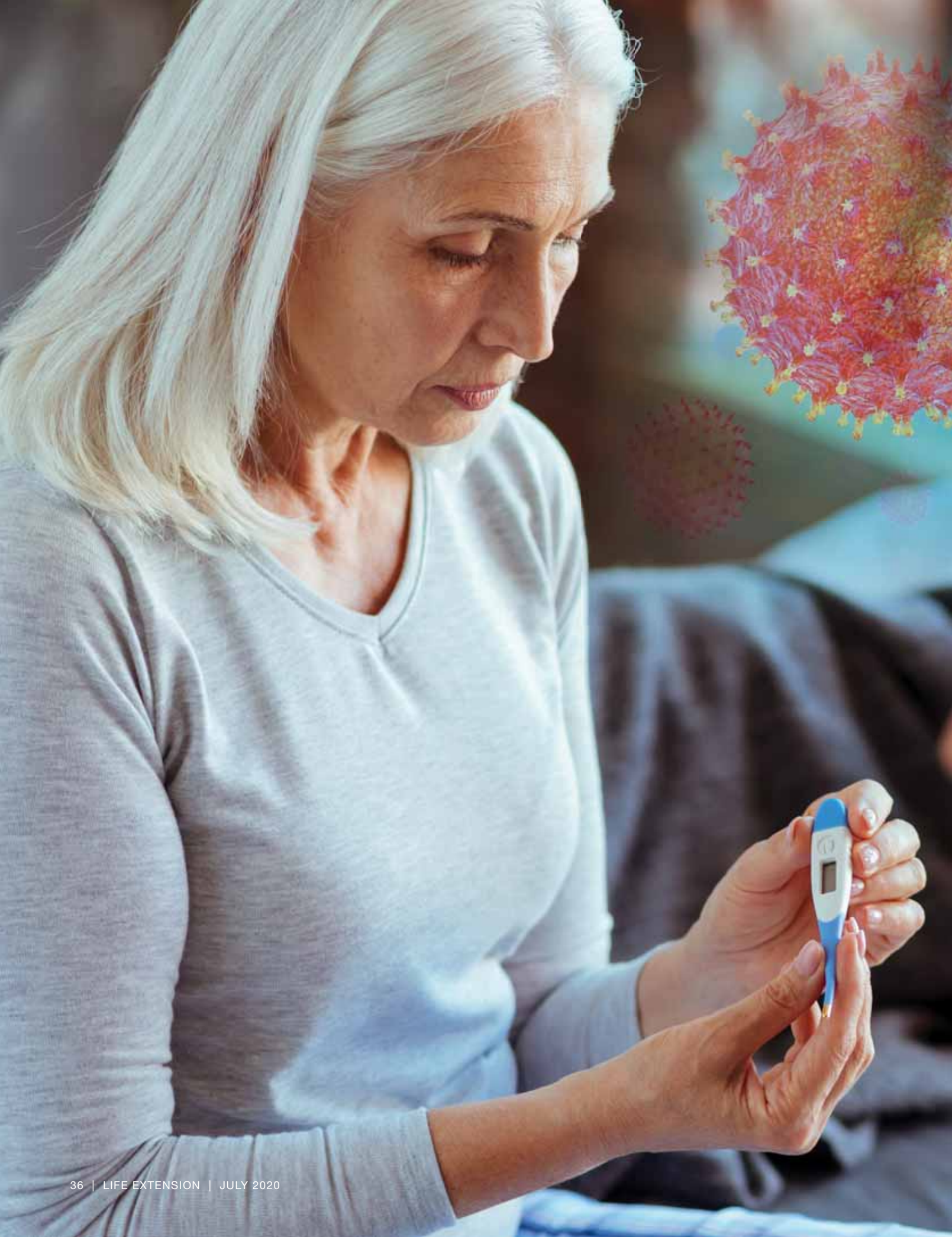
Item # 02403 • 100 Vegetarian Capsules

1 bottle **\$12**

4 bottles \$10.50 each



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.





When IMMUNE FUNCTION *“Falls off a Cliff”*

BY WILLIAM FALOON

Significant dollars are being invested to develop methods to turn youthful **immune function** back “on.”

Yet many of us can’t wait for delays while our immune systems **“fall off a cliff.”**

This article explains some of the changes that occur with aging that cause our **immune functions** to become dysfunctional (senescent).

It also describes some of what is available today to help restore immune competence in aging humans, including suppressing the **interleukin-6** cytokine.

Much of this article was published by **Life Extension®** in January 2016.¹

Human research has since moved forward on several fronts to induce systemic improvements in immune functions.

Around **age 60** a startling change occurs that decimates our ability to combat **infections** and **malignancies**.

Some people encounter these immune impairments earlier in life.

This catastrophic event decreases **naïve T cells** needed to ward off new bacteria, viruses, and cancers.

At the same time **naïve T cells** are lost, we accumulate senile **memory T cells** that emit **pro-inflammatory** signals that wreak havoc in every organ system.²

One of the deadliest of these inflammatory “signals” is a cytokine called **interleukin-6** (IL-6).³

Higher **IL-6** levels are associated with a **2-fold** greater risk of death.⁴ Higher levels are also involved with multiple degenerative processes, including **frailty**, from which so many elderly suffer.⁵⁻⁷

A common trait of healthy **centenarians** is that they have unusually **low** levels of **IL-6**.⁸

People associate **immune senescence** with weakened immune function. It turns out that impaired immunity is only half the problem. Spiraling levels of **IL-6** that attack our **healthy tissues** are another component of **immune senescence** that must be addressed.⁹

The encouraging news is that significant dollars are being invested to develop technologies to turn youthful **immune function** back “on.”¹⁰ These immune-restoration therapies may add decades to our healthy lifespans.



The problem is that many of us can't wait for bureaucratic delays while our immune systems **fall off a cliff**.

There is an urgent need today to accelerate restoration of **immune** competence in aging humans, including suppressing deadly **interleukin-6** levels.

Leading Cause of Disability and Death in Older Persons

Immune senescence is a leading cause of disability and death in aging humans.¹¹

By way of example, deaths from **pneumonia** are rare in youth, but spiral upward as humans mature.¹² If you read obituaries (as I do), the number of once-vigorous individuals who perish from opportunistic illnesses caused by **immune senescence** is startling.

Life Extension® magazine has published in-depth reports about underlying causes of **immune senescence** and what stop-gap measures people should initiate to reverse this deadly trend.¹³⁻¹⁵

In people over age 65, the top 10 causes of death include influenza, pneumonia, and sepsis.¹⁶ **Immune senescence** is a major cause of all these maladies.^{12,17-22}

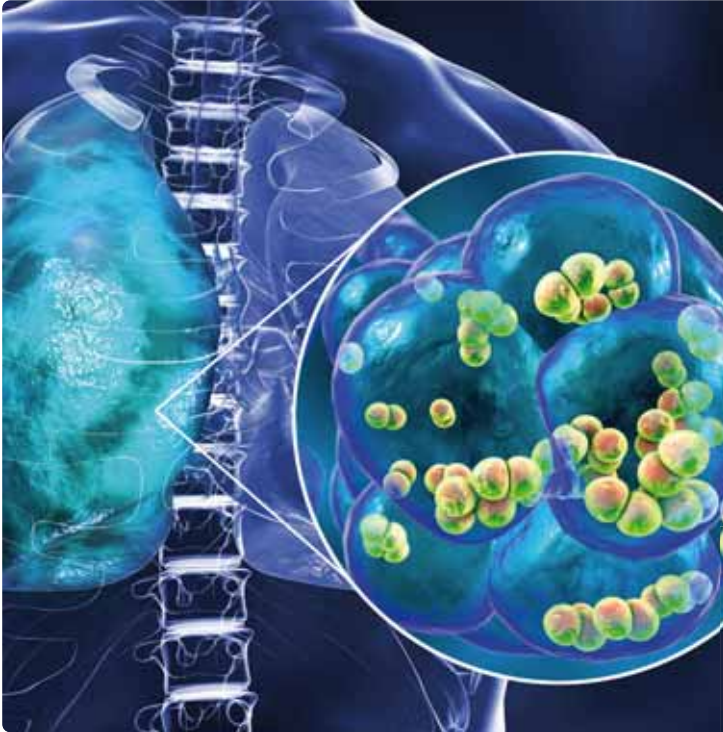
Cancer, stroke, Alzheimer's, and heart attack are common diseases of aging.¹⁶ These illnesses are all also related to **immune senescence**.

We often hear the term “**immune health**” as people seek to protect against winter **viral infections**. The public does not yet understand what causes our immune system to fail as we age.

*“We conclude that **CHF** (chronic heart failure) patients show a higher degree of **immunosenescence** than age-matched healthy controls. **T-lymphocyte** differentiation and **IL-6** levels are increased in patients with an advanced clinical status and may contribute to disease impairment through a compromised adaptive immune response due to accelerated aging of their immune system.”*

Publication: *International Journal of Cardiology*
– July 1, 2014

Article title: Immunosenescence and inflammation characterize chronic heart failure patients with more advanced disease.



More Naïve T Cells Urgently Needed

Immune **imbalance** occurs when our aging immune system fails to protect against new **cancers/infections** and instead generates **inflammatory** reactions (including increased **IL-6**) that attack every cell in our body.

A “**naïve**” immune cell is one that has not yet been activated.²³ Since it is “naïve” (not yet exposed to an antigen), naïve immune cells are primed to effectively respond to new infectious agents and malignancies.

Once exposed, **naïve immune cells** become **memory cells** or plasma cells specific to the original antigen. As our internal reservoir of **naïve immune cells** is decreased, we have less ability to respond to new infections/malignancies.²³

A deficit of **naïve immune cells** combined with over-accumulation of **exhausted memory cells** decreases the efficacy (antibody response) of **vaccinations**.²⁴

Exhausted **memory T cells** are associated with increased risks of coronary **heart disease** and **endothelial dysfunction**, along with systemic **inflammation**.²⁵⁻³⁰

If we are to guard against the ravages of **immune senescence**, we need to increase our numbers of **naïve cells** (“virgin” immune cells), while reducing numbers of senile **memory cells**.



WHAT YOU NEED TO KNOW

Immune Senescence

- Around age 60, physiological changes decimate our ability to combat infections and malignancies.
- Immune senescence is a leading cause of disability and death in aging humans.
- Most **Life Extension®** customers take nutrients that boost immune activity, including zinc, DHEA and fish oil.
- Immune imbalance occurs when our immune system fails to protect against new infections and instead generates inflammatory reactions (including increased IL-6) that attack every cell in our body.
- The herb **Cistanche** helps combat immune senescence, which appears to have rejuvenating effects on bone marrow.
- Supplementation with **Cistanche** has been shown to increase **naïve T cells** and **natural killer (NK) cells** while decreasing **memory T cells** and pro-inflammatory **IL-6**.

Protecting against Immune Senescence

Most **Life Extension®** customers take nutrients that exert beneficial effects on immune activity.

Zinc and **DHEA** partially restore **thymus function**, which is vital to transforming bone-marrow-derived immune cells into activated **T cells**.³¹⁻³⁵

DHEA and **fish oil** help suppress deadly **interleukin-6**.³⁶⁻⁴¹

An advance in combatting **immune senescence** is an herb called **Cistanche**. This medicinal plant has been used extensively in China to treat the “**ailments of aging**.”⁴²

Supplementation with **Cistanche** has been shown to increase **naïve T cells** and **natural killer (NK) cells** while decreasing **memory T cells** and pro-inflammatory **interleukin-6**.⁴³

A prime cause of the severe immune dysfunction suffered by the elderly is a marked decrease in **naïve T cells**⁴⁴⁻⁴⁶ and functional **natural killer cells**,⁴⁷⁻⁴⁹ with a concomitant increase in **memory T cells**.^{50,51}

Cistanche counteracts these pathological trends that characterize **immune senescence**.⁴³

How *Cistanche* Boosts T Cell Production and Healthy Longevity

Cistanche helps restore **progenitors** of peripheral **naïve T cells**, which explains the increase seen in these vital **immune cells** in response to **Cistanche**.⁴³

Animals supplemented with **Cistanche** have increased **lifespans**, which would be expected from a compound that counteracts **immune senescence**.⁴³

Cistanche is one of the most popular Chinese herbal medicines and is listed in the Chinese herbal pharmacopeias as having “**anti-aging**” properties.

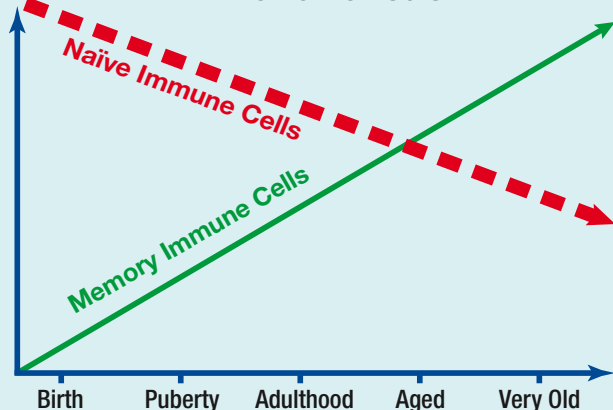
One reason Chinese physicians see such impressive therapeutic results is that **Cistanche** restores one of the most prominent **bone marrow** biomarkers of **immune cell** formation called **stem cell antigen-1**.⁴³

Senile **bone marrow** loses its ability to produce fresh, **naïve immune cells**, which are launched into the bloodstream to differentiate into mature **naïve T** and **natural killer cells**.

Bone marrow **stem cell antigen-1** represents the body’s main source of **naïve T cells** in the blood.⁴³

Cistanche appears to have a rejuvenating effect on the bone marrow, something that is generally available only through expensive recombinant drugs.⁵²⁻⁵⁴

Age-Related Decline in Immune Function

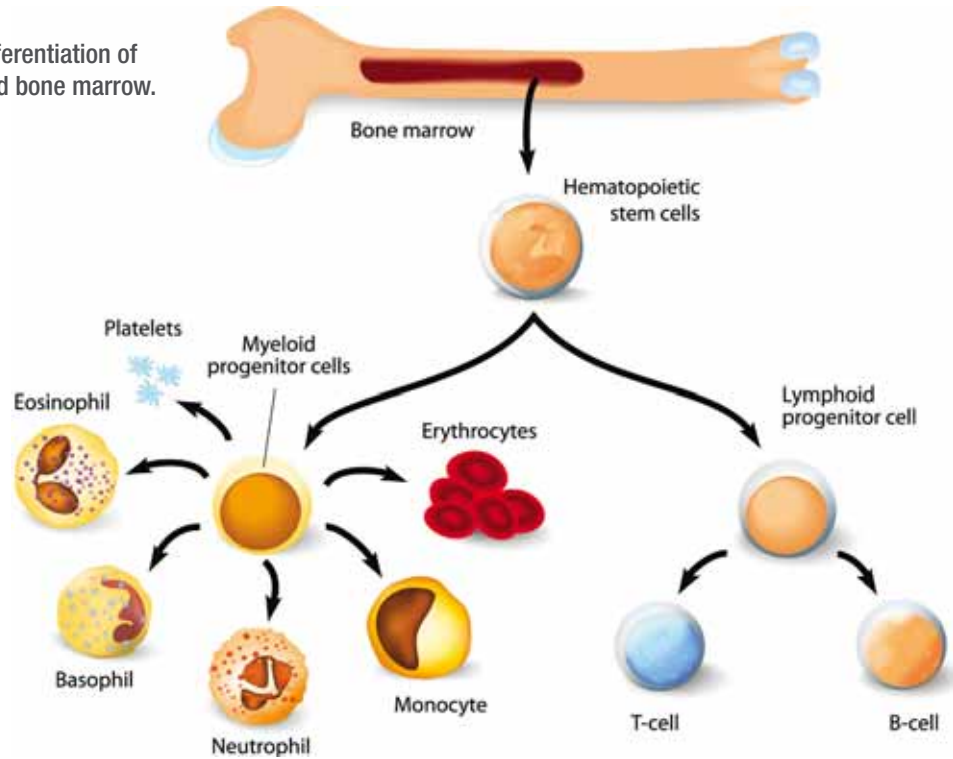


In youth we enjoy abundant **naïve T cell** populations that stand ready to destroy new bacteria, viruses, and cancers.

Once a **naïve** immune cell does its job, it converts to a **memory T cell** that responds only to the same bacteria, virus, etc. Aging results in excess memory cells that emit **inflammatory** signals, while depriving the body of vital **naïve cells** to fight new invaders and malignancies.



Blood cell formation from differentiation of hematopoietic stem cells in red bone marrow.



The beneficial impact of **Cistanche** was demonstrated in an open-label, pilot trial of elderly people. This study combined a low dose of **Cistanche (100 mg)** with zinc, vitamin E, vitamin B6, fucoidan, and coenzyme Q10. Not only were markers of **immune senescence** reversed, but the test subjects reported improvements in **quality of life**, such as not “**feeling tired all the time**.”

This makes sense in light of the multiple adverse effects **immune senescence** inflicts on the body, which include increased levels of **frailty**.⁵⁵

Cistanche represents an opportunity to restore vital components of our aging immune systems. Its low cost makes it readily affordable.

Suppressing Deadly Impact of IL-6

One way of describing “aging” is that beneficial factors (such as **naïve T cell** production) decrease while detrimental ones (like **interleukin-6**) increase.

IL-6 levels are especially high in patients with autoimmune conditions in which an out-of-control immune system attacks one’s own tissues.

High-serum **IL-6**, as seen in **rheumatoid arthritis**, for instance, is regarded as a reliable biomarker of high-grade **inflammation**.⁵⁶⁻⁵⁸

When it comes to “normal” aging, elevated **IL-6** contributes to the destruction of bone, heart valves, neurons, and other tissues.

The DNA damage that IL-6 inflicts accelerates aging processes and malignant transformation of healthy cells.⁵⁹⁻⁶⁵

Life Extension® has published a number of articles about the critical need for aging humans to suppress chronic inflammatory inducers like **interleukin-6**.

As will be described in the article on page 58, a low-cost **tea extract** has demonstrated the ability to reduce **IL-6**.

When this **tea extract** by itself was given to 90 patients (30–65 years old) with **metabolic syndrome**, the following reductions in **inflammatory** markers were observed:⁶⁶

- **C-reactive protein (CRP)** was reduced by **26%**
- **Tumor necrosis factor (TNF-a)** was reduced by **23%**
- **Interleukin-6 (IL-6)** was reduced by **21%**

In addition to suppressing **IL-6** and other inflammatory factors, this **tea extract** was shown to favorably alter genes (such as mutant p53) involved in tumor cell growth.⁶⁷



Making Major Strides... but Not Fast Enough

For the past five years, significant resources have been expended to initiate studies aimed at counteracting age-related disease.

Scientific studies document how certain nutrients that **Life Extension®** supporters have taken for decades (like DHEA and zinc) help protect against immune decline, while guarding against chronic inflammatory factors.⁶⁸⁻⁷³

Consumers have access to an arsenal of novel compounds to help counteract the underlying factors that characterize **immune senescence**.

An impressive array of clinical research is being investigated to induce systemic **age reversal** in elderly people, including restoration of **youthful immune function**.

The carnage inflicted by dysfunctional immunity in the **elderly** mandates that research accelerate faster, so that more lives can be saved. •

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

References

1. Available at: <https://www.lifeextension.com/magazine/2016/1/when-immune-function-falls-off-a-cliff>. Accessed April 5, 2020.
2. Available at: <http://onlinelibrary.wiley.com/doi/10.1046/j.1365-2567.2002.01447.x/epdf>. Accessed April 5, 2020.
3. Scheller J, Chalaris A, Schmidt-Arras D, et al. The pro- and anti-inflammatory properties of the cytokine interleukin-6. *Biochim Biophys Acta*. 2011 May;1813(5):878-88.
4. Harris TB, Ferrucci L, Tracy RP, et al. Associations of elevated interleukin-6 and C-reactive protein levels with mortality in the elderly. *Am J Med*. 1999 May;106(5):506-12.
5. Hubbard RE, O'Mahony MS, Savva GM, et al. Inflammation and frailty measures in older people. *J Cell Mol Med*. 2009 Sep;13(9B):3103-9.
6. Ershler WB, Keller ET. Age-associated increased interleukin-6 gene expression, late-life diseases, and frailty. *Annu Rev Med*. 2000;51:245-70.
7. Maggio M, Guralnik JM, Longo DL, et al. Interleukin-6 in aging and chronic disease: a magnificient pathway. *J Gerontol A Biol Sci Med Sci*. 2006 Jun;61(6):575-84.
8. Franceschi C, Olivieri F, Marchegiani F, et al. Genes involved in immune response/inflammation, IGF1/insulin pathway and response to oxidative stress play a major role in the genetics of human longevity: the lesson of centenarians. *Mech Ageing Dev*. 2005 Feb;126(2):351-61.
9. Simpson EE, Hodgkinson CF, Maylor EA, et al. Intracellular cytokine production and cognition in healthy older adults. *Psychoneuroendocrinology*. 2013 Oct;38(10):2196-208.
10. Available at: <https://www.sens.org/wp-content/uploads/2019/05/SENS-Research-Foundation-2019-Annual-Report.pdf>. Accessed April 5, 2020.
11. High KP, Akbar AN, Nikolich-Zugich J. Translational research in immune senescence: assessing the relevance of current models. *Semin Immunol*. 2012 Oct;24(5):373-82.
12. Shivshankar P, Boyd AR, Le Saux CJ, et al. Cellular senescence increases expression of bacterial ligands in the lungs and is positively correlated with increased susceptibility to pneumococcal pneumonia. *Aging Cell*. 2011 Oct;10(5):798-806.
13. Available at: <http://www.lifeextension.com/magazine/2015/2/major-advance-in-slowing-aging/page-01>. Accessed April 5, 2020.
14. Available at: <http://www.lifeextension.com/Magazine/2015/1/Activate-Your-Natural-Killer-Cells/Page-01>. Accessed April 5, 2020.
15. Available at: <http://www.lifeextension.com/Magazine/2015/1/How-Immune-Decline-Hastens-Aging/Page-01>. Accessed April 5, 2020.

16. Available at: <http://www.cdc.gov/nchs/data/ahcdagingtrends/01death.pdf>. Accessed April 5, 2020.
17. Bartling B. Cellular senescence in normal and premature lung aging. *Z Gerontol Geriatr*. 2013 Oct;46(7):613-22.
18. Glennie SJ, Sepako E, Mzinza D, et al. Impaired CD4 T cell memory response to *Streptococcus pneumoniae* precedes CD4 T cell depletion in HIV-infected Malawian adults. *PLoS One*. 2011;6(9):e25610.
19. Hernandez-Vargas EA, Wilk E, Canini L, et al. Effects of aging on influenza virus infection dynamics. *J Virol*. 2014 Apr;88(8):4123-31.
20. Zhou X, McElhaney JE. Age-related changes in memory and effector T cells responding to influenza A/H3N2 and pandemic A/H1N1 strains in humans. *Vaccine*. 2011 Mar 3;29(11):2169-77.
21. Opal SM, Girard TD, Ely EW. The immunopathogenesis of sepsis in elderly patients. *Clin Infect Dis*. 2005 Nov 15;41 Suppl 7:S504-12.
22. Vollmar B, Pradarutti S, Nickels RM, et al. Age-associated loss of immunomodulatory protection by granulocyte-colony stimulating factor in endotoxic rats. *Shock*. 2002 Oct;18(4):348-54.
23. Available at: <http://www.ncbi.nlm.nih.gov/books/NBK27090/>. Accessed April 5, 2020.
24. Weinberger B, Herndler-Brandstetter D, Schwanninger A, et al. Biology of immune responses to vaccines in elderly persons. *Clin Infect Dis*. 2008 Apr 1;46(7):1078-84.
25. Wehrens EJ, Prakken BJ, van Wijk F. T cells out of control--impaired immune regulation in the inflamed joint. *Nat Rev Rheumatol*. 2013 Jan;9(1):34-42.
26. Nakajima T, Schulte S, Warrington KJ, et al. T-cell-mediated lysis of endothelial cells in acute coronary syndromes. *Circulation*. 2002 Feb 5;105(5):570-5.
27. Terrazzini N, Bajwa M, Vita S, et al. A novel cytomegalovirus-induced regulatory-type T-cell subset increases in size during older life and links virus-specific immunity to vascular pathology. *J Infect Dis*. 2014 May 1;209(9):1382-92.
28. Olson NC, Doyle MF, Jenny NS, et al. Decreased naive and increased memory CD4(+) T cells are associated with subclinical atherosclerosis: the multi-ethnic study of atherosclerosis. *PLoS One*. 2013;8(8):e71498.
29. Ammirati E, Cianflone D, Vecchio V, et al. Effector Memory T cells Are Associated With Atherosclerosis in Humans and Animal Models. *J Am Heart Assoc*. 2012 Feb;1(1):27-41.
30. Dumitriu IE, Araguas ET, Baboonian C, et al. CD4+ CD28 null T cells in coronary artery disease: when helpers become killers. *Cardiovasc Res*. 2009 Jan 1;81(1):11-9.
31. Filipin Mdel V, Caetano LC, Brazao V, et al. DHEA and testosterone therapies in *Trypanosoma cruzi*-infected rats are associated with thymic changes. *Res Vet Sci*. 2010 Aug;89(1):98-103.
32. May M, Holmes E, Rogers W, et al. Protection from glucocorticoid induced thymic involution by dehydroepiandrosterone. *Life Sci*. 1990;46(22):1627-31.
33. Mitchell WA, Meng I, Nicholson SA, et al. Thymic output, ageing and zinc. *Biogerontology*. 2006 Oct-Dec;7(5-6):461-70.
34. Wong CP, Song Y, Elias VD, et al. Zinc supplementation increases zinc status and thymopoiesis in aged mice. *J Nutr*. 2009 Jul;139(7):1393-7.
35. Dardenne M, Boukaiba N, Gagnerault MC, et al. Restoration of the thymus in aging mice by in vivo zinc supplementation. *Clin Immunol Immunopathol*. 1993 Feb;66(2):127-35.
36. Maes M, Christophe A, Bosmans E, et al. In humans, serum polyunsaturated fatty acid levels predict the response of proinflammatory cytokines to psychologic stress. *Biol Psychiatry*. 2000 May 15;47(10):910-20.
37. Khalfoun B, Thibault F, Watier H, et al. Docosahexaenoic and eicosapentaenoic acids inhibit in vitro human endothelial cell production of interleukin-6. *Adv Exp Med Biol*. 1997;400B:589-97.
38. Moon Y, Pestka JJ. Deoxynivalenol-induced mitogen-activated protein kinase phosphorylation and IL-6 expression in mice suppressed by fish oil. *J Nutr Biochem*. 2003 Dec;14(12):717-26.
39. Shi Y, Pestka JJ. Mechanisms for suppression of interleukin-6 expression in peritoneal macrophages from docosahexaenoic acid-fed mice. *J Nutr Biochem*. 2009 May;20(5):358-68.
40. Araghi-Niknam M, Zhang Z, Jiang S, et al. Cytokine dysregulation and increased oxidation is prevented by dehydroepiandrosterone in mice infected with murine leukemia retrovirus. *Proc Soc Exp Biol Med*. 1997 Dec;216(3):386-91.
41. Liu S, Ishikawa H, Li FJ, et al. Dehydroepiandrosterone can inhibit the proliferation of myeloma cells and the interleukin-6 production of bone marrow mononuclear cells from patients with myeloma. *Cancer Res*. 2005 Mar 15;65(6):2269-76.
42. Jiang Y, Tu PF. Analysis of chemical constituents in *Cistanche species*. *J Chromatogr A*. 2009 Mar 13;1216(11):1970-9.
43. Zhang K, Ma X, He W, et al. Extracts of *Cistanche deserticola* Can Antagonize Immunosenescence and Extend Life Span in Senescence-Accelerated Mouse Prone 8 (SAM-P8) Mice. *Evid Based Complement Alternat Med*. 2014;2014:601383.
44. Pfister G, Weiskopf D, Lazuardi L, et al. Naive T cells in the elderly: are they still there? *Ann N Y Acad Sci*. 2006 May;1067:152-7.
45. Ferrando-Martinez S, Ruiz-Mateos E, Hernandez A, et al. Age-related deregulation of naive T cell homeostasis in elderly humans. *Age (Dordr)*. 2011 Jun;33(2):197-207.
46. Fagnoni FF, Vescovini R, Passeri G, et al. Shortage of circulating naive CD8(+) T cells provides new insights on immunodeficiency in aging. *Blood*. 2000 May 1;95(9):2860-8.



47. Camous X, Pera A, Solana R, et al. NK cells in healthy aging and age-associated diseases. *J Biomed Biotechnol*. 2012;2012:195956.
48. Beli E, Duriancik DM, Clinthorne JF, et al. Natural killer cell development and maturation in aged mice. *Mech Ageing Dev*. 2014 Jan;135:33-40.
49. Hazeldine J, Lord JM. The impact of ageing on natural killer cell function and potential consequences for health in older adults. *Ageing Res Rev*. 2013 Sep;12(4):1069-78.
50. Kovaiov RD, Weiskirchner I, Keller M, et al. Age-related differences in phenotype and function of CD4+ T cells are due to a phenotypic shift from naive to memory effector CD4+ T cells. *Int Immunol*. 2005 Oct;17(10):1359-66.
51. Wikby A, Maxson P, Olsson J, et al. Changes in CD8 and CD4 lymphocyte subsets, T cell proliferation responses and non-survival in the very old: the Swedish longitudinal OCTO-immune study. *Mech Ageing Dev*. 1998 May 15;102(2-3):187-98.
52. Liang HD, Yu F, Tong ZH, et al. Cistanches Herba aqueous extract affecting serum BGP and TRAP and bone marrow Smad1 mRNA, Smad5 mRNA, TGF-beta1 mRNA and TIEG1 mRNA expression levels in osteoporosis disease. *Mol Biol Rep*. 2013 Feb;40(2):757-63.
53. Zeng JC, Fan YG, Liu JR, et al. [Experimental study of directional differentiation of bone mesenchymal stem cells (BMSCs) to osteoblasts guided by serum containing cistanche deserticola]. *Zhongguo Gu Shang*. 2010 Aug;23(8):606-8.
54. Liang H, Yu F, Tong Z, et al. Effect of Cistanches Herba aqueous extract on bone loss in ovariectomized rat. *Int J Mol Sci*. 2011;12(8):5060-9.
55. van den Biggelaar AH, Huizinga TW, de Craen AJ, et al. Impaired innate immunity predicts frailty in old age. The Leiden 85-plus study. *Exp Gerontol*. 2004 Sep;39(9):1407-14.
56. Ishihara K, Hirano T. IL-6 in autoimmune disease and chronic inflammatory proliferative disease. *Cytokine Growth Factor Rev*. 2002 Aug-Oct;13(4-5):357-68.
57. Yao X, Huang J, Zhong H, et al. Targeting interleukin-6 in inflammatory autoimmune diseases and cancers. *Pharmacol Ther*. 2014 Feb;141(2):125-39.
58. Nowell MA, Williams AS, Carty SA, et al. Therapeutic targeting of IL-6 trans signaling counteracts STAT3 control of experimental inflammatory arthritis. *J Immunol*. 2009 Jan 1;182(1):613-22.
59. Rodier F, Coppe JP, Patil CK, et al. Persistent DNA damage signaling triggers senescence-associated inflammatory cytokine secretion. *Nat Cell Biol*. 2009 Aug;11(8):973-9.
60. Freund A, Orjalo AV, Desprez PY, et al. Inflammatory networks during cellular senescence: causes and consequences. *Trends Mol Med*. 2010 May;16(5):238-46.
61. Wei H, Chadman KK, McCloskey DP, et al. Brain IL-6 elevation causes neuronal circuitry imbalances and mediates autism-like behaviors. *Biochim Biophys Acta*. 2012 Jun;1822(6):831-42.
62. Quintanilla RA, Orellana DI, Gonzalez-Billault C, et al. Interleukin-6 induces Alzheimer-type phosphorylation of tau protein by deregulating the cdk5/p35 pathway. *Exp Cell Res*. 2004 Apr 15;295(1):245-57.
63. Mahler GJ, Farrar EJ, Butcher JT. Inflammatory cytokines promote mesenchymal transformation in embryonic and adult valve endothelial cells. *Arterioscler Thromb Vasc Biol*. 2013 Jan;33(1):121-30.
64. Mathieu P, Bouchareb R, Boulanger MC. Innate and Adaptive Immunity in Calcific Aortic Valve Disease. *J Immunol Res*. 2015;2015:851945.
65. Ishimi Y, Miyaura C, Jin CH, et al. IL-6 is produced by osteoblasts and induces bone resorption. *J Immunol*. 1990 Nov 15;145(10):3297-303.
66. Chu SL, Fu H, Yang JX, et al. A randomized double-blind placebo-controlled study of Pu'er tea extract on the regulation of metabolic syndrome. *Chin J Integr Med*. 2011 Jul;17(7):492-8.
67. Zhao L, Jia S, Tang W, et al. Pu-erh tea inhibits tumor cell growth by down-regulating mutant p53. *Int J Mol Sci*. 2011;12(11):7581-93.
68. Prasad AS. Zinc: an antioxidant and anti-inflammatory agent: role of zinc in degenerative disorders of aging. *J Trace Elem Med Biol*. 2014 Oct;28(4):364-71.
69. Wong CP, Ho E. Zinc and its role in age-related inflammation and immune dysfunction. *Mol Nutr Food Res*. 2012 Jan;56(1):77-87.
70. Haase H, Rink L. The immune system and the impact of zinc during aging. *Immun Ageing*. 2009 Jun 12;6:9.
71. Lichte P, Pfeifer R, Werner BE, et al. Dehydroepiandrosterone modulates the inflammatory response in a bilateral femoral shaft fracture model. *Eur J Med Res*. 2014 May 19;19:27.
72. Available at: <http://www.lifeextension.com/Magazine/2002/1/aws/ Page-01>. Accessed April 5, 2020.
73. Available at: http://www.lifeextension.com/Magazine/2001/8/report_dhea/ Page-02. Accessed April 5, 2020.



DEFEND YOUR HEALTH

Item #01713 • 5,000 IU • 60 softgels

1 bottle **\$7.50**

4 bottles \$6.50 each

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

VITAMIN D3

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



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



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

'C' TO THE MAX

Humans don't manufacture **vitamin C** internally, so it must be obtained through dietary sources or supplements.

Vitamin C is water soluble and needs to be constantly replenished.*

A highly **absorbable** form of **quercetin** complements vitamin C's activity in the body.

Each tablet provides **1,000 mg** of **vitamin C** and **15 mg** of **Bio-Quercetin Phytosome**.

Item #02227 • 250 vegetarian tablets

1 bottle **\$22.50** *

* Limited Supplies Available. One bottle will be initially shipped with the balance to follow upon our re-supply.

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



* PLoS Med. 2005 Sep;2(9):e307;author reply e309.

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.

Maintain Healthy **IMMUNE** FUNCTION

Cistanche: an ancient herb that has been used for thousands of years as a tonic to support health and promote longevity.¹

Scientists have identified *Cistanche* as rich in **echinacosides** which promote *increased* development of **T cells** and **natural killer cells**.^{1,2}

A 12-week **human study** using ***Cistanche* extract** found impressive results in immune function.²

Cistanche helps support an already healthy inflammatory response and inhibit **immune senescence**.³

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

Note: The same dose of standardized *Cistanche* can also be found in the Immune Senescence Protection Formula that also provides Reishi mushroom and Pu-erh tea extracts.

References 1. *Front Pharmacol.* 2016 Sep 20;7:289.
2. *Anti-Aging Medicine.* 2011;8(2):7-14.
3. *Evid Based Complement Alternat Med.* 2014;2014:601383.



Item # 01906
30 Vegetarian Capsules
1 bottle \$15
.....
4 bottles \$12 each





DHEA *Promotes* Quality of Life

BY STEPHANIE MYERS

DHEA is one of the most abundant hormones in the bloodstream.

With age, DHEA levels decline.¹

From a high point in our 20s, DHEA levels fall by **80%-90%** by the time we hit 80 years old.²

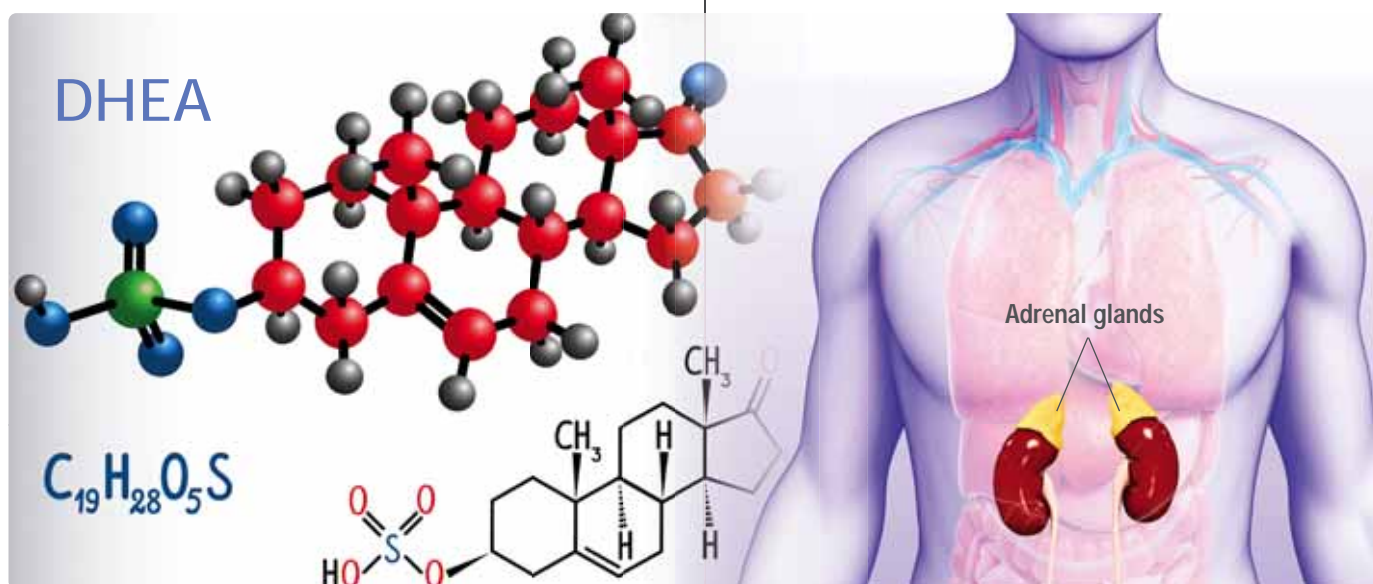
This loss has been associated with loss of function and increased risk for disease. It impacts quality of life and longevity.³⁻⁷

Back in 1981, **Life Extension**® recommended the hormone DHEA as a strategy to slow aging. There are now hundreds of published papers substantiating DHEA's youth-promoting properties.

DHEA has become a popular **anti-aging** supplement.

One landmark study that followed older men for 12 years found that an increase of **100 ug/dL** of DHEA-S circulating in the blood was associated with a **reduced risk of death from any cause by 36%**.³

A simple **blood test** can identify DHEA status in men and women. Taking oral **DHEA** capsules can restore **youthful** levels.



What Is DHEA?

Dehydroepiandrosterone (DHEA) is a **hormone** derived from cholesterol and pregnenolone.

It's produced by the adrenal glands, located just above the kidneys, and in smaller amounts in the testes in males and the ovaries in females.

DHEA acts as a **precursor**—the starting material—for production of the sex hormones testosterone and estrogen.

It also has direct hormonal effects of its own throughout the body.

Impact on the Sex Hormones

The adrenal glands, testes, and ovaries *need* DHEA to produce adequate **testosterone** and **estrogen**.

As DHEA levels drop with age, less testosterone and estrogen are produced.

Low levels of these sex hormones contribute to loss of vitality and eventual **frailty** in older men and women.

Lower DHEA levels are tied to other health problems and a diminished quality of life.

In older men, **low** testosterone results in erectile dysfunction, a drop in libido, loss of muscle mass and bone density, a tendency towards depression, and slowing brain function.^{4,8,9}

In older women, **low** estrogen levels are associated with a loss of libido, along with hot flashes, mood swings, fatigue, headaches, thinning of the bones, and risk for bone fractures.^{10,11}

By *increasing* DHEA levels, we help provide the body with some of the raw material it requires to produce the testosterone and estrogen.

But DHEA is not always the optimal way for men to boost **testosterone** or women to increase estrogen.

In men, DHEA can convert to **estrogen**, which is good for men with low estrogen that is not in the optimal range of **20 pg/mL-30 pg/mL**. Men need enough estrogen to protect against **osteoporosis**, but not so much that it increases **cardiovascular** risks.

This is why **blood testing** is so important for men to achieve **optimal** estradiol (an estrogen) levels of **20 pg/mL-30 pg/mL**.

In women, DHEA more often cascades into testosterone, which can be beneficial for aging women with deficient testosterone that can diminish sexual functions. It can be challenging for menopausal women to fully restore estrogen levels with DHEA alone.

In general, as **men** age, DHEA tends to increase estrogen more than testosterone. The opposite happens for **women**, whereby DHEA tends to increase testosterone more than estrogen.

This is one reason why women often only need **15 mg** a day of **DHEA** to achieve optimal levels, whereas aging men usually require about **25 mg** of supplemental **DHEA** a day.

However, the direction DHEA goes is influenced by genetics, diet, lifestyle and visceral fat levels. The best way for an individual to assess if DHEA is going more toward testosterone or estrogen is through blood tests that measure levels of **DHEA**, **testosterone** and **estradiol**.

Systemic Effects of DHEA

Although DHEA helps produce sex hormones, it also has a widespread, direct impact on tissues throughout the body.

Low levels of DHEA have been tied to premature aging and shortened lifespan, along with an *increased risk for*:^{2-5,7,10,12-17}

- Cognitive decline and dementia,
- Cardiovascular disease,
- Osteoporosis and bone fractures,
- Depression,
- Sexual dysfunction,
- Inflammation and inflammatory disorders, and
- Frailty.

Maintaining normal, youthful levels of DHEA into older age may help fend off the problems associated with low DHEA.

Increasing DHEA Levels

DHEA levels peak between ages 20 and 30, then decline at a rate of roughly **5% every year**.¹⁸

One effective way to raise DHEA levels in the blood in older adults is by taking **oral DHEA**.

As with any hormone, excess levels of DHEA are not desirable.

A simple blood test called **DHEA-S** can assess current levels. The results can then be used as a guide to determine how much oral DHEA is needed to achieve youthful levels.

For women, an ideal DHEA-S blood level is **275 ug/dL-400 ug/dL**. For men, it's **350 ug/dL-500 ug/dL**.

Most older people can achieve optimal results by taking **15 mg-50 mg** of DHEA daily.

WHAT YOU NEED TO KNOW

Keeping Youthful with DHEA

- **Dehydroepiandrosterone (DHEA)** is a hormone produced primarily in the adrenal glands, testes, and ovaries.
- It's needed by the body to produce the sex hormones **testosterone** and **estrogen**.
- DHEA also has many health-promoting effects of its own, directly impacting many bodily functions.
- Levels of DHEA drop as much as **80%-90%** by later adulthood, declining in parallel with our vitality and health.
- These low levels are associated with increased risk of disease, diminished quality of life, frailty, and shortened lifespan.
- Blood testing for DHEA can identify low levels and help guide proper oral intake to attain more youthful levels.
- Most older people can achieve optimal, youthful levels by taking **15 mg-50 mg** of DHEA daily.



Quality of Life

The impact of *higher* DHEA levels can be dramatic.

A recent study assessed the relationship between DHEA and **quality of life**, using the World Health Organization Quality of Life Scale.^{7,19}

The researchers found that in adults of various ages, *higher* DHEA levels corresponded to *better* results in three areas of the scale:

- **Physical health**, including levels of energy and fatigue, pain and discomfort, and sleep and rest,
- **Social relations**, including quality of personal relationships and sexual activity, and
- **Environmental dimensions**, including participation in recreation and leisure activities.

Those with higher DHEA also had better **working memory**, the ability to hold and use information in the short term, which is an important marker of cognitive function.

Other studies have reported similar findings related to cognitive function.

For example, one recent study found *lower* levels of DHEA-S in patients with **Alzheimer's disease**, compared to those with normal brain function.¹⁵

Improving Sexual Function

Many people consider a waning libido and diminished sexual function to be a normal part of aging. Studies of DHEA show that these signs of decline are closely associated with the age-related decline in levels of DHEA.

Studies have demonstrated that age-related *decline* in DHEA is associated with erectile dysfunction in men⁴ along with a drop in libido, ability to reach orgasm, and sexual frequency.²⁰

In women and men, *higher* levels of DHEA are associated with *improved* sexual function, including arousal, libido, ability to orgasm, and sexual frequency.^{20,21}

DHEA and Longevity

DHEA's impact goes far beyond quality-of-life issues.

Low levels are associated with increased risk for several disorders of older age, including cardiovascular disease, inflammatory disorders, and metabolic disorders.^{2-5,14,16}

Maintaining youthful levels of DHEA could help ward off these diseases, leading to a longer and healthier life.

Aside from its impact on disease, DHEA has also demonstrated an association with **longevity**.

Blood levels of DHEA correlate with longevity in primates.²²





This appears to be done by activating various “housekeeping” responses that keep tissues youthful and functioning optimally, thus maintaining balance in the body, supporting a healthy immune system, and improving resistance to the development of cancer.

In humans, studies have shown that *lower* levels of DHEA are predictive of **earlier death**.^{5,6,23-27}

For example, a study published in the *New England Journal of Medicine* followed older men for 12 years.³ It found that those with *lower* levels of DHEA-S were more likely to die from cardiovascular causes than those with *higher* levels.

The same study found that an increase of **100 ug/dL** in DHEA-S reduced the risk of death **from any cause** by **36%**.

Many other studies have reported similar findings.^{5,6,23-27}

One study took a different approach, tracking DHEA levels **over time** in older individuals.²⁴ It found that those people whose levels dropped at a *faster* rate were at greater risk of death than those whose levels declined at a slower rate.

In fact, the steeper downward trajectory was associated with a **75%** greater likelihood of death.

Tracking DHEA levels over time may give a better picture of overall health and identify those individuals who are most in need of taking oral DHEA to get back to youthful levels.

Life Extension® suggests checking **DHEA-S** levels as part of people’s yearly battery of lab tests.

Summary

DHEA is a vital hormone needed to produce testosterone and estrogen. It also has many direct health-promoting effects throughout the body.

Its levels drop dramatically in older age.

Many quality-of-life factors that deteriorate with age, such as sexual function, mood, cognitive function, and physical health, are associated with low DHEA levels.

Decreased DHEA levels are correlated with risk for age-related disorders and overall mortality.

Blood testing can help identify individuals with low levels and guide how much oral DHEA intake is needed to restore youthful levels, to help ward off aging and a diminished quality of life.

Note: Concerns have been raised regarding DHEA supplementation and hormone-sensitive cancers. To date, no study has convincingly shown an increased risk of hormone-dependent cancer in people supplementing with DHEA. As always, anyone with a medical condition should consult their doctor before beginning a new supplement or medication. •

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. Rutkowski K, Sowa P, Rutkowska-Talipska J, et al. Dehydroepiandrosterone (DHEA): hypes and hopes. *Drugs*. 2014 Jul;74(11):1195-207.
2. Samaras N, Samaras D, Frangos E, et al. A review of age-related dehydroepiandrosterone decline and its association with well-known geriatric syndromes: is treatment beneficial? *Rejuvenation Res*. 2013 Aug;16(4):285-94.
3. Barrett-Connor E, Khaw KT, Yen SS. A prospective study of dehydroepiandrosterone sulfate, mortality, and cardiovascular disease. *N Engl J Med*. 1986 Dec 11;315(24):1519-24.
4. El-Sakka AI. Dehydroepiandrosterone and Erectile Function: A Review. *World J Mens Health*. 2018 Sep;36(3):183-91.
5. Ohlsson C, Labrie F, Barrett-Connor E, et al. Low serum levels of dehydroepiandrosterone sulfate predict all-cause and cardiovascular mortality in elderly Swedish men. *J Clin Endocrinol Metab*. 2010 Sep;95(9):4406-14.
6. Phillips AC, Carroll D, Gale CR, et al. Cortisol, DHEA sulphate, their ratio, and all-cause and cause-specific mortality in the Vietnam Experience Study. *Eur J Endocrinol*. 2010 Aug;163(2):285-92.
7. Chen CY, Wu CC, Huang YC, et al. Gender differences in the relationships among neurosteroid serum levels, cognitive function, and quality of life. *Neuropsychiatr Dis Treat*. 2018;14:2389-99.
8. Leifke E, Gorenol V, Wichers C, et al. Age-related changes of serum sex hormones, insulin-like growth factor-1 and sex-hormone binding globulin levels in men: cross-sectional data from a healthy male cohort. *Clin Endocrinol (Oxf)*. 2000 Dec;53(6):689-95.
9. Laughlin GA, Barrett-Connor E, Bergstrom J. Low serum testosterone and mortality in older men. *J Clin Endocrinol Metab*. 2008 Jan;93(1):68-75.
10. Khosla S, Riggs BL, Robb RA, et al. Relationship of volumetric bone density and structural parameters at different skeletal sites to sex steroid levels in women. *J Clin Endocrinol Metab*. 2005 Sep;90(9):5096-103.
11. Available at: <https://www.menopause.org/for-women/sexual-health-menopause-online/changes-at-midlife/changes-in-hormone-levels>. Accessed April 20, 2020.
12. Aldred S, Mecocci P. Decreased dehydroepiandrosterone (DHEA) and dehydroepiandrosterone sulfate (DHEAS) concentrations in plasma of Alzheimer's disease (AD) patients. *Arch Gerontol Geriatr*. 2010 Jul-Aug;51(1):e16-8.
13. Amin S, Zhang Y, Sawin CT, et al. Association of hypogonadism and estradiol levels with bone mineral density in elderly men from the Framingham study. *Ann Intern Med*. 2000 Dec 19;133(12):951-63.
14. Lois K, Kassl E, Prokopiou M, et al. Adrenal Androgens and Aging. In: Feingold KR, Anawalt B, Boyce A, et al., editors. *Endotext*. South Dartmouth (MA)2000.
15. Pan X, Wu X, Kaminga AC, et al. Dehydroepiandrosterone and Dehydroepiandrosterone Sulfate in Alzheimer's Disease: A Systematic Review and Meta-Analysis. *Front Aging Neurosci*. 2019;11:61.
16. Savineau JP, Marthan R, Dumas de la Roque E. Role of DHEA in cardiovascular diseases. *Biochem Pharmacol*. 2013 Mar 15;85(6):718-26.
17. Zaluska M, Janota B. [Dehydroepiandrosteron (DHEA) in the mechanisms of stress and depression]. *Psychiatr Pol*. 2009 May-Jun;43(3):263-74.
18. Available at: https://www.health.harvard.edu/newsletter_article/DHEA_makes_the_fat_go_away. Accessed April 20, 2020.
19. Available at: https://www.who.int/mental_health/media/en/76.pdf. Accessed April 20, 2020.
20. Peixoto C, Carrilho CG, Barros JA, et al. The effects of dehydroepiandrosterone on sexual function: a systematic review. *Climacteric*. 2017 Apr;20(2):129-37.
21. Kushnir VA, Darmon SK, Barad DH, et al. Effects of dehydroepiandrosterone (DHEA) supplementation on sexual function in premenopausal infertile women. *Endocrine*. 2019 Mar;63(3):632-8.
22. Kroll J. Dehydroepiandrosterone, molecular chaperones and the epigenetics of primate longevity. *Rejuvenation Res*. 2015 Aug 20;18(4):341-6.
23. Berr C, Lafont S, Debuire B, et al. Relationships of dehydroepiandrosterone sulfate in the elderly with functional, psychological, and mental status, and short-term mortality: a French community-based study. *Proc Natl Acad Sci U S A*. 1996 Nov 12;93(23):13410-5.
24. Cappola AR, O'Meara ES, Guo W, et al. Trajectories of dehydroepiandrosterone sulfate predict mortality in older adults: the cardiovascular health study. *J Gerontol A Biol Sci Med Sci*. 2009 Dec;64(12):1268-74.
25. Glei DA, Goldman N. Dehydroepiandrosterone sulfate (DHEAS) and risk for mortality among older Taiwanese. *Ann Epidemiol*. 2006 Jul;16(7):510-5.
26. Jansson JH, Nilsson TK, Johnson O. von Willebrand factor, tissue plasminogen activator, and dehydroepiandrosterone sulphate predict cardiovascular death in a 10 year follow up of survivors of acute myocardial infarction. *Heart*. 1998 Oct;80(4):334-7.
27. Shufelt C, Bretsky P, Almeida CM, et al. DHEA-S levels and cardiovascular disease mortality in postmenopausal women: results from the National Institutes of Health--National Heart, Lung, and Blood Institute (NHLBI)-sponsored Women's Ischemia Syndrome Evaluation (WISE). *J Clin Endocrinol Metab*. 2010 Nov;95(11):4985-92.



BOOST

your
INTERNAL
DEFENSE
against
CELLULAR
STRESS



Young people produce abundant quantities of an internal cell *antioxidant* called **SOD** (superoxide dismutase).

With age, SOD production declines.

SOD Booster provides unique extracts of **aronia** and **melon** that promote the production of **SOD**.

SOD Booster • Item #02361

30 vegetarian capsules

1 bottle **\$21**

4 bottles **\$19 each**



Extramel® is a registered trademark of Bionov.

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

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



Promote *Tear* Production From The *Inside* Out



Item #01918 • 30 vegetarian capsules

1 bottle **\$13.50**

4 bottles \$12 each

Everyday factors can lead to dry, itchy, irritated eyes.

Tear Support with MaquiBright® is a unique oral supplement that supports your body's own tear production for continuous, all-day comfort.

The secret is the maqui berry's rich source of **delphinidins**, a source of support for tear-producing glands. When human subjects took just **60 mg** a day of **maqui berry extract**, there was a **45% increase** in lubricating tear production.^{1,2}

References

1. Food Chem. 2013;139(1-4):129-37.
2. Panminerva Med. 2014;56(3 Suppl 1):1-6.

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



For full product description and to order **Tear Support with MaquiBright®**, 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.

DHEA

FOR ALL NEEDS

DHEA levels markedly decline with age.

DHEA is an important hormone in your body. It supports healthy immune function, mood, sexual function, bone health, cardiovascular health, and more.

Just one 25 mg DHEA capsule restores **DHEA blood levels** to *youthful* ranges.

DHEA 25 mg capsules

Item #00335 • 100 capsules

1 bottle **\$12**

4 bottles **\$11 each**



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

Caution: Consult a physician or licensed, qualified healthcare professional before using these products if you have, or have a family history of, breast cancer, prostate cancer, or other hormone-sensitive diseases.



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.





Natural Approaches to Improve IMMUNE FUNCTION

BY JASON MEYERS

If we are to live longer, healthier lives, we need our immune system to function at peak capacity.

The following **plant-derived** compounds have shown an ability to help rescue the immune system from senescent decline:

- ***Cistanche***
- **Reishi mushrooms**
- **Pu-erh tea**

Together, these natural extracts help combat **immune senescence** by several complementary mechanisms that include enhancing activity of **natural killer cells** and **T cells** and turning down **overactive** immune reactions.

This article describes research supporting the use of low-cost plant extracts to help support immune health.

Reishi Mushroom Extract

The immune-boosting properties of **Reishi mushrooms** have been appreciated in Eastern medicine for thousands of years. Modern science is now validating their health-promoting properties.^{1,2}

Studies show that consuming these mushrooms improves immune function and has anti-tumor effects.²⁻⁹

In mice, **Reishi** has been found to promote the maturation and *activation* of immune system cells such as **T cells**, **natural killer cells**, **dendritic cells**, and **macrophages**.³⁻⁶

Lab studies show that Reishi also helps raise protective **IL-10** levels and lower pro-inflammatory **IL-6** levels.^{10,11}

This indicates that Reishi augments the function of both the **innate** and **adaptive immune system**.

The **innate immune system** can be thought of as the body's first line of defense, responding rapidly to potentially harmful insults such as viruses, bacteria, and cancer cells.

Natural killer cells are an important component of this innate immunity.¹²⁻¹⁷ The diminished activity of **natural killer cells** that occurs with aging predisposes the elderly to high rates of infection by viruses ranging from influenza to various herpes viruses.¹⁶⁻²¹

The **adaptive immune system** responds more slowly than the innate immune system but mounts a more specific, powerful attack against pathogens using specialized immune system cells called **T cells**.

With its ability to boost components of both **innate** and **adaptive** immunity, **Reishi** can protect the aging body from infections. This benefit has been borne out in laboratory studies demonstrating activity against many common viruses, including:

- Herpes simplex viruses—which cause oral and genital herpes²²
- Influenza viruses—which cause the flu²³
- Epstein-Barr virus—which causes mononucleosis but can also contribute to the formation of cancer^{24,25}
- Hepatitis B virus—a common cause of liver disease that can lead to liver failure^{26,27}
- Human immunodeficiency virus (HIV)—the virus which causes AIDS^{28,29}

Premature Death of Jack LaLanne Likely Caused by Immune Senescence

It is impossible to overstate the magnitude of disability and death that **immune senescence** inflicts on aging human populations. When you hear a person died from “**old age**,” in almost every instance the underlying culprit is a **dysfunctional** immune system that ignites deadly inflammatory fires while failing to protect against infections and malignancies.

No one we know tried to live for over **100 years** more than health pioneer **Jack LaLanne**. He engaged in rigorous lifelong exercise and ate a low-calorie healthy diet. He followed an old-line supplement program probably devoid of **vitamin K** and **DHEA**, which may have contributed to his premature death at age **96**.

Jack LaLanne died of **pneumonia** following **aortic valve** surgery. Aortic valve stenosis is caused by **calcification**, **chronic inflammation**, and other factors such as elevated **homocysteine**.³¹



Vitamin K prevents **calcification** that is so often the reason why an elderly person's aortic valve fails.³²⁻³⁷ **DHEA** partially protects against **inflammation**.³⁸⁻⁴⁰

Immune senescence may very well have contributed to Jack LaLanne's early demise by crippling his ability to fight off the **pneumonia**, which was the acute cause of his death.

It is difficult to imagine someone as fit and vigorous as **Jack LaLanne** succumbing to **pneumonia**. Yet a dysfunctional **immune system** deprives even the hardiest of us from warding off infections that were easily overcome in our youth.

Clearly, protecting against **immune senescence** is a mandatory component of a longevity program.



Anti-Cancer Properties

In addition to supporting protection from **infection**, Reishi exhibits **anti-cancer** properties as well—largely because of its ability to enhance immune function.

In particular, the boost Reishi gives to **natural killer cell**, **T cell**, and **macrophage function** aids in the identification and destruction of abnormal cells that may develop into **cancer**.^{2,9}

Reishi may also directly combat tumors through an array of mechanisms it has demonstrated in the lab: impairing the ability of tumor cells to grow, preventing tumor blood vessels from developing, starving the abnormal cells, and even directly killing cancer cells.^{2,9}

In one study, Reishi mushrooms were applied to various human cancer cell lines.⁹ Not only did the Reishi reduce the growth of the cells, but it induced cell death in many of the diseased cells.

Lifespan Extension

Perhaps most impressively, Reishi has been shown to significantly **extend lifespan** of mice.³⁰ Researchers followed two groups of mice, one fed a normal control diet and the other fed a diet enriched with a Reishi extract.

The **Reishi** supplemented group lived as much as **148 days longer** than the control group. Given that the lifespan of a mouse is typically less than two years, this represents a dramatic increase in longevity.

WHAT YOU NEED TO KNOW

Boosting the Aging Immune System

- Older age is associated with a decline in immune system function, known as immune senescence.
- Immune senescence increases the risk for infections, cancer, autoimmune disease, and chronic inflammatory conditions.
- Certain plants and fungi have been found to bolster immune system cells and functions, improving immunity.
- Reishi mushrooms, *Cistanche*, and Pu-erh tea have all been shown to improve immune function by various complementary mechanisms.
- Intake of extracts of these plants and fungi may help restore immune function, reducing the risk for infection, cancer, and other conditions for which the elderly are at increased risk.

Cistanche Extract

Cistanche is a type of desert plant that, like Reishi mushrooms, has long been appreciated for its medicinal uses in Eastern medicine.

Several studies have confirmed the ability of *Cistanche* extract to boost immune cells in the body.⁴¹⁻⁴⁴

In one study, researchers utilized a strain of **senescence-accelerated** mice. These mice age more rapidly than normal mice and display the same deterioration in immune function seen in human immune senescence.

The mice fed a diet supplemented with *Cistanche* extract for four weeks had a significantly increased number of **T cells** and **natural killer cells** in the blood, and lower **pro-inflammatory interleukin-6 (IL-6)** levels.

This enhancement in immune function translated to an **extended lifespan** as well. The average age after

supplementation with *Cistanche* was **15%** longer than the controls'.⁴¹

In addition to T cells and natural killer cells, *Cistanche* also helps activate other important immune cells, including macrophages, dendritic cells, and B cells.^{42,43}

Encouraging results have been demonstrated in a human study as well. When elderly subjects took **100 mg** of *Cistanche* extract daily for 12 weeks, there was a **6.1%** increase in **helper T cells** and an almost **12%** increase in **natural killer cell** activity. This increase represents an immune-boosting effect.⁴⁴

Patients also experienced improved markers of vascular function and a decrease in fatigue. No significant adverse effects were observed.

Given that these same improvements in immune function resulted in enhanced longevity in animal studies,

THE IMMUNE SYSTEM

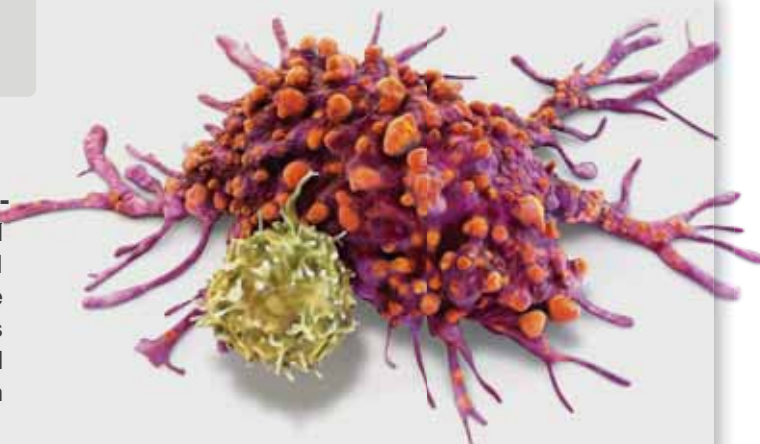
How Our Immune Cells Defend Us

Natural killer cells are the body's **first responders** against viral infections and cancer cells, and play an important role in battling bacterial and fungal infections.¹²⁻¹⁷ The age-related decline in the function of natural killer cells leads to higher rates of many viral, bacterial, and fungal infections—and these infections are more likely to be serious in those with age-related immune senescence.¹⁹⁻²¹

For example, research shows that the common cold (which is caused by a virus) is more frequent in individuals with low natural killer cell function—and conversely, that greater natural killer cell function helps protect against viral outbreaks.¹⁶⁻¹⁸

The decline in natural killer cell activity has also been shown to increase the rates of viral infections, including viruses that cause **influenza** and viruses in the **herpes family**.¹⁹ These include **cytomegalovirus (CMV)**, **Epstein-Barr virus**, **varicella zoster** (which causes chicken pox and shingles), and **herpes simplex viruses** (causing oral and genital herpes).

Compounding the problem, cytomegalovirus (CMV) itself may directly contribute to the loss of immune function.^{54,55} In one study, higher levels of CMV in older women correlated with an increased five-year risk of all-cause **mortality**.⁵⁶



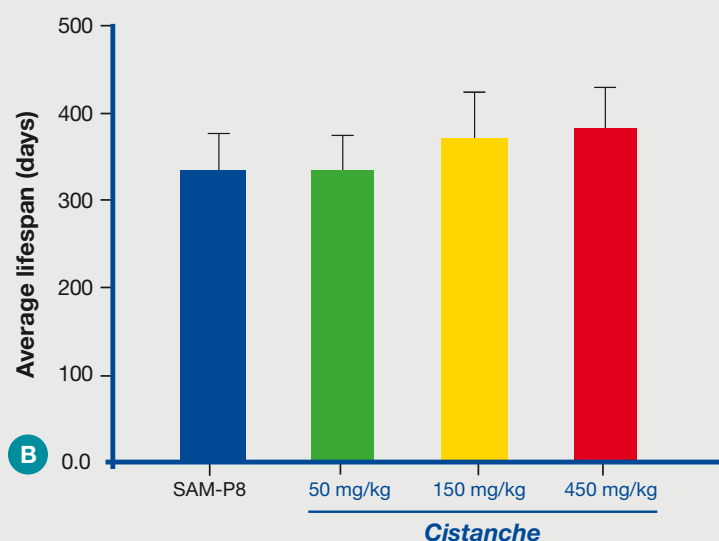
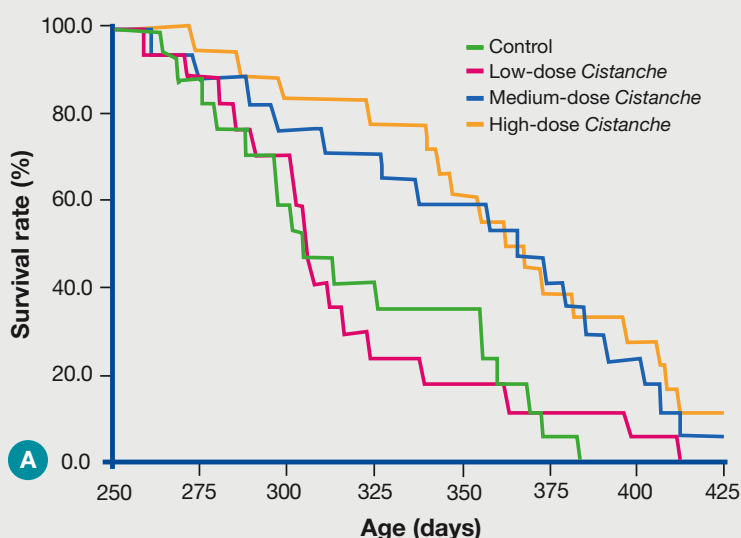
A Breakdown in the Body's Targeted Killers

T cells are targeted killers that are part of the body's **adaptive immunity**. If any infections go undetected by the natural killer cells, T cells are the “big guns” that step in and eliminate the infected cells.

These cells hunt down specific targets and stage a powerful attack to eliminate them once the enemy has been identified.

T cells contribute to **long-term immunity**, the phenomenon in which the body “remembers” an antigen (a virus, bacteria, or even a vaccine). That way, if an individual is later exposed to the same virus, bacteria, or antigen, the immune system is primed to destroy it more quickly in the future—often before any signs of the disease occur.

Lifespan Extension in Mice Supplemented with *Cistanche*⁴¹



A *Cistanche* increased survival of age-accelerated mice. Control mice (green line) were all dead by about 382 days, and low-dose (pink) *Cistanche* mice had all died by about 413 days. About 5% of mice supplemented with medium (blue) and about 10% of mice supplemented with high (gold) doses of *Cistanche* were still alive by the end of the study, at 425 days.

B *Cistanche* increased average lifespan of mice. Control age-accelerated mice (blue) lived on average about 325 days, as did mice supplemented with low-dose *Cistanche* (green). Mice supplemented with medium (yellow) and high (red) doses of *Cistanche*, however, had longer lifespans compared with control mice, at about 350 and 375 days, respectively.⁴¹

it can be hoped that the rejuvenating effect *Cistanche* has on the human immune system may assist in prolonging lifespan in people as well.

A hallmark marker of longevity potential is blood levels of interleukin-6 (IL-6).

Older individuals with higher levels of **IL-6** tend to not live as long and tend to have a higher burden of chronic disease. On the other hand, older people with lower IL-6 levels tend to be healthier and have better prospects for even longer lives. (See table on next page.)

This makes sense because *elevated* IL-6 generates chronic inflammatory signals that result in tissue damage throughout the body.⁴⁵⁻⁴⁹

Pu-erh Tea Extract's Immune Effects

A fermented black tea called **Pu-erh** has shown benefits for the aging immune system.⁵⁰

Studies show that Pu-erh tea and its extract combat immune senescence by multiple mechanisms.⁵⁰ Two of the chief ones include increasing **natural killer** and **T cells**.

In addition to its ability to bolster the immune system itself, **Pu-erh tea** appears to provide direct antibacterial and antiviral effects as well. Several studies have demonstrated that Pu-erh tea directly kills or inhibits the growth of bacteria and suppresses the growth of viruses such as hepatitis B.⁵⁰

Death Risk Data in Response to Elevated IL-6 and C-reactive protein (CRP)

| Elevated IL-6 and C-reactive protein are associated with a host of life-threatening conditions as shown below: | Biomarkers | |
|--|-------------|-------------|
| | IL-6 | CRP |
| Increased risk of dying from any cause in people with a mean age of 61 ⁵⁷ | 25% | |
| Increased risk of dying from any cause in people older than 80 ⁵⁸ | 118% | 158% |
| Increased risk of death following acute heart attack ⁵⁹ | 30% | 30% |
| Increased risk of sudden cardiac death ⁶⁰ | 63% | |
| Increased risk of dying from any cause in patients with obstructive airway disease ⁶¹ | 37% | |
| Increased risk of congestive heart failure following acute heart attack ⁵⁹ | 40% | 40% |
| Increased risk of poor functional outcome after stroke ⁶² | 210% | 90% |
| Increased risk of knee osteoarthritis ⁶³ | 174% | |
| Increased risk of developing the blindness-inducing eye disease age-related macular degeneration (AMD) ⁶⁴ | 78% | 118% |

In one investigation, scientists studied the effects of Pu-erh tea on the senescence-accelerated strain of mice discussed previously.⁵¹

Before supplementation with Pu-erh tea, the mice demonstrated the same features of immune system deterioration seen in aging humans, including lower numbers of active T cells and natural killer cells.

In addition, levels of the powerful pro-inflammatory cytokine **IL-6** were markedly elevated in the senescence-accelerated mice, compared with controls.

Feeding these mice with Pu-erh tea **reversed** these markers of immune senescence.

The treated mice experienced enhanced numbers of T cells and natural killer cells and a significant **43%** decrease in **IL-6**—benefits that more closely resemble a normal, healthy immune system.

Based on these immune-boosting results, the researchers concluded that intake of Pu-erh tea may help older individuals prevent infection and cancer.

Anti-Inflammatory Effects in Humans

A **human** study of Pu-erh tea extract further demonstrated its role in reversing **inflammatory cytokine** levels.

The study was performed among a group of patients with **metabolic syndrome**, a common condition

defined by central obesity, borderline or high fasting glucose, high blood pressure, and elevated blood lipids.⁵² Those with metabolic syndrome have higher levels of **inflammation** and are at an increased risk of having immune impairments.⁵³

Subjects were given either **Pu-erh tea extract** twice daily or a placebo. They were instructed to exercise and observe a healthy diet during the study period but were permitted no medicines that might otherwise affect the results.

After three months, patients provided blood samples for analysis of **inflammatory cytokines** and other markers of inflammation.

As expected, placebo recipients showed no significant changes in blood levels of **TNF-a** or **IL-6** (pro-inflammatory cytokines), **IL-10** (an anti-inflammatory cytokine), or **C-reactive protein** (CRP, a marker of total body inflammation).

Subjects supplemented with **Pu-erh tea extract** showed improvements in immune status as follows:

- **21% reduction** in **IL-6**,
- **23% reduction** in **TNF-a**, and
- **26% reduction** in **CRP**.

These reductions indicate significant decreases in overall pro-inflammatory status.

This study also found a **34% increase** of *inflammation-quelling IL-10*, which further demonstrates the overall reduction in inflammation possible with Pu-erh tea extract.

Pu-erh tea extract offers multiple pathways to potentially prevent progress of immune senescence.

Summary

Immune senescence occurs as people age and puts the elderly at increased risk for infections, cancers, and a variety of chronic inflammatory diseases.

Compounds naturally found in certain plants and fungi bolster weakened immune systems.

Reishi mushrooms, **Cistanche**, and **Pu-erh** tea can improve immune function by several complementary mechanisms, including amplifying the activity of natural killer cells, T cells, and various other immune system components.

They also help suppress over-activity of immune cells that can result in damaging inflammatory reactions.

Adding these nutrients to a healthy diet can help induce improvements in immune cell markers in older age. •



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

References

1. Babu PD, Subhasree R. The sacred mushroom "Reishi"-a review. *American-Eurasian Journal of Botany*. 2008;1(3):107-10.
2. Xu Z, Chen X, Zhong Z, et al. Ganoderma lucidum polysaccharides: immunomodulation and potential anti-tumor activities. *Am J Chin Med*. 2011;39(1):15-27.
3. Cao LZ, Lin ZB. Regulation on maturation and function of dendritic cells by Ganoderma lucidum polysaccharides. *Immunol Lett*. 2002 Oct 1;83(3):163-9.
4. Chang CJ, Chen YY, Lu CC, et al. Ganoderma lucidum stimulates NK cell cytotoxicity by inducing NKG2D/NCR activation and secretion of perforin and granulysin. *Innate Immun*. 2014 Apr;20(3):301-11.
5. Wang PY, Zhu XL, Lin ZB. Antitumor and Immunomodulatory Effects of Polysaccharides from Broken-Spore of Ganoderma lucidum. *Front Pharmacol*. 2012;3:135.
6. Chang YH, Yang JS, Yang JL, et al. Ganoderma lucidum extract promotes immune responses in normal BALB/c mice In vivo. *In Vivo*. 2009 Sep-Oct;23(5):755-9.
7. Chen WY, Yang WB, Wong CH, et al. Effect of Reishi polysaccharides on human stem/progenitor cells. *Bioorg Med Chem*. 2010 Dec 15;18(24):8583-91.
8. Ji Z, Tang Q, Zhang J, et al. Immunomodulation of bone marrow macrophages by GLIS, a proteoglycan fraction from Lingzhi or Reishi medicinal mushroom Ganoderma lucidum (W.Curt.:Fr.) P. Karst. *Int J Med Mushrooms*. 2011;13(5):441-8.
9. Ruan W, Wei Y, Popovich DG. Distinct Responses of Cytotoxic Ganoderma lucidum Triterpenoids in Human Carcinoma Cells. *Phytother Res*. 2015 Nov;29(11):1744-52.
10. Pan K, Jiang Q, Liu G, et al. Optimization extraction of Ganoderma lucidum polysaccharides and its immunity and antioxidant activities. *Int J Biol Macromol*. 2013 Apr;55:301-6.
11. Choi S, Nguyen VT, Tae N, et al. Anti-inflammatory and heme oxygenase-1 inducing activities of lanostane triterpenes isolated from mushroom Ganoderma lucidum in RAW264.7 cells. *Toxicol Appl Pharmacol*. 2014 Nov 1;280(3):434-42.
12. Chijioke O, Landtwing V, Munz C. NK Cell Influence on the Outcome of Primary Epstein-Barr Virus Infection. *Front Immunol*. 2016;7:323.
13. Novakova L, Lehuen A, Novak J. Low numbers and altered phenotype of invariant natural killer T cells in recurrent varicella zoster virus infection. *Cell Immunol*. 2011;269(2):78-81.
14. Orange JS. Natural killer cell deficiency. *J Allergy Clin Immunol*. 2013 Sep;132(3):515-25.
15. Vivier E, Tomasello E, Baratin M, et al. Functions of natural killer cells. *Nat Immunol*. 2008 May;9(5):503-10.
16. Jost S, Altfeld M. Control of human viral infections by natural killer cells. *Annu Rev Immunol*. 2013;31:163-94.
17. Vidal SM, Khakoo SI, Biron CA. Natural killer cell responses during viral infections: flexibility and conditioning of innate immunity by experience. *Curr Opin Virol*. 2011 Dec;1(6):497-512.
18. Xu M, Muto T, Yabe T, et al. The relationship between the frequency of the common cold and the activities of natural killer cells. *Environ Health Prev Med*. 2000 Jan;4(4):212-6.
19. Hazeldine J, Lord JM. The impact of ageing on natural killer cell function and potential consequences for health in older adults. *Ageing Res Rev*. 2013 Sep;12(4):1069-78.
20. Ongradi J, Kovesdi V. Factors that may impact on immunosenescence: an appraisal. *Immun Ageing*. 2010 Jun 14;7:7.
21. Fuentes E, Fuentes M, Alarcon M, et al. Immune System Dysfunction in the Elderly. *An Acad Bras Cienc*. 2017 Jan-Mar;89(1):285-99.

22. Eo SK, Kim YS, Lee CK, et al. Possible mode of antiviral activity of acidic protein bound polysaccharide isolated from *Ganoderma lucidum* on herpes simplex viruses. *J Ethnopharmacol.* 2000 Oct;72(3):475-81.
23. Avtonomova AV, Krasnopolskaya LM. Antiviral properties of basidiomycetes metabolites. *Antibiot Khimioter.* 2014;59(7-8):41-8.
24. Akihisa T, Nakamura Y, Tagata M, et al. Anti-inflammatory and anti-tumor-promoting effects of triterpene acids and sterols from the fungus *Ganoderma lucidum*. *Chem Biodivers.* 2007 Feb;4(2):224-31.
25. Iwatsuki K, Akihisa T, Tokuda H, et al. Lucidenic acids P and Q, methyl lucidenate P, and other triterpenoids from the fungus *Ganoderma lucidum* and their inhibitory effects on Epstein-Barr virus activation. *J Nat Prod.* 2003 Dec;66(12):1582-5.
26. Li Y, Yang Y, Fang L, et al. Anti-hepatitis activities in the broth of *Ganoderma lucidum* supplemented with a Chinese herbal medicine. *Am J Chin Med.* 2006;34(2):341-9.
27. Li YQ, Wang SF. Anti-hepatitis B activities of ganoderic acid from *Ganoderma lucidum*. *Biotechnol Lett.* 2006 Jun;28(11):837-41.
28. Liu J, Liang Q, Frost-Pineda K, et al. Relationship between biomarkers of cigarette smoke exposure and biomarkers of inflammation, oxidative stress, and platelet activation in adult cigarette smokers. *Cancer Epidemiol Biomarkers Prev.* 2011 Aug;20(8):1760-9.
29. Akbar R, Yam WK. Interaction of ganoderic acid on HIV related target: molecular docking studies. *Bioinformation.* 2011;7(8):413-7.
30. Wu Z, Zhang Y, Tan N, et al. ReishiMax extends the lifespan of mice: A preliminary report. *The FASEB Journal.* 2011 April 1, 2011;25(1 Supplement):601.2.
31. Novaro GM, Aronow HD, Mayer-Sabik E, et al. Plasma homocysteine and calcific aortic valve disease. *Heart.* 2004 Jul;90(7):802-3.
32. Beulens JW, Bots ML, Atsma F, et al. High dietary menaquinone intake is associated with reduced coronary calcification. *Atherosclerosis.* 2009 Apr;203(2):489-93.
33. Geleijnse JM, Vermeer C, Grobbee DE, et al. Dietary intake of menaquinone is associated with a reduced risk of coronary heart disease: the Rotterdam Study. *J Nutr.* 2004 Nov;134(11):3100-5.
34. Fusaro M, Noale M, Viola V, et al. Vitamin K, vertebral fractures, vascular calcifications, and mortality: Vitamin K Italian (VIKI) dialysis study. *J Bone Miner Res.* 2012 Nov;27(11):2271-8.
35. Theuvsen E, Smit E, Vermeer C. The role of vitamin K in soft-tissue calcification. *Adv Nutr.* 2012 Mar 1;3(2):166-73.
36. Koos R, Mahnken AH, Muhlenbruch G, et al. Relation of oral anticoagulation to cardiac valvular and coronary calcium assessed by multislice spiral computed tomography. *Am J Cardiol.* 2005 Sep 15;96(6):747-9.
37. Schurgers LJ, Dissel PE, Spronk HM, et al. Role of vitamin K and vitamin K-dependent proteins in vascular calcification. *Z Kardiol.* 2001;90 Suppl 3:57-63.
38. Shimizu T, Choudhry MA, Szalay L, et al. Salutary effects of androstenediol on cardiac function and splanchnic perfusion after trauma-hemorrhage. *Am J Physiol Regul Integr Comp Physiol.* 2004 Aug;287(2):R386-90.
39. Lichte P, Pfeifer R, Werner BE, et al. Dehydroepiandrosterone modulates the inflammatory response in a bilateral femoral shaft fracture model. *Eur J Med Res.* 2014 May 19;19:27.
40. Haring R, Baumeister SE, Volzke H, et al. Prospective inverse associations of sex hormone concentrations in men with biomarkers of inflammation and oxidative stress. *J Androl.* 2012 Sep-Oct;33(5):944-50.
41. Zhang K, Ma X, He W, et al. Extracts of *Cistanche deserticola* Can Antagonize Immunosenescence and Extend Life Span in Senescence-Accelerated Mouse Prone 8 (SAM-P8) Mice. *Evid Based Complement Alternat Med.* 2014;2014:601383.
42. Zhang YH, Wang LC, Tu PF, et al. Macrophage activation by low molecular weight saccharides from *Cistanche deserticola*. *Zhongguo Zhong Yao Za Zhi.* 2017 Nov;42(21):4207-10.
43. Zhang A, Yang X, Li Q, et al. Immunostimulatory activity of water-extractable polysaccharides from *Cistanche deserticola* as a plant adjuvant in vitro and in vivo. *PLoS One.* 2018;13(1):e0191356.
44. Yonei Y, Kitano T, Ogura M, et al. Effects of Health Food Containing *Cistanche Deserticola* Extract on QOL and Safety in Elderly: An Open Pilot Study of 12-week Oral Treatment. *Anti-Aging Medicine.* 2011;8(2):7-14.
45. Walston JD, Matteini AM, Nievergelt C, et al. Inflammation and stress-related candidate genes, plasma interleukin-6 levels, and longevity in older adults. *Exp Gerontol.* 2009 May;44(5):350-5.
46. Di Bona D, Vasto S, Capurso C, et al. Effect of interleukin-6 polymorphisms on human longevity: a systematic review and meta-analysis. *Ageing Res Rev.* 2009 Jan;8(1):36-42.
47. Cohen HJ, Pieper CF, Harris T, et al. The association of plasma IL-6 levels with functional disability in community-dwelling elderly. *J Gerontol A Biol Sci Med Sci.* 1997 Jul;52(4):M201-8.
48. Wassel CL, Laughlin GA, Barrett-Connor E. Abstract 1136: Association of C-reactive Protein (CRP) and Interleukin-6 (IL-6) With Longevity Into the 80s and 90s: The Rancho Bernardo Study. *Circulation.* 2009;120(suppl_18):S453-S.
49. Puzianowska-Kuznicka M, Owczar M, Wiecezowska-Tobis K, et al. Interleukin-6 and C-reactive protein, successful aging, and mortality: the PolSenior study. *Immun Ageing.* 2016;13:21.
50. Lee LK, Foo KY. Recent advances on the beneficial use and health implications of Pu-Erh tea. *Food Research International.* 2013 10//;53(2):619-28.
51. Zhang L, Shao WF, Yuan LF, et al. Decreasing pro-inflammatory cytokine and reversing the immunosenescence with extracts of Pu-erh tea in senescence accelerated mouse (SAM). *Food Chem.* 2012 Dec 15;135(4):2222-8.
52. Chu SL, Fu H, Yang JX, et al. A randomized double-blind placebo-controlled study of Pu'er tea extract on the regulation of metabolic syndrome. *Chin J Integr Med.* 2011 Jul;17(7):492-8.
53. Ugarte-Gil MF, Sanchez-Zuniga C, Gamboa-Cardenas RV, et al. Circulating naive and memory CD4+ T cells and metabolic syndrome in patients with systemic lupus erythematosus: data from a primarily Mestizo population. *Rheumatology (Oxford).* 2015 Jul;54(7):1302-7.
54. Solana R, Tarazona R, Aiello AE, et al. CMV and Immunosenescence: from basics to clinics. *Immun Ageing.* 2012 Oct 31;9(1):23.
55. Pawelec G, McElhaney JE, Aiello AE, et al. The impact of CMV infection on survival in older humans. *Curr Opin Immunol.* 2012 Aug;24(4):507-11.
56. Wang GC, Kao WH, Murakami P, et al. Cytomegalovirus infection and the risk of mortality and frailty in older women: a prospective observational cohort study. *Am J Epidemiol.* 2010 May 15;171(10):1144-52.
57. Schnabel RB, Yin X, Larson MG, et al. Multiple inflammatory biomarkers in relation to cardiovascular events and mortality in the community. *Arterioscler Thromb Vasc Biol.* 2013 Jul;33(7):1728-33.
58. Giovannini S, Onder G, Liperoti R, et al. Interleukin-6, C-reactive protein, and tumor necrosis factor-alpha as predictors of mortality in frail, community-living elderly individuals. *J Am Geriatr Soc.* 2011 Sep;59(9):1679-85.
59. Hartford M, Wiklund O, Mattsson Hultén L, et al. C-reactive protein, interleukin-6, secretory phospholipase A2 group IIA and intercellular adhesion molecule-1 in the prediction of late outcome events after acute coronary syndromes. *J Intern Med.* 2007 Nov;262(5):526-36.
60. Hussein AA, Gottdiener JS, Bartz TM, et al. Inflammation and sudden cardiac death in a community-based population of older adults: the Cardiovascular Health Study. *Heart Rhythm.* 2013 Oct;10(10):1425-32.
61. Mehrotra N, Freire AX, Bauer DC, et al. Predictors of mortality in elderly subjects with obstructive airway disease: the PILE score. *Ann Epidemiol.* 2010 Mar;20(3):223-32.
62. Whiteley W, Jackson C, Lewis S, et al. Inflammatory markers and poor outcome after stroke: a prospective cohort study and systematic review of interleukin-6. *PLoS Med.* 2009 Sep;6(9):e1000145.
63. Livshits G, Zhai G, Hart DJ, et al. Interleukin-6 is a significant predictor of radiographic knee osteoarthritis: The Chingford Study. *Arthritis Rheum.* 2009 Jul;60(7):2037-45.
64. Klein R, Myers CE, Cruickshanks KJ, et al. Markers of inflammation, oxidative stress, and endothelial dysfunction and the 20-year cumulative incidence of early age-related macular degeneration: the Beaver Dam Eye Study. *JAMA Ophthalmol.* 2014 Apr 1;132(4):446-55.

ZiNC

SUPPORTS YOUR FIRST LINE OF DEFENSE

Research shows zinc deficiency is common in aging populations—and may contribute to the decline of **immune function**.¹

Zinc supports and activates:

- **Natural killer** cell function²
- A healthy inflammatory response³
- **Thymic** function needed to make immune **T-cells**.

Life Extension® combines the superior bioavailability of **zinc methionate**⁴ with **zinc citrate** to provide 50 mg of these **absorbable** zincs in a single capsule.

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

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

CAUTION: Supplemental zinc can inhibit the absorption of copper. If more than **50 mg** of supplemental zinc is taken daily on a chronic basis, **2 mg** of supplemental copper should also be taken to prevent copper deficiency. Chronic ingestion of more than **100 mg** of zinc daily may be immunosuppressive for some aspects of T-cell and NK cell function.



Item #01813 • 90 vegetarian capsules

1 bottle **\$6.75**

4 bottles \$6 each

References

1. *Immun Ageing*. 2009 Jun 12;6:9.
2. <https://www.sciencedirect.com/science/article/abs/pii/S1756464618303621>.
3. *Am J Clin Nutr*. 2004 Mar;79(3):444-50.
4. *J Trace Elem Med Biol*. 2010 Apr;24(2):89-94.





SUPPORT
HEALTHY
METABOLIC
FACTORS

OMEGA-7

Researchers at **Harvard Medical School** and **Cleveland Clinic** have been investigating **omega-7**, a fatty acid with body-wide benefits. Their focus has been on how omega-7 promotes a healthy metabolism.

Provinal® Purified Omega-7 is becoming a popular nutrient used to enhance **omega-3s** by providing the following systemic effects:

- Increases satiety hormones
- Helps smooth arterial walls
- Supports cardiovascular health
- Supports cellular glucose shuttling
- Supports insulin sensitivity
- Supports healthy triglyceride and cholesterol levels already within normal range

Item #01812 • 30 softgels

1 bottle **\$20.25**

4 bottles \$18 each



ENHANCES
METABOLIC
HEALTH

Provinal® is a registered trademark of
Tersus Life Sciences, LLC.



For full product description and to order
Provinal® Purified Omega-7, 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.

Immune Senescence Protection Formula

Support Your Aging Immune System

Three natural plant extracts—**Cistanche**, **Pu-erh Tea**, and **Reishi Mushroom**—have been shown to support more youthful immune function.

Cistanche

- Supports longer lifespan in animals.¹
- Optimizes the ratio of CD4 to CD8 cells, indicative of a more youthful immune system.¹

Pu-erh tea

- Boosts natural killer and naïve T cells while decreasing interleukin-6 (IL-6).²

Reishi

- Helps reduce biomarkers of immune senescence.³

References

1. *Anti-Aging Med.* 2011;8(2):7-14.
2. *Food Chem.* 2012 Dec 15;135(4):2222-8.
3. *Am J Chin Med.* 2011;39(1):15-27.



Item #02005 • 60 vegetarian tablets

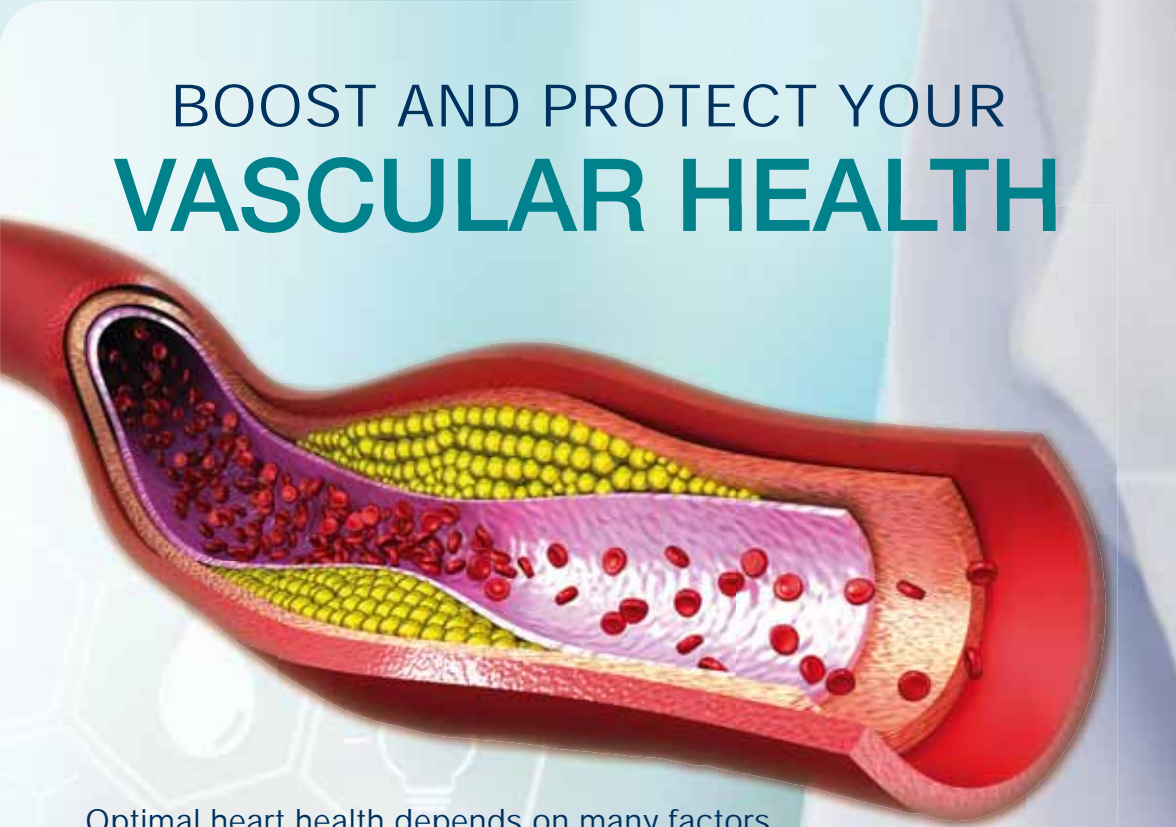
1 bottle **\$28.50**

4 bottles \$26.50 each

For full product description and to order
Immune Senescence Protection Formula™,
call 1-800-544-4440 or visit www.LifeExtension.com

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

BOOST AND PROTECT YOUR VASCULAR HEALTH



Optimal heart health depends on many factors including proper functioning of the endothelium—the thin layer of cells lining the interior of the entire circulatory system.

TRIPLE-ACTION PROTECTION

Endothelial Defense™ with Pomegranate Complete

contains three unique ingredients shown to support endothelial health.

1. Pomegranate Complete

provides potent polyphenols scientifically shown to support healthy blood flow.

2. Superoxide dismutase (SOD)

supports healthy arterial function and boosts the body's protective enzymes.

3. Sweet Orange Peel Extract

supports nitric oxide production for healthy circulation.

Item #02497 • 60 softgels

1 bottle **\$43.50** • 4 bottles \$40 each



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

Caution: Do not take this product if you are allergic to wheat or gluten.

Cardiose® is a registered trademark of INTERQUIM, S.A. d.b.a. Ferrer HealthTech.
POMELLA® Extract is covered under U.S. Patent 7,638,640 and POMELLA® is a registered trademark of Verdure Sciences, Inc.
Isocell SA, France is the owner of US Patents Nos. 6,045,809 and 6,426,068B1 and trademark of GliSODin®.



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.

PERSONALIZED PRECISION IMMUNOTHERAPY: New Hope for Defeating Deadly Cancer

BY DIPNARINE MAHARAJ, MD, FACP



Science has made remarkable strides in the fight against **cancer**.

But too often, treatments still fail. Cancer remains the second most common cause of death in the U.S., after heart disease.

A new approach called **personalized precision immunotherapy** offers fresh hope to cancer patients who seem to have run out of options.

In the case of one leukemia patient who had failed chemotherapy and a bone marrow transplant, and was given less than a year to live, a cutting-edge treatment increased the activity of his own immune system **more than nine-fold**.

This helped his body destroy the cancer and restore his immune system, leading to a recovery so dramatic, he recently completed his first triathlon.

Three years after he began treatment, his cancer remains ***in complete remission***.

A Diagnosis and Failed Treatment

It was 2015. Richard (the patient's name has been changed to protect his privacy) was 37 years old, with no history of health problems, when he began feeling fatigue, lethargy, an ache in his back, and pain in his leg and ribs.¹

Pain medication didn't help, and after two weeks, doctors performed a series of tests, including a complete blood count and a follow-up bone marrow biopsy. The results confirmed his worst fear: He had an aggressive form of **acute lymphoblastic leukemia**, a cancer of the blood and bone marrow.

The news got worse. Those cancer cells all carried the **Philadelphia chromosome**, an abnormality that makes treatment more difficult, relapse more likely, and prognoses poorer.^{1,2}

At the previous clinic, before coming to the Maharaj Institute of Immune Regenerative Medicine, Richard embarked on a complicated five-drug **chemotherapy** regimen, primarily consisting of medications that stop wildly reproducing cells—but that also shut down many vital natural processes in the body, leading to severe side effects.¹

Richard also received one of a new generation of cancer drugs, **imatinib**, which succeeded in suppressing the activity of the Philadelphia chromosome.

He then underwent another round of high-dose chemotherapy, along with total body irradiation to destroy all vestiges of his cancer cells.

That was followed by a **bone marrow transplant** from his brother. The goal was to repopulate Richard's cancer-ridden bone marrow with *healthy donor stem* cells

from his brother, including donor immune cells that could directly attack the leukemia.

As often happens, Richard developed **graft-versus-host disease**, in which the immune cells from his brother turned on Richard's own tissues, attacking them and threatening his life.¹

To manage the graft-versus-host disease, Richard received several drugs including steroids, chemotherapy such as methotrexate, and severe immune-suppressing drugs such as cyclosporine, in the hope that they'd control the donor marrow cells and stop their attacks on Richard's body. Fortunately, this approach worked—for a time.

But soon, a relapse occurred, with renewed activity of the Philadelphia chromosome evident. He then received an infusion of his brother's **lymphocytes** (immune cells made in the bone marrow). It seemed to work, putting him into

a second remission, but a second relapse occurred a few months later.

At 39, Richard was told he had **less than a year to live**.¹

Remarkable Recovery

But Richard's luck was about to change.

In March of 2017, he found his way to the **Maharaj Institute of Immune Regenerative Medicine** in Boynton Beach, FL, to discuss his few remaining options.¹

Richard chose to go forward with an experimental treatment: **personalized, low-dose immunotherapy**.

Immunotherapy is a type of treatment that boosts the body's own, natural immune system, helping it fight disease.

Treatment began with daily low-dose injections of **interleukin-2** (IL-2), a naturally occurring human signaling protein. Its normal function



How Personalized Immunotherapy Works



Traditional chemotherapy or radiation treatments aim to wipe out cancer cells, but they kill so many healthy cells at the same time that they do severe damage to a patient.

And when treatment stops, the cancer too often comes back.

Even bone marrow transplants, that are sometimes part of the treatment of leukemia, lymphoma, and similar cancer, and which replace diseased blood-forming cells with fresh, healthy ones, can fail or lead to graft-versus-host disease.

Personalized precision immunotherapy takes a new approach. Administering recombinant (genetically engineered) **IL-2** stimulates our *own* **natural killer cells** to attack tumors.^{1,3}

It also works to maintain the crucial condition of **immune tolerance**. That's what keeps our immune systems from working against us, and it is what breaks down when patients develop graft-versus-host disease.^{1,4-7}

In Richard's case, IL-2 achieved both goals. It *raised* levels of tumor-killing natural killer cells and *suppressed* levels of cells trying to attack his healthy tissues. IL-2 also boosted levels of interferon gamma, which promotes the natural killer cells' abilities.^{1,8,9}

One size does *not* fit all with this kind of treatment. Doctors created a **personalized** approach, selecting just the right compound (IL-2), administering it in carefully monitored amounts, and altering the dose in response to daily blood testing.

They achieved a nearly unheard-of result: **complete remission** of an aggressive cancer, with minimal side effects and no evidence of new graft-versus-host disease.

in the body is to regulate immune system cells, providing them with explicit instructions.

The goal of treatment was to selectively stimulate the transplanted immune cells to attack the leukemia—and to *stop* their assaults on Richard's own tissue.¹

What made the therapy **personalized** was that Richard's blood was monitored daily to see how the treatment was working. The doses and duration of each cycle of IL-2 injections were **precisely** determined by the results.

Richard rapidly improved. Over the course of four cycles of treatment, there was an astonishing **nine-fold increase** in the activity of his own **natural killer cells**, immune cells containing enzymes that kill tumors.¹

Levels of another signaling protein, **interferon-gamma**, which boosts the immune system, also rose dramatically and remained high throughout treatment.

At the end of the 23-week course of immunotherapy, the total proportion of Richard's own cells that were fighting his cancer increased from just **7.1%** to **63.4%**.

At the same time, **regulatory T-cells**, which *suppress* immune response, declined significantly. These cells had been holding back Richard's immune cells from their full potential.

By the end of his treatment, Richard's blood showed no evidence of Philadelphia chromosome activity—and **no leukemia cells in his marrow**. Side effects of his treatment were limited to momentary, low-grade redness at the injection site.

Now, roughly three years after starting this personalized immunotherapy journey, Richard remains healthy, shows no symptoms, and has a normal quality of life.

In fact, the recovery has been so remarkable, he recently completed his first **triathlon**.

Researchers believe this type of treatment holds great promise in treating patients with many different forms of cancer.

It is important to understand that IL-2 became available as a cancer drug decades ago, in 1992, and initially there was great hope that it might effectively treat most malignancies.

However, the high-doses of IL-2 used in those early days yielded only marginal benefits against patients' cancers but inflicted serious side effects. Dr. Maharaj's approach uses personalized IL-2 dosing about **10%** as potent as when IL-2 is administered as front-line treatment. This lower dose yields marked improvements in immune function without serious side effects.

Summary

Many forms of cancer are still resistant to aggressive treatments like chemotherapy.

Adults with **recurrent acute lymphoblastic leukemia**, for example, have a dismal prognosis, with long-term survival measured in months.

But there's a new hope: **personalized precision immunotherapy**.

Using this treatment on a patient who had been given less than a year to live, doctors administered a potent signaling molecule, **IL-2**, to stimulate the immune system. The dose was adjusted in response to daily blood testing.

After 23 weeks of treatment with almost no side effects, his cancer is effectively gone. He remains healthy and cancer-free three years later.

Personalized immunotherapy holds tremendous promise for treating deadly leukemias and may be of value for other cancers in the future. •

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

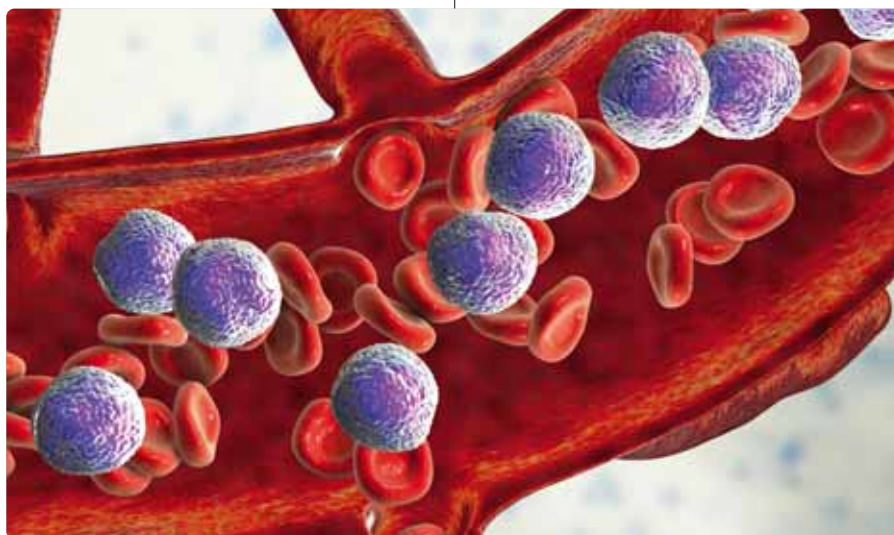
References

1. Maharaj D, Vianna P, DeCarvalho G, et al. Molecular remission using low-dose immunotherapy for relapsed refractory Philadelphia chromosome-positive precursor B-cell acute lymphoblastic leukemia post-allogeneic stem cell transplant. *Future Sci OA*. 2019 Jun;5(5):FSO380.
2. Pui CH, Roberts KG, Yang JJ, et al. Philadelphia Chromosome-like Acute Lymphoblastic Leukemia. *Clin Lymphoma Myeloma Leuk*. 2017 Aug;17(8):464-70.
3. Klemann C, Wagner L, Stephan M, et al. Cut to the chase: a review of CD26/dipeptidyl peptidase-4's (DPP4) entanglement in the immune system. *Clin Exp Immunol*. 2016 Jul;185(1):1-21.
4. Ackerman A, Kedar E, Slavin S. Use of recombinant human interleukin-2 in conjunction with syngeneic bone marrow transplantation in mice as a model for control of minimal residual disease in malignant hematologic disorders. *Blood*. 1991 Sep 1;78(5):1212-5.
5. Slavin S, Naparstek E, Nagler A, et al. Allogeneic cell therapy with donor peripheral blood cells and recombinant human interleukin-2 to treat leukemia relapse after allogeneic bone marrow transplantation. *Blood*. 1996 Mar 15;87(6):2195-204.

6. Malek TR, Bayer AL. Tolerance, not immunity, crucially depends on IL-2. *Nat Rev Immunol*. 2004 Sep;4(9):665-74.
7. Nelson BH. IL-2, regulatory T cells, and tolerance. *J Immunol*. 2004 Apr 1;172(7):3983-8.
8. Wang R, Jaw JJ, Stutzman NC, et al. Natural killer cell-produced IFN-gamma and TNF-alpha induce target cell cytotoxicity through up-regulation of ICAM-1. *J Leukoc Biol*. 2012 Feb;91(2):299-309.
9. Strasser A, Jost PJ, Nagata S. The many roles of FAS receptor signaling in the immune system. *Immunity*. 2009 Feb 20;30(2):180-92.

For more information on personalized precision immunotherapy, please contact the Maharaj Institute of Immune Regenerative Medicine at 561-752-5522 or info@miirm.org.

Dipnarine Maharaj, MD, FACP, has over 30 years of experience as an internist, hematologist, oncologist, and bone marrow/stem cell transplant physician. He is the Founder and Director of the South Florida Bone Marrow Stem Cell Transplant Institute DBA Maharaj Institute of Immune Regenerative Medicine in Boynton Beach, Florida. Dr. Maharaj is on the Scientific Advisory Board of **Life Extension®**.



Sweet DREAMS

Choose the Melatonin That's Right For You

Healthy sleep is one of the best ways to feel revitalized and maintain optimal health.

While many people find melatonin helps improve sleep, others take it nightly for its **immune** protection effects.

Individual doses range from **300 mcg to 10 mg** taken 30-60 minutes before going to sleep.

Caution: Consult your health care provider before taking this product if you are being treated for a medical condition (especially autoimmune or depressive disorders). Use caution if combining with alcohol. This product is not intended for children, pregnant or lactating women, or women trying to become pregnant. Do not attempt to drive or operate heavy machinery after taking this product.

Sensoril® and Capros® are patent protected and registered trademarks of Natreon, Inc.

MicroActive® Melatonin is a registered trademark of Bioactives LLC. Lactium® is used under license.

For occasional sleeplessness.



Melatonin Timed Release 300 mcg

100 vegetarian tablets

Price: **\$9**
Item # 01787



Melatonin 3 mg

60 vegetarian capsules

Price: **\$6**
Item # 00330



Melatonin 500 mcg

200 vegetarian capsules

Price: **\$13.50**
Item# 01083



Melatonin 3 mg

60 vegetarian lozenges

Price: **\$6**
Item# 00332



Melatonin Timed Release 750 mcg

60 vegetarian tablets

Price: **\$6**
Item # 01788



Melatonin Timed Release 3 mg

60 vegetarian tablets

Price: **\$9**
Item # 01786



Melatonin 1 mg

60 capsules

Price: **\$3.75**
Item# 00329



Enhanced Sleep with Melatonin

30 capsules

Price **\$16.50**
Item# 01551



Melatonin 10 mg

60 vegetarian capsules

Price: **\$21**
Item# 00331



Enhanced Sleep without Melatonin

30 capsules

Price: **\$16.50**
Item# 01511



Melatonin 300 mcg

100 vegetarian capsules

Price: **\$5.25**
Item# 01668



Melatonin IR/XR

60 capsules

Price: **\$9**
Item# 02201



For full product description and to order any of these premium-grade **Melatonin** supplements, call 1-800-544-4440 or visit www.LifeExtension.com

GEROPROTECT®

Stem Cell

This **GEROPROTECT®** formula supports **stem cell** health and function.

Life Extension® scientists developed this proprietary formula in collaboration with the Deep-Learning AI Technology at **Insilico Medicine**.

Three plant-based nutrients (**garcinol**, **piceatannol**, and **resveratrol**) were selected for *activating* key **cell-signaling pathways** that support stem cell health.



Item #02401 • 60 vegetarian capsules
1 bottle **\$36**
4 bottles \$33 each

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

Livino!™ is a trademark of Sabinsa Corporation.

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

Boost “Functional” Natural Killer Cell Activity

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

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

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

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

Clinical Studies

In one clinical study, scientists documented a **3-fold** increase of **natural killer** cell activity in healthy individuals within three to four weeks of receiving **500 mg** daily of the rice bran compound found in **NK Cell Activator™**.

In another double-blind, randomized, placebo-controlled study, researchers noted that subjects taking the rice-bran compound found in **NK Cell Activator™** experienced a boost in *myeloid dendritic cells*—cells that act as key messengers between the innate and the adaptive immune systems.⁴

The suggested single serving of one vegetarian tablet of **NK Cell Activator™** provides:

| | |
|---|---------------|
| Proprietary Enzymatically Modified Rice Bran | 500 mg |
|---|---------------|

Contains wheat.

References

1. *Curr Opin Virol*. 2011 Dec;1(6):497-512.
2. *Clin Exp Immunol*. 1987 May;68(2):340-7.
3. *Immunology*. 2009 Oct;128(2):151-63.
4. *Cancer Immunol Immunother*. 2013 Mar;62(3):437-45.

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



Item #01903 • 30 vegetarian tablets

1 bottle **\$33.75**

4 bottles \$31.50 each





BY MICHAEL DOWNEY

Reduce Effects of Excess Stress to Protect Immunity

It's hard to avoid **stress** during a global pandemic.

The concern is that increased **stress** can weaken **immune functions**.

Ongoing stress triggers **high levels** of **cortisol**, a steroid hormone.

Excess **cortisol** diminishes **immune functions**, and has been shown to increase disease risk while shortening human lifespans.¹⁻¹⁷

A **2019** study found that **anticipating stress** the next day is associated with elevated **cortisol** soon after waking up in the morning.¹⁸

Human studies demonstrate that specific **plant extracts** can reduce **cortisol** levels and inhibit its destructive effects.¹⁹⁻²⁴

Stress Weakens Immune Function

A recent poll reports that **45%** of Americans feel that their mental health has been negatively impacted due to worry and stress over the novel **coronavirus**.²⁵

Cortisol is one of the body's main **stress hormones**.

During stressful times, the adrenal glands release it as part of the "**fight-or-flight**" response.²⁶

Necessary for life-or-death situations, cortisol directs a complex series of hormonal and physiological changes that support either fleeing to safety or fighting off the threat.^{27,28}

Cortisol *boosts* muscle tension, blood sugar, heart-beat, tissue-repair substances, and mental focus. At the same time, **cortisol** turns *down* non-urgent processes such as **immune functions**, along with the digestive and reproductive systems.²⁹

When the stressful threat has passed, cortisol is supposed to return to normal "balanced" levels.

When stressors are almost *a/ways* present, as they have been since the **coronavirus** outbreak, **cortisol** remains "turned on."

Its continuing high presence in the blood adversely affects critical functions of the body and brain.³⁰



Danger of Elevated Cortisol

Stress results in a decrease in levels of **lymphocytes**. These immune cells are used to kill viruses and other invaders.^{31,32}

Lymphocyte counts are often reduced when one is fighting a **viral** infection.³³⁻³⁵

Even if it's just for a few days, **social isolation** and **loneliness**, both common during the current pandemic, also weaken immunity.³⁶

Older individuals are more susceptible to stress and to stress-induced immune damage.³⁷

Long-term overexposure to excess **cortisol** disrupts almost all body processes, increasing risk for health problems that include:^{1-17,38}

- Immune impairment,
- Cardiovascular disease,
- Diabetes,
- Osteoporosis,
- Gastrointestinal problems,
- Obesity,
- Neurodegeneration, including Alzheimer's disease, and
- Anxiety, depression, and insomnia.

Most worrisome, chronically elevated cortisol is linked to increased **mortality** risk.

A large study of people over age 65 found that **men** with **high** cortisol levels were **63% more likely to die** than those with lower levels.

Women with elevated cortisol were **82% more likely to die** than those with low levels.⁵ And those with high urinary cortisol had a **five-fold** increased risk of death from **cardiovascular disease**.³

Higher cortisol is also associated with shortening of **telomeres**, the stretches of DNA that cap the ends of chromosomes.^{39,40} As telomeres shorten, the cells that bear them get closer to the ends of their lives, aging the tissues and organs in which they dwell.

It's impossible to avoid all stress, *especially* during a pandemic. But scientists have demonstrated that natural compounds can **lower excess cortisol** levels.



Lychee-Green Tea Blend Lowers Cortisol

Grown in China since the 11th century,⁴¹ **lychee fruit** is rich in **polyphenols** that promote a variety of biological activities, most notably the ability to reduce **inflammation** and **cortisol** levels.¹⁹

Most **lychee** products sold today contain **long-chain polyphenols**, which are not easily *absorbed* in the intestinal tract.

To overcome this obstacle scientists developed a **low molecular size** extract derived from **lychee fruit** and **green tea**.⁴²

The result is a new compound that is stable and highly *absorbable*.

Researchers tested this **lychee-green tea blend** on human **monocytes**, a type of immune cell. They found that it significantly suppressed inflammatory signaling molecules called **cytokines**, helping to decrease inflammation.⁴³

This confirmed earlier results from clinical trials that evaluated the **lychee-green tea blend**'s ability to lower stress and *stress-induced cortisol*.

WHAT YOU NEED TO KNOW

Counter the Immune-Damaging Effects of Stress

- **Stress** increases levels of the hormone **cortisol**, which can weaken immune function.
- A weak immune system raises the risk of infections caused by viruses and other pathogens.
- Chronically elevated cortisol increases the risk of other diseases—including cardiovascular disease, diabetes, and neurodegeneration—and of overall **mortality**.
- Human studies show that both a **lychee-green tea blend** and a combination of **two bark** extracts from *Magnolia* and *Phellodendron* trees reduce high cortisol levels.
- These compounds can effectively reduce unwanted circulating cortisol, safely inhibiting its destructive effects.

Reducing Stress-Induced Cortisol

Researchers randomly assigned 19 sedentary but healthy male volunteers (with an average age of 22) to take either a placebo or **100 mg** of the **lychee-green tea blend** daily for four weeks.

They conducted blood tests for **cortisol** and other inflammatory markers before and after the study, and after exercise, which raises cortisol levels.¹⁹

Unlike those in the placebo group, the men taking the blend showed significant *decreases* in **cortisol** and the pro-inflammatory cytokines **IL-1beta** and **IL-6**. The lychee-green tea extract also reduced the rate of increase of these factors following exercise.¹⁹

In another study, 10 healthy men took either a placebo or **100 mg** of the **lychee-green tea** blend twice daily for 10 days before exercising under low-oxygen conditions, to increase stress.²⁰

Exercise increased cortisol substantially in the **placebo** group. The cortisol increase in the **lychee-green tea** group was significantly *smaller*.²⁰

Physically Induced Cortisol

Scientists next assessed the effects of the **lychee-green tea blend** on cortisol and inflammation caused by *physical stress*.

Either a placebo or **100 mg** of the blend was given to 13 healthy males. After 30 minutes, the lower portion of each man's legs was immersed in hot water for half an hour. Researchers measured cortisol and inflammatory cytokines before and after this procedure.²¹

Compared to placebo subjects, lychee-green tea recipients had significantly *lower* concentrations of **cortisol**, **IL-1beta**, and **IL-6** after the heat-related stress. These benefits continued for up to two hours after the stress ended. (**IL-1beta** and **IL-6** are pro-inflammatory factors.)

Lychee-green tea recipients also had significantly *lower* increases in temperatures of the skin and body core during the application of heat, indicating a more balanced and improved response to the physically stressful event.²¹

Later studies confirmed that the **lychee-green tea** blend prevents heat-induced elevations in body temperature. This reduces fluid loss from sweating under heat stress and prevents stress-induced blunting of **immune response**.⁴⁴⁻⁴⁷

How to Measure Your Stress Levels

Living under the threat of a pandemic, **stress** can become so constant that you don't even notice *how* stressed you are.

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

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

A follow-up **cortisol test** will show whether your efforts have been successful or need to be intensified.



Effects of Tree Bark Extracts

Scientists have identified two **tree bark extracts** that deliver similar protection against elevated **cortisol**.

The extracts come from a magnolia species, *Magnolia officinalis*, and *Phellodendron amurense*, also known as **Amur cork tree**.

Both have been used in traditional Chinese medicine for centuries and have been shown to have non-sedating **anti-anxiety** effects.²²

In one study, investigators enlisted 56 healthy but moderately stressed individuals. Twice daily, participants were given either a placebo or **250 mg** of a mixture containing *both bark extracts*.²³

After four weeks, the bark extract recipients had **18% lower cortisol levels** compared to placebo recipients. They also had mood improvements and reduced feelings of stress, depression, anger, and fatigue, all likely related to lowered cortisol.²³

Two small, additional studies documented benefits of this bark extract blend:

- One six-week study was conducted on healthy but overweight **premenopausal** women (aged 20-50) with above-average anxiety. Compared to a placebo, a **250 mg** dose of the bark extract combination, given three times a day, significantly **decreased anxiety**.²²
- A second study was conducted on a similar group of women with above-average anxiety, who reported *eating more* in response to stress. The placebo group had significant weight gain over the six-week study. But **weight gain** was **prevented** in the **bark extract** subjects.²⁴

Elevated cortisol weakens the immune system's ability to fight infection. **Lychee-green tea** blend and the **bark extract** combination have been shown to reduce excessive cortisol secretion in response to stress.

Summary

Stress weakens **immune functions** by raising levels of **cortisol**.

This increases the risks of infections and chronic diseases and shortens lifespans.

A **lychee-green tea blend** provides highly *absorbable* nutrients that have been shown to lower cortisol in **human** studies.



A combination of **two bark extracts** from the *Magnolia* and *Phellodendron* trees has also been shown, in **human** trials, to lower cortisol and reduce outward manifestations of stress.

These compounds offer one approach to reducing excess **cortisol** levels, which may counteract some of the harmful effects inflicted by **chronic stress**. •

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. Duggal NA, Upton J, Phillips AC, et al. NK cell immunosenescence is increased by psychological but not physical stress in older adults associated with raised cortisol and reduced perforin expression. *Age (Dordr)*. 2015 Feb;37(1):9748.
2. Noordam R, Gunn DA, Tomlin CC, et al. Cortisol serum levels in familial longevity and perceived age: the Leiden longevity study. *Psychoneuroendocrinology*. 2012 Oct;37(10):1669-75.
3. Vogelzangs N, Beekman AT, Milaneschi Y, et al. Urinary cortisol and six-year risk of all-cause and cardiovascular mortality. *J Clin Endocrinol Metab*. 2010 Nov;95(11):4959-64.
4. Hackett RA, Kivimaki M, Kumari M, et al. Diurnal Cortisol Patterns, Future Diabetes, and Impaired Glucose Metabolism in the Whitehall II Cohort Study. *J Clin Endocrinol Metab*. 2016 Feb;101(2):619-25.
5. Schoorlemmer RM, Peeters GM, van Schoor NM, et al. Relationships between cortisol level, mortality and chronic diseases in older persons. *Clin Endocrinol (Oxf)*. 2009 Dec;71(6):779-86.

6. Cohen S, Janicki-Deverts D, Doyle WJ, et al. Chronic stress, glucocorticoid receptor resistance, inflammation, and disease risk. *Proc Natl Acad Sci U S A*. 2012 Apr 17;109(16):5995-9.
7. Notarianni E. Hypercortisolemia and glucocorticoid receptor-signaling insufficiency in Alzheimer's disease initiation and development. *Curr Alzheimer Res*. 2013 Sep;10(7):714-31.
8. Popp J, Wolfgruber S, Heuser I, et al. Cerebrospinal fluid cortisol and clinical disease progression in MCI and dementia of Alzheimer's type. *Neurobiol Aging*. 2015 Feb;36(2):601-7.
9. Toledo JB, Toledo E, Weiner MW, et al. Cardiovascular risk factors, cortisol, and amyloid-beta deposition in Alzheimer's Disease Neuroimaging Initiative. *Alzheimers Dement*. 2012 Nov;8(6):483-9.
10. Nielsen NR, Kristensen TS, Schnohr P, et al. Perceived stress and cause-specific mortality among men and women: results from a prospective cohort study. *Am J Epidemiol*. 2008 Sep 1;168(5):481-91; discussion 92-6.
11. Carroll BJ. Ageing, stress and the brain. *Novartis Found Symp*. 2002;242:26-36; discussion -45.
12. Wikgren M, Maripuu M, Karlsson T, et al. Short telomeres in depression and the general population are associated with a hypocortisolemic state. *Biol Psychiatry*. 2012 Feb 15;71(4):294-300.
13. Epel ES. Psychological and metabolic stress: a recipe for accelerated cellular aging? *Hormones (Athens)*. 2009 Jan-Mar;8(1):7-22.
14. Kyrou I, Tsigos C. Chronic stress, visceral obesity and gonadal dysfunction. *Hormones (Athens)*. 2008 Oct-Dec;7(4):287-93.
15. Azuma K, Adachi Y, Hayashi H, et al. Chronic Psychological Stress as a Risk Factor of Osteoporosis. *J UOEH*. 2015 Dec 1;37(4):245-53.
16. Kyrou I, Tsigos C. Stress mechanisms and metabolic complications. *Horm Metab Res*. 2007 Jun;39(6):430-8.
17. Schneiderman N, Ironson G, Siegel SD. Stress and health: psychological, behavioral, and biological determinants. *Annu Rev Clin Psychol*. 2005;1:607-28.
18. Kramer AC, Neubauer AB, Stoffel M, et al. Tomorrow's gonna suck: Today's stress anticipation predicts tomorrow's post-awakening cortisol increase. *Psychoneuroendocrinology*. 2019 Aug;106:38-46.
19. Lee JB, Shin YO, Min YK, et al. The effect of Oligonol intake on cortisol and related cytokines in healthy young men. *Nutr Res Pract*. 2010 Jun;4(3):203-7.
20. Nagasawa J, Sugiyama K, Uchimar J. Oxidative stress in hypobaric and normobaric hypoxia and antioxidant effect of Oligonol. *Japan J Mountain Med*. 2010;30:118-24.
21. Shin Y-O, Lee J-B, Min Y-K, et al. Effect of oligonol intake on cortisol and cytokines, and body temperature after leg immersion into hot water. *Food Science and Biotechnology*. 2011;20(3):659-63.
22. Kalman DS, Feldman S, Feldman R, et al. Effect of a proprietary Magnolia and Phellodendron extract on stress levels in healthy women: a pilot, double-blind, placebo-controlled clinical trial. *Nutr J*. 2008 Apr 21;7:11.
23. Talbott SM, Talbott JA, Pugh M. Effect of Magnolia officinalis and Phellodendron amurense (Relora(R)) on cortisol and psychological mood state in moderately stressed subjects. *J Int Soc Sports Nutr*. 2013 Aug 7;10(1):37.
24. Garrison R, Chambliss WG. Effect of a proprietary Magnolia and Phellodendron extract on weight management: a pilot, double-blind, placebo-controlled clinical trial. *Altern Ther Health Med*. 2006 Jan-Feb;12(1):50-4.
25. Available at: <https://www.kff.org/health-reform/issue-brief/the-implications-of-covid-19-for-mental-health-and-substance-use/>. Accessed April 30, 2020.
26. Available at: <https://www.mayoclinic.org/healthy-lifestyle/stress-management/in-depth/stress/art-20046037>. Accessed April 30, 2020.
27. Available at: <https://www.health.harvard.edu/staying-healthy/understanding-the-stress-response>. Accessed April 30, 2020.
28. Available at: <https://www.ncbi.nlm.nih.gov/books/NBK538239/>. Accessed April 30, 2020.
29. Available at: <https://www.ncbi.nlm.nih.gov/books/NBK278995/>. Accessed May 3, 2020.
30. Yarbeygi H, Panahi Y, Sahraei H, et al. The impact of stress on body function: A review. *EXCLI J*. 2017;16:1057-72.
31. Larosa DF, Orange JS. 1. Lymphocytes. *J Allergy Clin Immunol*. 2008 Feb;121(2 Suppl):S364-9; quiz S412.
32. Available at: <https://www.ncbi.nlm.nih.gov/books/NBK8423/>. Accessed May 5, 2020.
33. Pedersen SF, Ho YC. SARS-CoV-2: a storm is raging. *J Clin Invest*. 2020 May 1;130(5):2202-5.
34. Wang X, Xu W, Hu G, et al. SARS-CoV-2 infects T lymphocytes through its spike protein-mediated membrane fusion. *Cell Mol Immunol*. 2020 Apr 7:1-3.
35. Zhang JJ, Dong X, Cao YY, et al. Clinical characteristics of 140 patients infected with SARS-CoV-2 in Wuhan, China. *Allergy*. 2020 Feb 19.
36. Available at: <https://www.apa.org/monitor/2019/05/ce-corner-isolation>. Accessed April 30, 2020.
37. Available at: <https://www.cdc.gov/coronavirus/2019-ncov/daily-life-coping/managing-stress-anxiety.html>. Accessed April 29, 2020.
38. Available at: <https://health.clevelandclinic.org/what-happens-when-your-immune-system-gets-stressed-out/>. Accessed April 30, 2020.
39. Aulinas A, Ramirez MJ, Barahona MJ, et al. Telomeres and endocrine dysfunction of the adrenal and GH/IGF-1 axes. *Clin Endocrinol (Oxf)*. 2013 Dec;79(6):751-9.
40. Tomiyama AJ, O'Donovan A, Lin J, et al. Does cellular aging relate to patterns of allostasis? An examination of basal and stress reactive HPA axis activity and telomere length. *Physiol Behav*. 2012 Apr 12;106(1):40-5.
41. Available at: <https://hort.purdue.edu/newcrop/morton/lychee.html>. Accessed April 30, 2020.
42. Available at: <https://www.maypro.com/products/oligonol®>. Accessed April 30, 2020.
43. Lee N, Shin MS, Kang Y, et al. Oligonol, a lychee fruit-derived low-molecular form of polyphenol mixture, suppresses inflammatory cytokine production from human monocytes. *Hum Immunol*. 2016 Jun;77(6):512-5.
44. Lee J, Shin Y, Murota H. Oligonol supplementation modulates plasma volume and osmolality and sweating after heat load in humans. *J Med Food*. 2015 May;18(5):578-83.
45. Lee JB, Shin YO. Oligonol supplementation affects leukocyte and immune cell counts after heat loading in humans. *Nutrients*. 2014 Jun 24;6(6):2466-77.
46. Lee JB, Shin YO. Beneficial effect of Oligonol supplementation on sweating response under heat stress in humans. *Food Funct*. 2014 Oct;5(10):2516-20.
47. Shin YO, Lee JB, Song YJ, et al. Oligonol supplementation attenuates body temperature and the circulating levels of prostaglandin E2 and cyclooxygenase-2 after heat stress in humans. *J Med Food*. 2013 Apr;16(4):318-23.





Support Healthy Immune Function with Whey Protein



VANILLA FLAVOR



CHOCOLATE FLAVOR

Available in Vanilla and Chocolate Flavors!

Whey protein, packed with vital amino acids, also promotes **glutathione** synthesis.

Glutathione plays an important role in supporting immune balance in the body.¹

Whey fractions help modulate a full range of immune functions.^{2,3}

WHEY PROTEIN CONCENTRATE

- Vanilla or chocolate flavor
- Delivers **20 grams** of protein

Item # 02260 • Whey Protein Concentrate (Vanilla) • 500 grams (17.64 oz.)

Item # 02261 • Whey Protein Concentrate (Chocolate) • 640 grams (22.56 oz.)

1 container **\$22.50** • 4 containers \$19.95 each

Contains milk.

For full product description and to order **Wellness Code® Whey Protein Concentrate**, call **1-800-544-4440** or visit **www.LifeExtension.com**

Use this product as a food supplement only. Do not use for weight reduction.

References: **1.** *Int J Gen Med.* 2011 Jan 25;4:105-13. **2.** *Br J Nutr.* 2000 Nov;84 Suppl 1:S81-9. **3.** *J Dairy Sci.* 2000 Jun;83(6):1187-95.



Highly Absorbable **ASTAXANTHIN**

Astaxanthin is a carotenoid that benefits the brain, heart, skin, and immune system.

Found naturally in seafood and algae, as little as **50%** of **astaxanthin** is normally **absorbed** in the blood-stream.^{1,2}

Life Extension® combines **4 mg** of **astaxanthin** with a blend of four different **phospholipids**, which has been shown to enhance carotenoid **absorption** by **several-fold**.³

References

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

For full product description and to order
Astaxanthin 4 mg with Phospholipids,
call 1-800-544-4440 or
visit www.LifeExtension.com

Item #01923 • 30 softgels
1 bottle \$12
4 bottles \$10.50 each



STRESSED??



Stress releases the hormone **cortisol** throughout the body. Maintaining healthy cortisol levels promotes healthy **immune function**.*

Cortisol-Stress Balance for a greater sense of calm amid today's stressful challenges.

Item #02312 • 30 vegetarian capsules

1 bottle **\$33.75**

4 bottles \$30 each



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

* Available at: <https://www.mayoclinic.org/healthy-lifestyle/stress-management/in-depth/stress/art-20046037>. Accessed May 5, 2020

Relora® is a trademark of Lonza or its affiliates. Oligonol® is a registered trademark of Amino Up Chemical Co., Ltd.



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

OPTIMIZE DIGESTION — and — INTESTINAL BALANCE

Digestive enzymes are essential to the body's **absorption** and optimal utilization of food and all its nutrients.^{1,2}

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

Enhanced Super Digestive Enzymes provides specific **enzymes** required to support the reactions that break down food proteins, fats, carbohydrates, and other nutrients.

Enhanced Super Digestive Enzymes with Probiotics provides the same enzymes that are in **Enhanced Super Digestive Enzymes**—but with the added benefits of the **probiotic** *B. coagulans*.

This **probiotic** creates a protective shield that resists digestion in the stomach, allowing it to fully colonize in the intestines to support digestive health and suppress less beneficial bacteria to improve digestive comfort.^{3,4}

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

Enhanced Super Digestive Enzymes

Item #0201 • 60 vegetarian capsules

1 bottle **\$16.50**

4 bottles \$15 each



Enhanced Super Digestive Enzymes with Probiotics*

Item #0202 • 60 vegetarian capsules

1 bottle **\$21**

4 bottles \$18 each



References

1. *Altern Med Rev.* 2008 Dec;13(4):307-14.
2. *JOP.* 2005 May 10;6(3):206-15.
3. Available at: <http://www.sabinsa.com/newsroom/articles/bacillus-coagulans-probiotic-of-choice-nutracos-march-april-2012.pdf>. Accessed September 30, 2015.
4. Available at: http://www.sabinsa.com/newsroom/WhitePapers/Probiotics_For_Health_And_Well_Being_Nutra.pdf. Accessed September 30, 2015.

* Lactospore® is a registered trademark of Sabinsa Corp.



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.

Pecans

BY LAURIE MATHENA



Pecans are often associated with sugary foods like pecan pie, sweet potato casserole, or marshmallows. But to get the most health benefits, skip the sugar-laden treats and grab a handful of pecans on their own.

Technically a fruit rather than a nut, pecans are high in protein, at **three grams** per ounce. They also contain **healthy fats**.

Heart Health

Pecans are high in healthy fats that are known to promote heart health, like monounsaturated and polyunsaturated fats.

In an eight-week, randomized, controlled study, one group of subjects consumed **68 grams** of pecans with their meals, while a second group did not eat the pecans. After eight weeks, the pecan-eating group experienced a reduction in both LDL cholesterol and total cholesterol.¹

Cancer Prevention

Pecans contain a high amount of a specific type of monounsaturated fat called **oleic acid**.

One important laboratory study showed that oleic acid dramatically lowered the expression of a gene called **Her-2/neu** that is involved in the development of breast cancer.² This is significant, as activation of Her-2/neu is associated with aggressive tumors and a poor prognosis.

This finding is consistent with newer studies showing that adherence to the Mediterranean diet (high in monounsaturated fats like those in pecans) was associated with a reduced risk of breast cancer.³

References

1. *J Am Diet Assoc.* 2000 Mar;100(3):312-8.
2. *Ann Oncol.* 2004 Nov;15(11):1719-21.
3. *Nutrients.* 2018 Mar 8;10(3).

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

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

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

References

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



Item #00925 • 120 vegetarian capsules

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

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



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

SAFE- GUARD Your Skin from Within

Unique ORAL formula provides
Polypodium leucotomos fern
extract along with nicotinamide
and red orange extract.



Item #01938 • 120 vegetarian capsules

1 bottle **\$33**

4 bottles \$30 each

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



This product is not a substitute for topical sunscreens.

Red Orange Complex® is a registered trademark of Bionap S.r.l.

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.

ACTIVE LIFESTYLE & FITNESS

- 01529 Creatine Capsules
- 02318 Keto Brain and Body Boost
- 02020 Super Carnosine
- 02023 Tart Cherry with CherryPURE®
- 02146 Wellness Bar—Chocolate Brownie
- 02147 Wellness Bar—Cookie Dough
- 02246 Wellness Code® Advanced Whey Protein Isolate Vanilla
- 02221 Wellness Code® Muscle Strength & Restore Formula
- 02127 Wellness Code® Plant Protein Complete & Amino Acid Complex
- 02261 Wellness Code® Whey Protein Concentrate Chocolate
- 02260 Wellness Code® Whey Protein Concentrate Vanilla
- 02243 Wellness Code® Whey Protein Isolate Chocolate
- 02242 Wellness Code® Whey Protein Isolate Vanilla
- 02220 Wellness Shake • Chocolate
- 02219 Wellness Shake • Vanilla

AMINO ACIDS

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

BLOOD PRESSURE & VASCULAR SUPPORT

- 01824 Advanced Olive Leaf Vascular Support with Celery Seed Extract
- 02004 Arterial Protect
- 70000 Blood Pressure Monitor Arm Cuff
- 70004 Blood Pressure Monitor Digital Wrist Cuff
- 02497 Endothelial Defense™ Pomegranate Plus
- 02320 NitroVasc™ Boost
- 00984 Optimal BP Management
- 01953 Pomegranate Complete
- 00956 Pomegranate Fruit Extract
- 02024 Triple Action Blood Pressure AM/PM
- 02102 VenoFlow™

BONE HEALTH

- 01726 Bone Restore
- 02123 Bone Restore-Sugar-Free
- 01727 Bone Restore with Vitamin K2
- 01725 Bone Strength Collagen Formula
- 00313 Bone-Up™
- 01963 Calcium Citrate with Vitamin D
- 01506 Dr. Strum's Intensive Bone Formula
- 01476 Strontium Caps

BRAIN HEALTH

- 01524 Acetyl-L-Carnitine
- 01974 Acetyl-L-Carnitine Arginate
- 01008 Blast™
- 01659 Citicoline® (CDP-Choline)
- 02321 Cognitex® Basics
- 02396 Cognitex® Elite
- 02397 Cognitex® Elite Pregnenolone
- 01540 DMAE Bitartrate (dimethylaminoethanol)
- 02006 Dopa-Mind™
- 02212 Focus Tea™
- 01658 Ginkgo Biloba Certified Extract™
- 01527 Huperzine A

- 00020 Lecithin Granules
- 02101 Memory Protect
- 00709 Migra-Eeze™
- 01603 Neuro-Mag® Magnesium L-Threonate Caps
- 02032 Neuro-Mag® Magnesium L-Threonate Powder
- 00888 Optimized Ashwagandha Extract
- 01676 PS (Phosphatidylserine) Caps
- 01327 Vinpocetine

CHOLESTEROL MANAGEMENT

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

DIGESTION SUPPORT

- 53348 Betaine HCl
- 54160 Black Vinegar
- 30747 Digest RC®
- 07136 Effervescent Vitamin C - Magnesium Crystals
- 02021 Enhanced Super Digestive Enzymes
- 02022 Enhanced Super Digestive Enzymes and Probiotics
- 02033 EsophaCool™
- 01737 Esophageal Guardian
- 01706 Extraordinary Enzymes
- 02100 Gastro-Ease™
- 01122 Ginger Force™
- 00605 Regimint
- 01386 TruFiber®

ENERGY MANAGEMENT

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

EYE HEALTH

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

FISH OIL & OMEGAS

- 02311 Clearly EPA/DHA Fish Oil
- 00463 Flaxseed Oil
- 01937 Mega EPA/DHA
- 02218 Mega GLA Sesame Lignans
- 01983 Super Omega-3 EPA/DHA Fish Oil, Sesame Lignans & Olive Extract

- 01988 Super Omega-3 Plus EPA/DHA Fish Oil, Sesame Lignans, Olive Extract, Krill & Astaxanthin
- 01982 Super Omega-3 EPA/DHA Fish Oil, Sesame Lignans & Olive Extract • 120 softgels
- 01985 Super Omega-3 EPA/DHA Fish Oil, Sesame Lignans & Olive Extract • 60 enteric coated softgels
- 01984 Super Omega-3 EPA/DHA Fish Oil, Sesame Lignans & Olive Extract • 120 enteric coated softgels
- 01986 Super Omega-3 EPA/DHA Fish Oil, Sesame Lignans & Olive Extract • 240 softgels
- 01812 Provinal® Purified Omega-7
- 01640 Vegetarian DHA

FOOD

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

GLUCOSE MANAGEMENT

- 01503 CinSulin® with InSea²® and Crominex® 3+
- 01620 CoffeeGenic® Green Coffee Extract
- 02122 Glycemic Guard™
- 00925 Mega Benfotiamine
- 01803 Tri Sugar Shield®

HEART HEALTH

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

HORMONE BALANCE

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

IMMUNE SUPPORT

- 00681 AHCC®
- 02302 Bio-Quercetin
- 01961 Enhanced Zinc Lozenges
- 01704 Immune Modulator with Tinofend®
- 00955 Immune Protect with PARACTIN®
- 02005 Immune Senescence Protection Formula™
- 29727 Kinoko® Gold AHCC
- 24404 Kinoko® Platinum AHCC
- 00316 Kyolic® Garlic Formula 102
- 00789 Kyolic® Reserve
- 01681 Lactoferrin (Apolactoferrin) Caps
- 01903 NK Cell Activator™
- 01394 Optimized Garlic
- 01309 Optimized Quercetin
- 01811 Peony Immune
- 00525 ProBoost Thymic Protein A
- 01708 Reishi Extract Mushroom Complex
- 01906 Standardized Cistanche
- 13685 Ten Mushroom Formula®
- 01097 Ultra Soy Extract
- 01561 Zinc Lozenges

INFLAMMATION MANAGEMENT

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

JOINT SUPPORT

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

KIDNEY & BLADDER SUPPORT

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

LIVER HEALTH & DETOXIFICATION

- 02240 Anti-Alcohol HepatoProtection Complex
- 01651 Calcium D-Glucarate
- 00550 Chlorella
- 01571 Chlorophyllin
- 01922 European Milk Thistle • 60 softgels
- 01925 European Milk Thistle • 120 softgels
- 01522 Milk Thistle • 60 veg capsules
- 02402 FLORASSIST® Liver Restore™
- 01541 Glutathione, Cysteine & C
- 01393 HepatoPro
- 01608 Liver Efficiency Formula
- 01534 N-Acetyl-L-Cysteine

- 00342 PectaSol-C® Modified Citrus Pectin Powder
- 01080 PectaSol-C® Modified Citrus Pectin Capsules
- 01884 Silymarin
- 02361 SOD Booster

LONGEVITY & WELLNESS

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

MEN'S HEALTH

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

MINERALS

- 01661 Boron
- 02107 Extend-Release Magnesium
- 30731 Ionic Selenium
- 01677 Iron Protein Plus
- 02403 Lithium
- 01459 Magnesium Caps
- 01682 Magnesium (Citrate)
- 01328 Only Trace Minerals
- 01504 Optimized Chromium with Crominex® 3+
- 02309 Potassium with Extend-Release Magnesium
- 01740 Sea-Iodine™
- 01879 Se-Methyl L-Selenocysteine
- 01778 Super Selenium Complex
- 00213 Vanadyl Sulfate
- 01813 Zinc Caps

MISCELLANEOUS

- 00577 Potassium Iodide
- 00657 Solarshield® Sunglasses

MOOD & STRESS MANAGEMENT

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

MULTIVITAMINS

- 02199 Children's Formula Life Extension Mix™
- 02498 Comprehensive Nutrient Packs ADVANCED
- 02354 Life Extension Mix™ Capsules
- 02364 Life Extension Mix™ Capsules without Copper
- 02356 Life Extension Mix™ Powder
- 02355 Life Extension Mix™ Tablets
- 02357 Life Extension Mix™ Tablets with Extra Niacin
- 02365 Life Extension Mix™ Tablets without Copper
- 02292 Once-Daily Health Booster • 30 softgels
- 02291 Once-Daily Health Booster • 60 softgels
- 02313 One-Per-Day Tablets
- 02317 Two-Per-Day Capsules • 60 capsules
- 02314 Two-Per-Day Capsules • 120 capsules
- 02316 Two-Per-Day Tablets • 60 tablets
- 02315 Two-Per-Day Tablets • 120 tablets

NERVE & COMFORT SUPPORT

- 02202 ComfortMAX™
- 02303 PEA Discomfort Relief

PERSONAL CARE

- 01006 Biosil™ • 5 mg, 30 veg capsules
- 01007 Biosil™ • 1 fl oz
- 00321 Dr. Proctor's Advanced Hair Formula
- 00320 Dr. Proctor's Shampoo
- 02322 Hair, Skin & Nails Collagen Plus Formula
- 01278 Life Extension Toothpaste
- 00408 Venotone
- 00409 Xyliwhite Mouthwash
- 02304 Youthful Collagen
- 02252 Youthful Legs

PET CARE

- 01932 Cat Mix
- 01931 Dog Mix

PROBIOTICS

- 01622 Bifido GI Balance
- 01825 FLORASSIST® Balance
- 02125 FLORASSIST® GI with Phage Technology
- 01821 FLORASSIST® Heart Health
- 02250 FLORASSIST® Mood Improve
- 02208 FLORASSIST® Nasal
- 02120 FLORASSIST® Oral Hygiene
- 02203 FLORASSIST® Prebiotic
- 01920 FLORASSIST® Throat Health
- 52142 Jarro-Dophilus® for Women
- 00056 Jarro-Dophilus EPS® • 60 veg capsules
- 21201 Jarro-Dophilus EPS® • 120 veg capsules
- 01038 Theralac® Probiotics
- 01389 TruFlora® Probiotics

SKIN CARE

- 80157 Advanced Anti-Glycation Peptide Serum
- 80165 Advanced Growth Factor Serum
- 80170 Advanced Hyaluronic Acid Serum
- 80154 Advanced Lightening Cream
- 80155 Advanced Peptide Hand Therapy
- 80175 Advanced Probiotic-Fermented Eye Serum
- 80152 Advanced Triple Peptide Serum
- 80140 Advanced Under Eye Serum with Stem Cells
- 80137 All-Purpose Soothing Relief Cream
- 80139 Amber Self MicroDermAbrasion
- 80118 Anti-Aging Mask
- 80151 Anti-Aging Rejuvenating Face Cream
- 80153 Anti-Aging Rejuvenating Scalp Serum
- 80176 Collagen Boosting Peptide Cream
- 80156 Collagen Boosting Peptide Serum

80169 Cucumber Hydra Peptide Eye Cream
80141 DNA Support Cream
80167 Environmental Support Serum
80163 Eye Lift Cream
80123 Face Rejuvenating Anti-Oxidant Cream
80109 Hyaluronic Facial Moisturizer
80110 Hyaluronic Oil-Free Facial Moisturizer
80138 Hydrating Anti-Oxidant Facial Mist
00661 Hydroderm
80103 Lifting & Tightening Complex
80168 Melatonin Advanced Peptide Cream
80114 Mild Facial Cleanser
80172 Multi Stem Cell Hydration Cream
80159 Multi Stem Cell Skin Tightening Complex
80122 Neck Rejuvenating Anti-Oxidant Cream
80174 Purifying Facial Mask
80150 Renewing Eye Cream
80142 Resveratrol Anti-Oxidant Serum
01938 Shade Factor™
02129 Skin Care Collection Anti-Aging Serum
02130 Skin Care Collection Day Cream
02131 Skin Care Collection Night Cream
80166 Skin Firming Complex
02096 Skin Restoring Ceramides
80130 Skin Stem Cell Serum
80164 Skin Tone Equalizer
80143 Stem Cell Cream with Alpine Rose
80148 Tightening & Firming Neck Cream
80161 Triple-Action Vitamin C Cream
80162 Ultimate MicroDermabrasion
80173 Ultimate Peptide Serum
80160 Ultra Eyelash Booster
80101 Ultra Wrinkle Relaxer
80113 Under Eye Refining Serum
80104 Under Eye Rescue Cream
80171 Vitamin C Lip Rejuvenator
80129 Vitamin C Serum
80136 Vitamin D Lotion
80102 Vitamin K Cream

SLEEP

01512 Bioactive Milk Peptides
02300 Circadian Sleep
01551 Enhanced Sleep with Melatonin
01511 Enhanced Sleep without Melatonin
02234 Fast-Acting Liquid Melatonin
01669 Glycine
02308 Herbal Sleep PM
01722 L-Tryptophan
01668 Melatonin • 300 mcg, 100 veg capsules
01083 Melatonin • 500 mcg, 200 veg capsules
00329 Melatonin • 1 mg, 60 capsules
00330 Melatonin • 3 mg, 60 veg capsules
00331 Melatonin • 10 mg, 60 veg capsules
00332 Melatonin • 3 mg, 60 veg lozenges
02201 Melatonin IR/XR
01787 Melatonin 6 Hour Timed Release
300 mcg, 100 veg tablets
01788 Melatonin 6 Hour Timed Release
750 mcg, 60 veg tablets
01786 Melatonin 6 Hour Timed Release
3 mg, 60 veg tablets
01721 Optimized Tryptophan Plus
01444 Quiet Sleep
01445 Quiet Sleep Melatonin

VITAMINS

01533 Ascorbyl Palmitate
00920 Benfotiamine with Thiamine
00664 Beta-Carotene
01945 BioActive Complete B-Complex
00102 Biotin
00084 Buffered Vitamin C Powder
02229 Fast-C® and Bio-Quercetin Phytosome
02075 Gamma E Mixed Tocopherol Enhanced with
Sesame Lignans
02070 Gamma E Mixed Tocopherol/Tocotrienols
01913 High Potency Optimized Folate
01674 Inositol Caps Liquid Emulsified
02244 Liquid Vitamin D3 • 2,000 IU, 1 fl oz
02232 Liquid Vitamin D3 • 2,000 IU, 1 fl oz, mint
01936 Low-Dose Vitamin K2
01536 Methylcobalamin • 1 mg, 60 veg lozenges
01537 Methylcobalamin • 5 mg, 60 veg lozenges
00065 MK-7
00373 No Flush Niacin
01939 Optimized Folate (L-Methylfolate)
01217 Pyridoxal 5'-Phosphate Caps
01400 Super Absorbable Tocotrienols
02334 Super K
02335 Super K Elite
01863 Super Vitamin E
02028 Vitamin B5 (Pantothenic Acid)
01535 Vitamin B6
00361 Vitamin B12
02228 Vitamin C and Bio-Quercetin Phytosome
1,000 mg, 60 veg tablets
02227 Vitamin C and Bio-Quercetin Phytosome
1,000 mg, 250 veg tablets
01753 Vitamin D3 • 25 mcg (1,000 IU), 90 softgels
01751 Vitamin D3 • 25 mcg (1,000 IU), 250 softgels
01713 Vitamin D3 • 125 mcg (5,000 IU), 60 softgels
01718 Vitamin D3 • 175 mcg (7,000 IU), 60 softgels
01758 Vitamin D3 with Sea-Iodine™
02040 Vitamins D and K with Sea-Iodine™

WEIGHT MANAGEMENT & BODY COMPOSITION

00658 7-Keto® DHEA Metabolite • 25 mg, 100 capsules
02479 7-Keto® DHEA Metabolite • 100 mg, 60 veg capsules
01509 Advanced Anti-Adipocyte Formula
01807 Advanced Appetite Suppress
02207 AMPK Metabolic Activator
01823 CalReduce Selective Fat Binder
02478 DHEA Complete
01738 Garcinia HCA
01292 Integra-Lean®
01908 Mediterranean Trim with Sinetrol™ -XPur
01492 Optimized Irvingia with Phase 3™ Calorie Control Complex
01432 Optimized Saffron with Satiereal®
00818 Super CLA Blend with Sesame Lignans
01902 Waist-Line Control™
02151 Wellness Code® Appetite Control

WOMEN'S HEALTH

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

THE VERSATILE BENEFITS OF PYCNOGENOL®

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



1
DAILY

*ARTERIAL PROTECT

Item #02004 • 30 vegetarian capsules

1 bottle \$33

4 bottles \$29 each



1
DAILY

+**VENOFLOW™

Item #02102 • 30 vegetarian capsules

1 bottle \$39

4 bottles \$36 each



*PYCNOGENOL®

French Maritime Pine Bark Extract

Item #01637 • 60 vegetarian capsules

1 bottle \$48

4 bottles \$45 each

Arterial Protect

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

VenoFlow™

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

Pycnogenol®

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

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



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

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

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

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.

Highly Absorbable **CURCUMIN**

Curcumin Elite™ utilizes a new patented **turmeric extract** that results in **45 times** greater bioavailability of active or free **curcuminoids** and **270 times** better **total curcuminoid absorption** compared to standard curcumin.

Curcumin Elite™ contributes to *higher blood levels* of bio-active curcuminoids that **stay in the body longer** to provide more health benefits.

Advanced Curcumin Elite™ contains the same optimal **500 mg** potency of **curcumin** with the added benefits of **ginger** and additional **turmeric** actives.

*45 times Greater
Bioavailability
At a Lower Price*



Item #02407
500 mg, 60 vegetarian capsules
1 bottle **\$24**
.....
4 bottles \$22 each



Item #02324
500 mg curcumin + gingerol, 30 softgels
1 bottle **\$20**
.....
4 bottles \$18 each

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



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



The Science of a Healthier Life™

PO BOX 407198
FORT LAUDERDALE, FLORIDA 33340-7198



IN THIS EDITION OF *LIFE EXTENSION*® MAGAZINE



7 WHAT IF COVID-19 SYMPTOMS WORSEN?

Currently available therapies may reduce the risk of a **SARS-CoV-2** patient requiring **ventilator** support.



28 LITHIUM: CRITICAL FOR OVERALL HEALTH

Lithium, by inhibiting the *enzyme* **GSK-3**, can promote longevity, slow brain aging, and improve health parameters.



36 WHEN IMMUNE FUNCTION "FALLS OFF A CLIFF"

Standardized botanicals improve protective **immune factors** while *reducing* **pro-inflammatory** cytokines such as **interleukin-6** (IL-6).



48 DHEA PROMOTES QUALITY OF LIFE

DHEA replacement can improve quality of life and reduce the risk of degenerative disorders.



58 NATURAL APPROACHES TO IMPROVE IMMUNE FUNCTION

Three **plant-based compounds** can *improve* **immune function** by augmenting **natural killer cells** and **T cells** that decline during **immune senescence**.



78 REDUCE ADVERSE EFFECTS OF STRESS

Ongoing stress triggers **high levels** of **cortisol**, which can weaken immune function.

VISIT US ONLINE AT [LIFEEXTENSION.COM](https://www.lifeextension.com)