



The Science of a Healthier Life™

LifeExtension.com

February 2020

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LIFE EXTENSION® MAGAZINE: NEW LOOK—SAME GREAT SCIENCE NEWS



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**STEM CELL**  
*Renewal*



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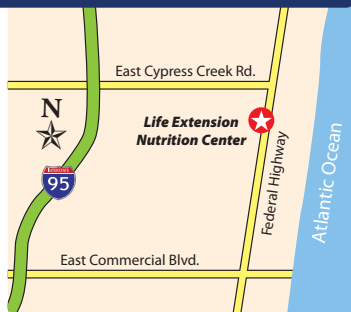
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### Scientific Advisory Board

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### Contributors

Michael Downey • Chris Fern • Susan Goldschein • David Greene

Jean Halstead • Laurie Mathena • Christian Mendez • Paul Henry Wand, MD

### Advertising

Vice President of Marketing • Rey Searles • [rsearles@lifeextension.com](mailto:rsearles@lifeextension.com)

National Advertising Manager • JT Hroncich • 404-347-4170

### Senior Director of Sales and Business Development

Carolyn Bouchard • [cbouchard@lifeextension.com](mailto:cbouchard@lifeextension.com) • 954-202-7685

### Circulation & Distribution

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Editorial offices: 954-766-8433 • fax: 954-491-5306

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Wellness specialists: 800-226-2370 • Email: [wellness@LifeExtension.com](mailto:wellness@LifeExtension.com)

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## 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](http://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, FAFAP**, 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.





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



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



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



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



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



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



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

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



**Dipnarine Maharaj MD, MB, ChB, FRCP (Glasgow), FRCP (Edinburgh), FRCPath., FACP**, 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](http://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.





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Can't  
Compete**

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- 12 times the vitamin B12
- 10 times the biotin
- 10 times the selenium
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- 2.5 times the vitamin B3
- 2 times the vitamin D
- 2 times the vitamin E
- 2 times the zinc

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# Slash Decades from Your Age-Related Disease Burden

*Heart Failure has grown to an epidemic involving multi-year suffering, hospital confinement and high medical expenditures.*



WILLIAM FALOON

The **map** on this page reveals sharply varying **heart failure** death rates, depending on the **region** of the United States.

The dark **red** areas with the **high-est** death rates represent population groups who often engage in dangerous lifestyles and do little to **prevent** age-related disorders.

This map is corroborated by a study published in ***The Lancet Public Health*** showing marked differences in the “**age-related disease burden**” among **countries**.<sup>1</sup>

In a startling revelation, a **76-year-old** in **Japan** and **46-year-old** in **Papua, New Guinea** have the same level of

age-related **health problems** as an average **65-year-old** worldwide.<sup>1</sup>

The **United States** ranked **54<sup>th</sup>** on this list, between **Algeria** and **Iran**.<sup>1,2</sup>

The **age-related disease** differences among countries, along with **maps** showing wide discrepancies across different regions in the United States, help validate the degree of **control** we exert over our personal health.

I’ve copied **maps** of the United States in this article showing wide variations in **disease incidence**, much of them having to do with **controllable** risk factors.

Much more can be done to forestall the **disease burden** of maturing Americans.

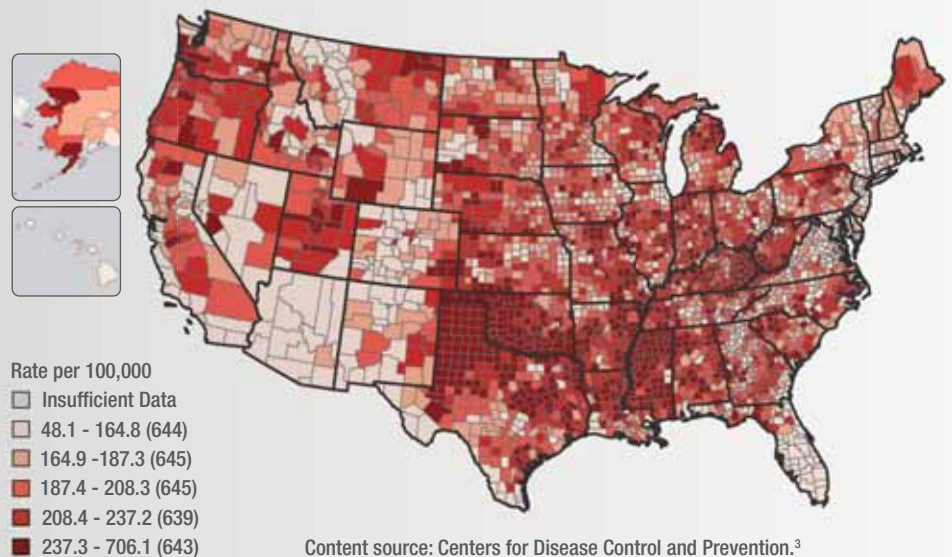
For **40** consecutive years, our **Life Extension®** group has advocated for nationwide enactment of proven **age-delaying** strategies.

## Death from Heart Failure Varies by Geography

The map to the right shows the rate of death from heart failure by county during 2014-2016.

Reference to specific commercial products, manufacturers, companies, or trademarks does not constitute its endorsement or recommendation by the U.S. Government, Department of Health and Human Services, or Centers for Disease Control and Prevention.

This material is otherwise available on the agency website for no charge.





## You Control Disease Risk and How Old You Feel!

**NEW GUINEA: 46-year-old = 65-year-old**

**JAPAN: 76-year-old = 65-year-old**

A 76-year-old in Japan and 46-year-old in Papua, New Guinea have the same age-related disease burdens.

### 30-Year Difference in Age-Related Disease Burdens

Measuring population ageing: an analysis of the Global Burden of Disease Study 2017. *Lancet Public Health*. 2019 Mar;4(3):e159-e67.

Some people misunderstand the mission of **Life Extension**®.

They think we only seek to extend the lives of elderly people, regardless of how many degenerative disorders they suffer.

To the contrary, we advocate aggressive, **preventive** strategies to reduce disease risks.

Epidemiological data reveal most long-lived groups enjoy reduced **age-related disease burdens**.<sup>4,5</sup> Such

“**healthy aging**” usually translates into longer lifespans.

An exception is the United States. We rank number **34** in **life expectancy**,<sup>6</sup> but come in at **54** as it relates to our burden of **age-related disease**.<sup>1,2</sup>

This means that while Americans live **longer** than in many other countries, we suffer more degenerative afflictions that diminish **quality-of-life**.

Readers of **Life Extension**® magazine follow healthier lifestyle patterns to reduce their age-related disease burden.

### More Money Does Not Always Translate to Better Health

Americans spend more healthcare dollars per capita than people in *any* other country.

Yet overall health rankings often show the United States coming in last among developed countries.

Some blame **conventional medicine** for delivering longer lifespans but failing to extinguish our burden of chronic-disorders.

The map on this page, however, depicts sharp contrasts in life expectancy in different **regions** of the United States.

A lot of this is attributable to **socio-economic** differences. People live **longer** in safer neighborhoods with higher-quality health care, a cleaner environment, and better **life-style choices**.

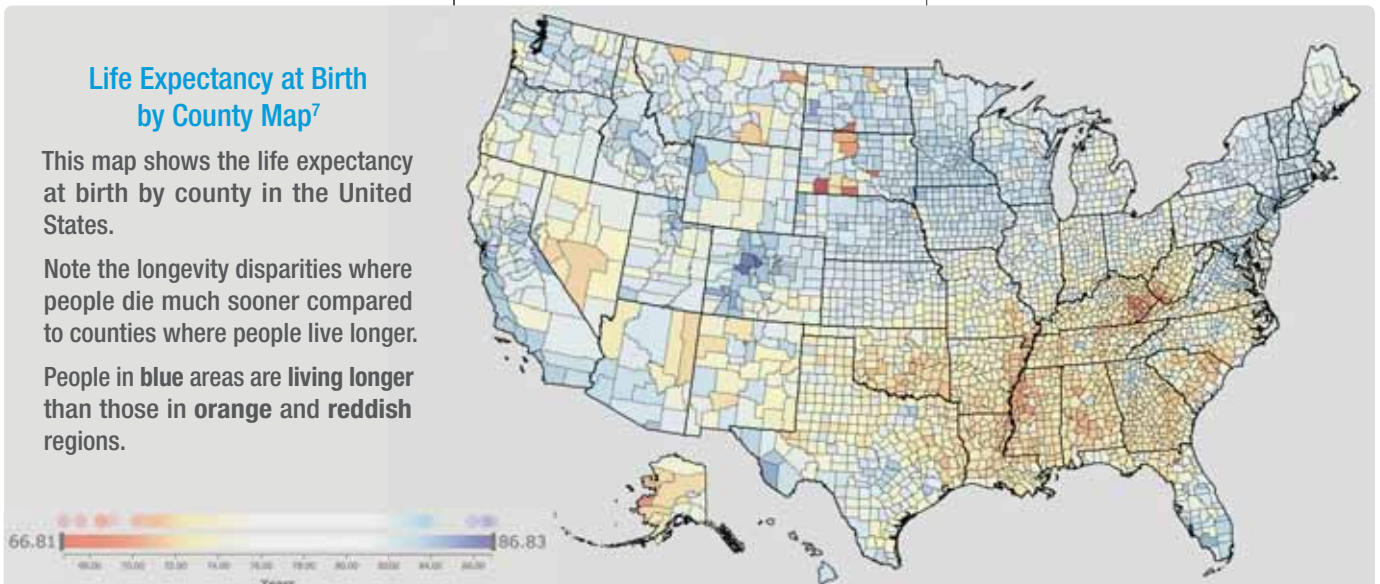
While major problems exist with how medicine is priced and practiced in the United States, much of the **higher age-related disease burden** (and reduced longevity) is **self-inflicted**, such as eating an unhealthy **diet**.

### Life Expectancy at Birth by County Map<sup>7</sup>

This map shows the life expectancy at birth by county in the United States.

Note the longevity disparities where people die much sooner compared to counties where people live longer.

People in **blue** areas are living longer than those in **orange** and **reddish** regions.



Source: Institute for Health Metrics Evaluation. Used with permission. All rights reserved.



A **Mayo Clinic** study shows that less than **3%** of Americans meet even the basic criteria for a “healthy lifestyle.”<sup>9</sup>

I’d like to think most of you fit into this “healthy lifestyle” category, but we are all challenged to do *everything* right.

### Factors Influencing Longevity

Huge discrepancies of **disease burden** and **life expectancy** exist among countries around the world.

A lot has to do with high infant and maternal mortality, infectious disease prevalence, poor sanitation, and lack of access to clean water in less developed countries.

And while these factors appear obvious today, they were met with fierce skepticism in the past.

For instance, it required meticulous research by **Dr. John Snow** in the mid-1800s to demonstrate that ingesting **feces-laden water** was the culprit behind **cholera** and other water-borne infections.<sup>14</sup>

Physicians in **1854** attributed **cholera** to other factors that characterized **London** at that time. Dr. Snow spent years proving them wrong.

Rational decision making has not improved much on a relative basis since Dr. Snow’s time. This can be seen in geographic regions where scant attention is paid to healthy living, including high prevalences of **obesity** and **tobacco** use.

The penalty for **unhealthy** choices is a **higher** burden of **age-related diseases** and **shorter lifespans**.

The longevity benefits associated with one’s healthy lifestyle are well documented. Yet most Americans are failing to take meaningful steps to slash their **age-related disease burden**.

### In This Month’s Issue

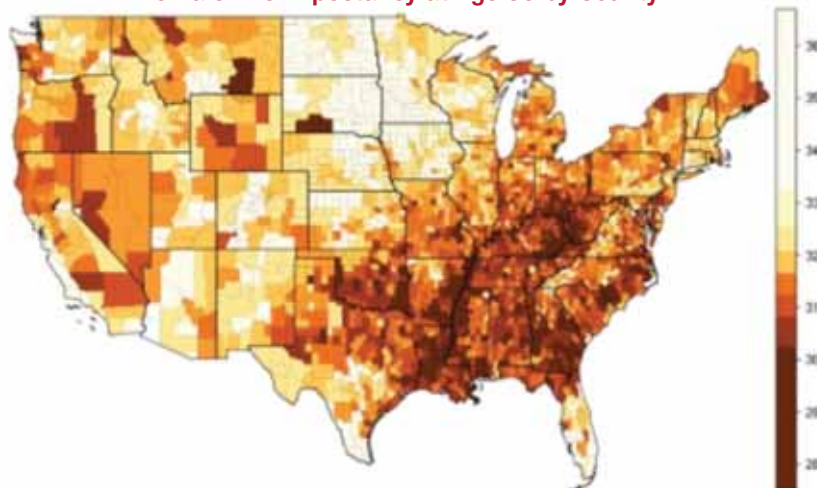
Despite impressive research findings published over the past 25 years, most Americans have insufficient or deficient **vitamin D** levels. A review article on page 64 describes new studies revealing the whole-health benefits of this low-cost supplement.

The data on the benefits of **curcumin** keep growing stronger while the **cost** of highly **absorbable** turmeric extract has dropped.

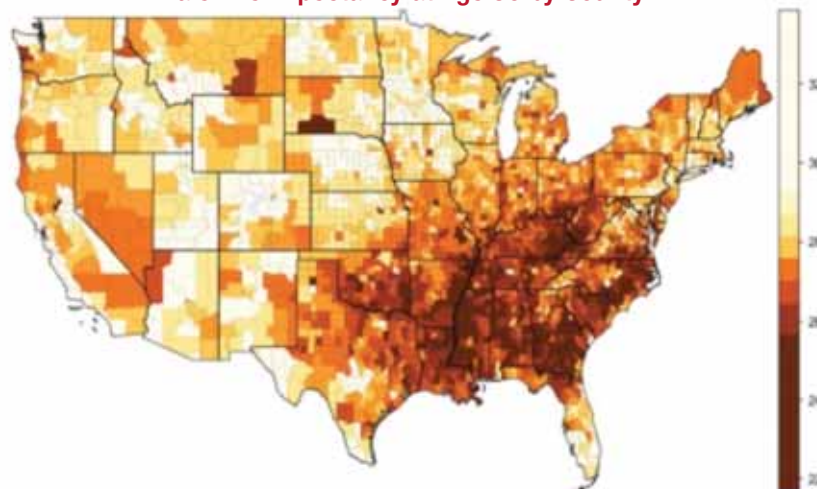
The article on page 32 of this issue describes findings indicating curcumin is even more beneficial than previously thought.

As people age, levels of cellular **NAD<sup>+</sup>** markedly decline. Published findings are uncovering additional mechanisms showing that boosting **NAD<sup>+</sup>** can help thwart multiple age-related disorders.

Female Life Expectancy at Age 50 by County



Male Life Expectancy at Age 50 by County



### Longevity Disparity Of Older Americans at Age 50 in United States<sup>8</sup>

These maps show the average number of years a 50-year-old can expect to live.

Note the longevity disparities in regions where people die much sooner compared to those where people are living longer.

The maximal life expectancy differences of about **10 years** reflect averages, and do not take in account the aggressive **preventative** strategies utilized by most readers of **Life Extension<sup>®</sup> Magazine**.

**Dry eye** afflicts **34%** of people worldwide. A low-cost **berry extract** led to a **72% improvement** in dry-eye-symptom scores. See the article on page 42 for details.

**SAMe** was introduced to the United States by **Life Extension®** in **1997**. It became popular among those suffering severe mood disorders. New findings reveal SAMe has **anti-aging** properties by improving **DNA methylation**. The article on page 50 describes these data.

### Super Sale Prices

Just once a year, we **discount** prices on all the **nutrients** used by our supporters.

These discounts apply to updated versions of popular formulas that are designed to **delay** many underlying factors involved in **biological aging**.

Long-term supporters use the month of January to **stock up** on nutrients they use throughout the year.

The Super Sale pricing, volume discounts, and rebates on future purchases add up to significant savings.

To order your supplement staples at low **Super Sale** prices, please call **1-800-544-4440** (24 hours) by **February 3, 2020**.

For longer life,

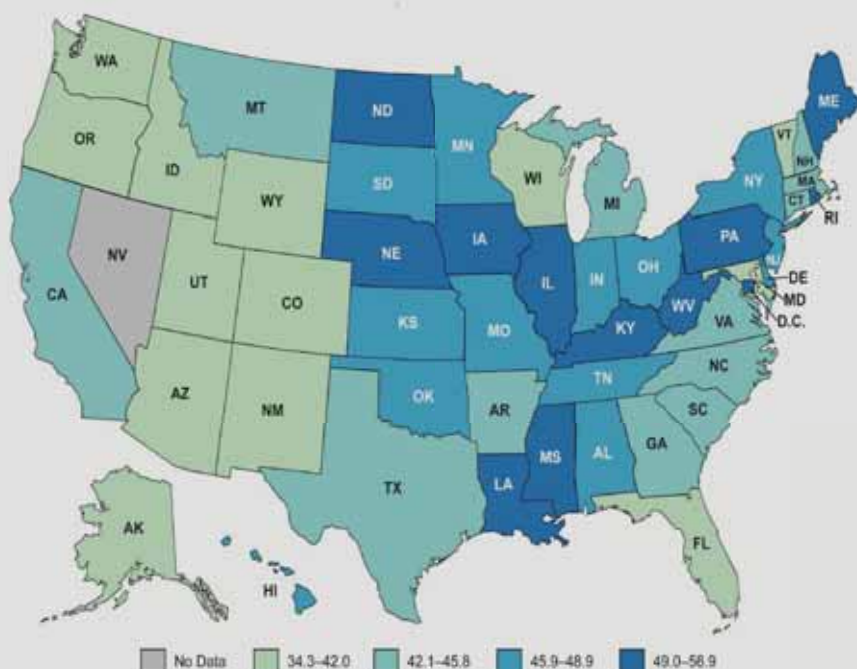


William Faloon, Co-Founder  
Life Extension Buyers Club

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### Colorectal Cancer Incidence Rates\* by State, 2007†



### Impact Statement

In this map, colorectal cancer incidence rates by state are displayed for diagnosis year 2007. The states are divided into groups based on the rates at which people developed colorectal cancer in 2007. The rates are the numbers out of 100,000 people who developed colorectal cancer each year.<sup>15</sup>

\*Rates are per 100,000 and are age-adjusted to the 2000 U.S. standard population.

†Source: U.S. Cancer Statistics Working Group. United States Cancer Statistics: 1999–2007 Incidence and Mortality Web-based Report. Atlanta (GA): Department of Health and Human Services, Centers for Disease Control and Prevention, and National Cancer Institute; 2010. Available at: <http://www.cdc.gov/uscs>.

Reference to specific commercial products, manufacturers, companies, or trademarks does not constitute its endorsement or recommendation by the U.S. Government, Department of Health and Human Services, or Centers for Disease Control and Prevention. This material is otherwise available on the agency website for no charge.

Content source: Centers for Disease Control and Prevention.





## Life Expectancy Inequalities Among U.S. Counties (1980-2014)

A study published in **JAMA Internal Medicine** concluded:

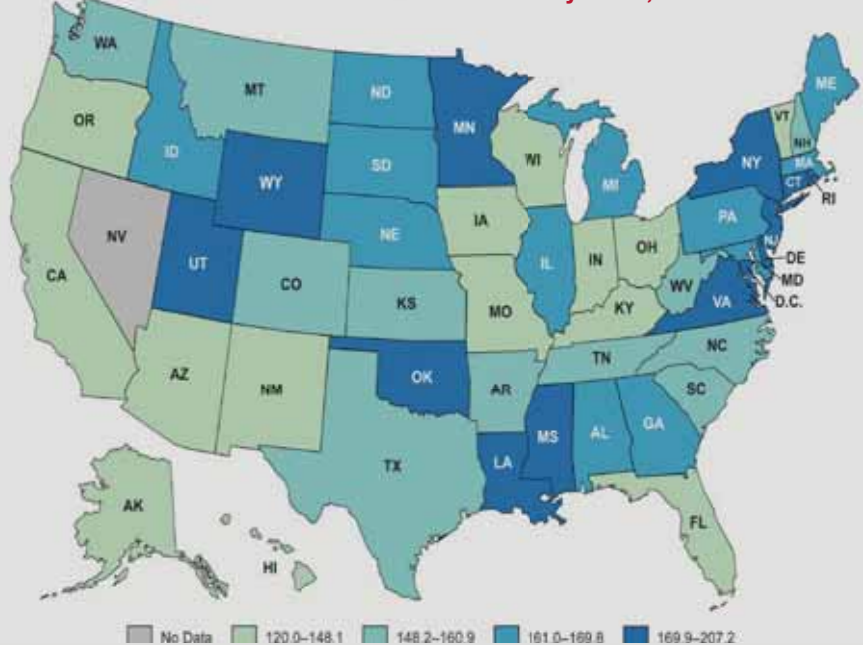
*“Geographic disparities in life expectancy among U.S. counties are large and increasing.*

*Much of the variation in life expectancy among counties can be explained by a combination of socioeconomic and race/ethnicity factors, behavioral and metabolic risk factors, and health care factors.*

*Policy action targeting socioeconomic factors and behavioral and metabolic risk factors may help reverse the trend of increasing disparities in life expectancy in the United States.”<sup>10</sup>*

This report published by the **American Medical Association** is consistent with other data showing remarkable differences in longevity based on factors we largely can **control**.<sup>11-13</sup>

### Prostate Cancer Incidence Rates\* by State, 2007†



### Impact Statement

In this U.S. map, prostate cancer incidence rates by state are displayed for diagnosis year 2007. The states are divided into groups based on the rates at which men developed prostate cancer in 2007. The rates are the numbers out of 100,000 men who developed prostate cancer each year.<sup>16</sup>

\*Rates are per 100,000 and are age-adjusted to the 2000 U.S. standard population.

†Source: U.S. Cancer Statistics Working Group. United States Cancer Statistics: 1999–2007 Incidence and Mortality Web-based Report. Atlanta (GA): Department of Health and Human Services, Centers for Disease Control and Prevention, and National Cancer Institute; 2010. Available at: <http://www.cdc.gov/uscs>.

Reference to specific commercial products, manufacturers, companies, or trademarks does not constitute its endorsement or recommendation by the U.S. Government, Department of Health and Human Services, or Centers for Disease Control and Prevention.

This material is otherwise available on the agency website for no charge.

Content source: Centers for Disease Control and Prevention.

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EPA/DHA fish oil, sesame lignans and olive extract

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

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Specialized **Pro-Resolving Mediators (SPMs)** support a healthy relationship with inflammatory factors in our aging bodies.

**SPMs** help:

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# In the News

## Advisory Panel Recommends FDA Approve Wider Use of Fish Oil Drug

A study published in the *New England Journal of Medicine* in early **2019** showed remarkable benefits in people taking **higher**-doses (**4,000 mg/day**) of a **fish oil** drug that consisted only of **EPA**.<sup>1</sup>

There was a **25% reduction** in a composite of cardiovascular death, nonfatal myocardial infarction, nonfatal stroke, coronary revascularization, or unstable angina in those using this fish oil drug.

The study observed several other benefits including:<sup>1</sup>

- Cardiovascular death reduced by **20%**
- Fatal or nonfatal heart attacks reduced by **31%**
- Fatal or nonfatal stroke reduced by **28%**
- Urgent or emergent coronary revascularization reduced by **35%**
- Hospitalization for unstable angina reduced by **32%**

This fish oil drug (Vascepa®) is marketed to doctors as **fish oil** that lowers **triglycerides** without raising **LDL cholesterol**.<sup>2</sup>

To the physician, this may sound appealing compared to a competitive **fish oil drug** called **Lovaza®**, which contains **EPA** and **DHA**.



What is troubling, however, is that patients taking the **EPA-only** fish oil drug (Vascepa®) are unlikely to take other fish oil supplements. This ignores the important role of the **DHA** component of the omega-3 family on life-sustaining processes, especially **brain** and **eye** health.

The estimated out-of-pocket cost, assuming no insurance coverage, is about **\$300 a month** for this **EPA-only** fish oil drug.

This is **7-times higher** than what a comparable amount of **EPA+DHA** can be obtained for from dietary supplements.

A panel of experts **unanimously recommended** in November 2019 that the **FDA** allow wider use of this fish-oil-based drug.<sup>3</sup>

**Editor's Note:** The media provided favorable coverage to the FDA's scientific advisory panel's endorsement of this **fish oil drug**, but often omitted that these same omega-3 potencies are available as low cost supplements that don't require a prescription.

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## Frailty in Older Adults Linked with Decreased Nutrient Levels

Lower blood levels of several nutrients are associated with a greater risk of frailty among older adults, reported an article in *The Journal of the American Medical Directors Association*.\*

Participants included 4,068 people in The Irish Longitudinal Study on Ageing who were aged 50 or older. They underwent frailty assessments using three different instruments, and their blood samples were tested for folate, vitamin B12, vitamin D, lutein, and zeaxanthin.

“Frailty is characterized by multi-system loss of physiological reserve, systemic decompensation in response to stressors, and increased risk of adverse outcomes including falls, disability, and mortality,” the authors stated.

The instruments used to measure participants’ frailty were the Frailty Phenotype, the Frailty Index, and the FRAIL Scale (fatigue, resistance, ambulation, illnesses, and loss of weight).

“Models were adjusted for sociodemographic, lifestyle, health, and seasonal factors,” researchers explained.

**Increases in frailty** using all three methods of assessment were associated with **lower levels of lutein, zeaxanthin and vitamin D. Pre-frailty** was associated with **lower levels of lutein and vitamin D.**

**Editor’s Note:** “Our data suggest that low micronutrient status has potential as an easily modifiable marker and intervention target for frailty,” the authors concluded.

\* *J Am Med Dir Assoc.* 2019 Aug 7.







## Increased Omega-3 Linked to Decreased Asthma Symptoms

A study published in the *International Journal of Environmental Research and Public Health* found that higher levels of omega-3 fatty acids are associated with a lower risk of asthma symptoms.\*

The participants were 642 employees of a fish processing factory, who had a higher-than-average intake of fish.

Of these individuals, **8%** currently had asthma, **11%** had asthma symptoms, and **26%** experienced nonspecific bronchial hyperresponsiveness (a hallmark of asthma also associated with COPD).

Participants' blood samples were analyzed for levels of **omega-3** and **omega-6** fatty acids.

"We found that certain types of **omega-3** (from marine oils) were significantly associated with a decreased risk of having asthma or asthma-like symptoms by up to **62%**."

High **omega-6** consumption (from vegetable oils), on the other hand, was associated with an increased risk by up to **67%**," said coauthor Dr. Andreas Lopata.

This study corroborates previous data showing most people need to increase omega-3s and reduce dietary intake of **omega-6** fats.

**Editor's Note:** "Asthma incidence has nearly doubled in the past 30 years and about **half** of asthma patients do not get any benefit from the drugs available to treat it. So, there's a growing interest in non-drug treatment options," Dr. Lopata asserted.

\* *Int J Environ Res Public Health*. 2018 Dec 25;16(1).

## Antidepressant Drug Side Effect Relieved by Pycnogenol

Pycnogenol, a compound occurring in maritime **pine bark**, helps lower the incidence of sexual dysfunction occurring as a side effect of antidepressant therapy, according to a study reported in *Physiology International*.\*

The investigation included 20 men and 47 women diagnosed with a depressive episode or recurrent depressive disorder who had responded to treatment with escitalopram (sold under brand name Lexapro®), a selective serotonin reuptake inhibitor (SSRI) antidepressant.

Participants were randomized to receive either **50 mg** of Pycnogenol daily, in combination with escitalopram, or escitalopram only, for four months.

At the first visit and during subsequent monthly examinations, the subjects were evaluated for depressive episode severity, sexual function, blood pressure and other factors.

During the study, depression significantly declined in both groups. After a month of treatment, those who received Pycnogenol experienced a significant **improvement** in **sexual function** scores, while in the group that received escitalopram only, scores remained unchanged.

**Editor's Note:** The effects associated with Pycnogenol in this study are based on its ability to improve endothelial function via its antioxidant, vasodilatory, anticoagulant and anti-inflammatory actions, researchers said.

\* *Physiol Int.* 2019 Mar 1;106(1):59-69.





## Selenium Lowers Risk of Hospital ICU Mortality

Results of a meta-analysis reported in the journal *Medicine* found a lower risk of mortality among intensive care unit (ICU) patients who were given selenium, an antioxidant mineral.\*

For the meta-analysis, researchers selected 19 randomized, controlled trials that included 3,341 critically ill patients. Intravenous selenium was given to 1,694 individuals, while 1,647 were in the control group. Except for four of the trials, daily doses of selenium varied during the duration of each trial. Treatment duration ranged from 4.1 days to more than 28 days.

Patients who received selenium had a **14%** lower risk of dying during the trial, compared to those who received a placebo or no treatment.

When the nine trials that reported length of ICU stay were analyzed, no significant difference was observed between those people who received selenium and the control subjects. However, selenium supplementation was associated with a shorter total hospital stay.

**Editor's Note:** The authors concluded that, "The current evidence suggests that the use of selenium could cause reduction in overall mortality and may shorten the hospital length-of-stay in critically ill patients."

\* *Medicine (Baltimore)*. 2019 May; 98(20): e15473.



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BY SUSAN GOLDSCHHEIN



# NAD<sup>+</sup> Promotes Stem Cell Renewal and Regenerates Mitochondria





**Life Extension®** receives many inquiries about **stem cell infusion therapies** offered in the United States and other countries.

Our current view from small **human** trials is that there may be a benefit to infusions of **exosomes** that are naturally **secreted** from healthy stem cells.

Stem cell **exosomes** have **regenerative** properties that help restore **functional cells** needed to maintain tissue and organ viability.

Overlooked when considering **exosome** treatments is the ability to **rejuvenate** existing **stem cell pools** utilizing approaches many of you *already* follow.

This includes activating **AMPK** and restoring youthful levels of **sirtuins** and **NAD<sup>+</sup>**.

Increasing **NAD<sup>+</sup>** is a promising way to **self-renew** existing **stem cells** in order to **extend lifespan** and **prevent disease**.<sup>1-12</sup>

A study published in **June 2019** shows how a **NAD<sup>+</sup> boosting** supplement called **nicotinamide riboside** increased **stem cell** colonies by **75%** in the gut of aging mice.<sup>13</sup>

Other studies point to the role of **NAD<sup>+</sup>** in restoring **circadian rhythms** needed for restorative **sleep**.<sup>14</sup>

Age-related **sleep deterioration** and **digestive disorders** adversely impact quality of life and accelerate degenerative processes in older individuals.

The most critical role of **NAD<sup>+</sup>** is **DNA repair**. Each day, our DNA sustains numerous breaks that are **repaired** by **NAD<sup>+</sup>**-dependent enzymes.

With age, **NAD<sup>+</sup>** levels plummet. Another study published in **2019** showed that a modest dose of **nicotinamide riboside** boosted **NAD<sup>+</sup>** levels by **51%** in overweight **humans**.<sup>15</sup>

We advise holding off on most **stem cell infusions** until more is known about safety and efficacy.

New data reveal how **NAD<sup>+</sup>** improves functionality of existing **stem cells** and replenishes **mitochondria** in cells throughout the body.

### We Retain Stem Cells As We Age

- ▶ Stem cells are capable of self-renewal.
- ▶ Stem cells differentiate into functional (somatic) tissue cells.
- ▶ The number of stem cells may not greatly decrease with age.
- ▶ Aging reduces regenerative potential of stem cells.
- ▶ Stem cell senescence contributes to age-related conditions.

Khorraminejad-Shirazi M, et al. Aging and stem cell therapy: AMPK as an applicable pharmacological target for rejuvenation of aged stem cells and achieving efficacy in stem cell therapy. *Hematol Oncol Stem Cell Ther* (2017).

## What is NAD<sup>+</sup>?

**Nicotinamide adenine dinucleotide (NAD<sup>+</sup>)** is a compound found in every living cell.

It is critical for **cell energy** production. Recent research shows **NAD<sup>+</sup>** does much more.<sup>6,8-11,16,17</sup>

Hundreds of different **proteins** in each cell *require* **NAD<sup>+</sup>** to work properly.<sup>17</sup>

The most important proteins are the **sirtuins**, cellular guardians that protect against **DNA damage** that leads to many age-related ailments.<sup>18,19</sup>

**Sirtuins** are an important target for **anti-aging** interventions.<sup>10,11,20-22</sup> Multiple animal studies have demonstrated that *increasing sirtuin activity* leads to longer life and reduction in age-related loss of function.<sup>12,23,24</sup>

As **NAD<sup>+</sup>** levels decline with aging, there is reduced sirtuin **activity**. Boosting NAD<sup>+</sup> helps ramp up **sirtuin activity**.

Increasing NAD<sup>+</sup> levels can bring additional benefits tied to healthy longevity including:<sup>20,25</sup>

- **Promoting AMPK activity**, an enzyme that improves metabolism and helps protect against obesity and diabetes,
- **Modulating p53**, a tumor suppressor gene that repairs damaged DNA and protects against cancer initiation,
- **Inhibiting NF-kB (nuclear factor-kappa B)**, a protein that induces the chronic inflammation tied to many diseases and premature aging, and
- **Inhibiting mTOR**, a molecular complex whose abnormal activation contributes to many chronic diseases of aging.



## Nicotinamide Riboside and Resveratrol: A Powerful Anti-Aging Duo

**Resveratrol** is a plant compound found in red grapes, red wine, and other darkly colored fruits.

Among its many benefits, it activates **sirtuins**, the key defender proteins linked to longer, healthier life.<sup>47-49</sup>

But resveratrol can't do this if cells are low in **NAD<sup>+</sup>**. That's because **NAD<sup>+</sup>** is required for sirtuins to work properly. It would be like pressing the accelerator in your car when your gas tank is empty.

The solution is to increase intake of **nicotinamide riboside** to boost **NAD<sup>+</sup>** levels at the same time as promoting sirtuin activity with **resveratrol**. This combination ensures that the enhanced sirtuin activity can have its maximum beneficial effect on health and aging.

## Nicotinamide Riboside Boosts NAD<sup>+</sup>

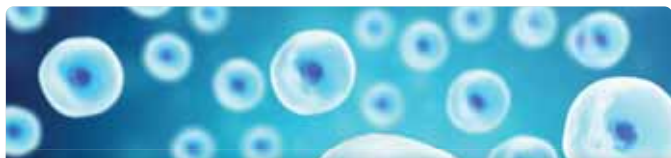
*Higher* levels of NAD<sup>+</sup> correlate with improved health and a lower occurrence of age-related disorders.

*Lower* NAD<sup>+</sup> levels contribute to many diseases of older age, including sleep disturbances, metabolic disorders, diabetes, cardiovascular disease, and cognitive decline.<sup>7,9-11,14,26</sup>

An easy way to boost NAD<sup>+</sup> levels is with **nicotinamide riboside**, which converts to NAD<sup>+</sup> in your body.

In human subjects, a **300 mg** dose of **nicotinamide riboside** increased cellular NAD<sup>+</sup> levels by **51%**.<sup>15</sup>

**Nicotinamide riboside** is highly absorbable, or **bio-available**, when taken orally.<sup>27</sup>



## How Old Stem Cells May Be Rejuvenated

- ▶ Boost cellular AMPK
- ▶ AMPK lowers excess mTORC1
- ▶ Replenish NAD<sup>+</sup> cell levels
- ▶ Activate sirtuins (with resveratrol)

Khorraminejad-Shirazi M, et al. Aging and stem cell therapy: AMPK as an applicable pharmacological target for rejuvenation of aged stem cells and achieving efficacy in stem cell therapy. *Hematol Oncol Stem Cell Ther* (2017).



## Remarkable New Findings

Recent studies of NAD<sup>+</sup> and nicotinamide riboside have shown two primary ways in which they improve health.

### 1. Replacing Old Mitochondria and Improving Mitochondrial Function

**Mitochondria** are the power suppliers of every cell, breaking down nutrients like sugars and fats into energy the cell can use to do work. When mitochondria age, they become dysfunctional, contributing to many illnesses.

Evidence indicates that **sirtuins** perform **cellular housekeeping** that includes replacing old and damaged mitochondria with healthy, new ones.<sup>28</sup> This process rejuvenates cells and improves their metabolism while maintaining their optimal function.

Because **sirtuin activity** is dependent on **NAD<sup>+</sup>** (which plummets with age), supplementation with **nicotinamide riboside** can help preserve cellular functions.

Replenishing **NAD<sup>+</sup>** levels with **nicotinamide riboside** resulted in enhanced mitochondrial function that:

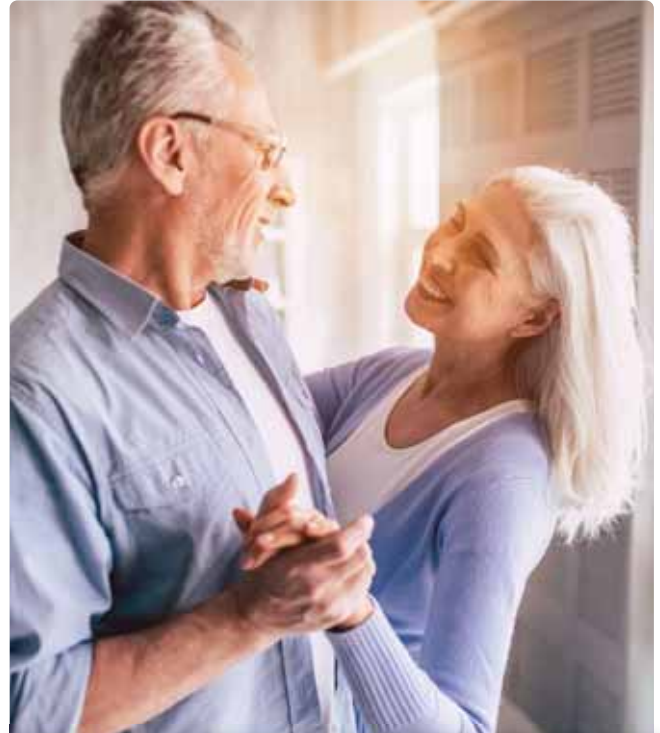
- Rejuvenated aging **bone marrow cells**, helping to maintain **immune function** and prevent bone marrow failure and related diseases.<sup>29,30</sup>
- Improved muscle function and reduced muscle pathology in an animal model of **muscular dystrophy**,<sup>31</sup> and
- Lessened liver **inflammation** and induced mitochondrial biogenesis, the formation of new mitochondria, in mice liver cells.<sup>32</sup>

### 2. Rejuvenating Stem Cells

Healthy **stem cells** in tissues are needed to *replace* dead or dying **functional cells** with new ones. But stem cells age and become dysfunctional over time, causing tissues to deteriorate and increasing risk for disease.<sup>33</sup>

**Nicotinamide riboside** intake can help prevent this. In a study on elderly mice, nicotinamide riboside replenished NAD<sup>+</sup> levels, which improved mitochondria function that **rejuvenated stem cells** in muscles. It also prevented the deterioration of muscle, skin, and brain stem cells.<sup>24</sup>

This prolonged the lifespan of old mice by approximately **5%**. Though this number may not seem huge, the supplementation only began when the mice were already two years old, the equivalent of about **80 years** in humans.<sup>34</sup>



## WHAT YOU NEED TO KNOW

### NAD<sup>+</sup> for Healthy Longevity

- **NAD<sup>+</sup>** (nicotinamide adenine dinucleotide) is an essential cofactor for hundreds of cellular processes.
- **Sirtuins**, cellular defenders linked to longer life and protection from disease, require optimal NAD<sup>+</sup> levels to function.
- Levels of NAD<sup>+</sup> drop with age, accelerating aging. **Nicotinamide riboside** helps replenish NAD<sup>+</sup> levels.
- Boosting NAD<sup>+</sup> has been tied to improved mitochondrial function, healthier stem cells that rejuvenate tissues, and **increased longevity**.
- Maximizing NAD<sup>+</sup> also protects tissues from the effects of age and **may reduce risk for age-related diseases** such as cognitive decline, cardiovascular disease, and metabolic disease.

## NAD<sup>+</sup> Protects Stem Cells in Aging Mice

- ▶ Enhanced muscle function
- ▶ Extended lifespan
- ▶ Protection of muscle, neural, and melanocyte stem cells

NAD<sup>+</sup> repletion improves mitochondrial and stem cell function and enhances lifespan in mice. *Science*. 2016 Jun 17;352(6292):1436-43.



A more significant effect may occur if NAD<sup>+</sup> is boosted *earlier* in life, and combined with interventions like **resveratrol** that prompts cells to express **sirtuin proteins** that NAD<sup>+</sup> then **activates**.

New studies corroborate a beneficial impact of NAD<sup>+</sup> on other **stem cells**.<sup>13,29</sup> In one study, researchers looked at adult mice gut **stem cells**, which typically dwindle in older age.<sup>13</sup> Injuries to the gut of these older animals have a difficult time healing.

**Nicotinamide riboside** increased these digestive tract **stem cell** colonies by approximately **75%**, improving the ability to recover from injury. This finding has favorable implications for older individuals suffering from **digestive tract** discomforts.

## Wide-Ranging Benefits of NAD<sup>+</sup>

Boosting NAD<sup>+</sup> levels can have a positive impact on multiple areas of health.

### Longevity

Studying the effect of a supplement on *human* longevity is difficult, because of the long average lifespan of humans. But many studies show that increasing NAD<sup>+</sup> **prolongs the life** of a variety of organisms.<sup>12,23,24,35</sup>

In yeast, a single-cell organism with a short lifespan, **nicotinamide riboside** increased lifespan as demonstrated by improved cell **replicative capacity**.<sup>23</sup>

Studies of worms show that nicotinamide riboside can prolong their life by at least **10%**.<sup>35</sup>

These effects extend to mammals as well.<sup>12,24</sup>

### Physical Performance

In a recent study of older men, levels of NADH, the reduced form of NAD<sup>+</sup> were significantly increased by **59%** only two hours after taking one dose of **nicotinamide riboside**, while markers of oxidative stress were decreased.<sup>15</sup>

The men in this study had an **8%** improvement in peak isometric muscle torque (a measure of muscle force) and a **15%** improvement in fatigue associated with exercise.

### Brain Health

Studies of mouse models of **Alzheimer's disease** have shown improvements with nicotinamide riboside supplementation.<sup>36,37</sup>

In the most recent study, it reversed the cognitive deficits in mice, improving memory.<sup>37</sup> The pathology observed in the brains of Alzheimer's disease patients, **amyloid plaques**, was also reduced in the brains of these animals. A previous study had similar findings.<sup>36</sup>

### Obesity and Metabolic Disorders

Sirtuins improve metabolism and can be helpful guardians against weight gain, metabolic syndrome, and type II diabetes.<sup>38-43</sup>

By boosting **sirtuin activity**, nicotinamide riboside enhanced metabolism and prevented excessive **weight gain** in mice.<sup>44</sup>

In animal models of **type II diabetes**, this improved metabolism helped control blood sugar levels and shield against the damage done by high blood glucose.<sup>42</sup>

### Cardiovascular Health

Improved metabolism and lower body weight help to reduce risk for cardiovascular disease.

But nicotinamide riboside does even more to protect the cardiovascular system.

One recent study focused on mice with **heart disease** that had a **30%** reduction in NAD<sup>+</sup> levels.<sup>45</sup> Untreated, they typically developed heart failure. But nicotinamide riboside attenuated the decline in cardiac function.



People **aged 50** have about **40%** less NAD<sup>+</sup> whereas 80-year-old people can have **90%-98%** lower levels of NAD<sup>+</sup> compared to 21-year-olds.

Heart failure risk increases as people grow older.

Recent studies show that **nicotinamide riboside** protects the organs of the cardiovascular system *and* protects other tissues from the effects of cardiovascular disease.

Normally, if blood flow to a tissue is compromised due to disease, the tissue dies, as happens in a **myocardial infarction** or a **stroke**. Preclinical studies show that **nicotinamide riboside** improves the response of tissues to this type of injury, reducing damage and encouraging recovery of the tissue.<sup>5,46</sup>

### Unified Theory of Stem Cell Rejuvenation

- ▶ Adult stem cells lose ability to repopulate tissues with functional cells.
- ▶ Systemic deterioration occurs as functional cells degenerate/die.
- ▶ How your stem cells may be renewed:
  - **Boost cellular AMPK**
  - **Suppress excess mTORC1**
  - **Replenish NAD<sup>+</sup> cell levels**
  - **Activate sirtuin proteins**

Khorraminejad-Shirazi M, et al. Aging and stem cell therapy: AMPK as an applicable pharmacological target for rejuvenation of aged stem cells and achieving efficacy in stem cell therapy. *Hematol Oncol Stem Cell Ther* (2017).

### How NAD<sup>+</sup> Improves Sleep

It's no secret that sleep patterns become disrupted with age.

Much of this problem is due to a disruption in circadian rhythms that govern our sleep/wake cycle.

NAD<sup>+</sup> has shown the ability to rebalance circadian rhythms through its stimulation of a vital cell protein called SIRT1.

In an animal study, mice deficient in SIRT1 experienced decreased quality of sleep.<sup>14</sup>

Increasing NAD<sup>+</sup> levels can help increase SIRT1 and other sirtuins, helping to restore normal sleep/wake cycles.

### Summary

**NAD<sup>+</sup>** is a critical component of a healthy aging program.

Every cell requires it for hundreds of processes. These include **activity of sirtuins**, cellular guardians linked to prolonged lifespan and healthspan.

**NAD<sup>+</sup>** levels and sirtuin expression diminish with advancing age, accelerating aging processes and degenerative disease risk.

**Nicotinamide riboside** is a compound that increases cellular NAD<sup>+</sup> levels, enhancing sirtuin activity. New research has found that maintaining more youthful NAD<sup>+</sup> levels can slow certain aspects of biological aging.

NAD<sup>+</sup> also improves the health of **stem cells** that can replace dead and dying cells and keep vital tissues functioning.

This not only extends lifespan, but also helps reduce the risk for metabolic disease, obesity, cardiovascular disease, cognitive dysfunction, and more. ●

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

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# Essential Factor to Reduce Cell Fat Storage

The engine that enabled you to mature from a **fertilized egg** to an **adult** is a cell protein called **mTOR**.

Once we reach maturity, **mTOR** should turn down and serve only to maintain our structural and functional integrity.

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**.

## Increase AMPK to Lower mTOR

Studies show that increasing **AMPK** activity turns down excess **mTOR**.<sup>1</sup>

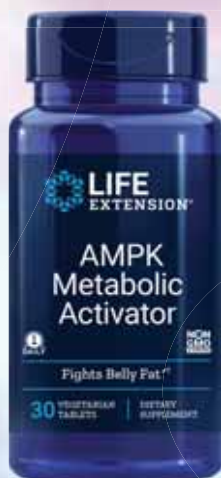
Scientific studies show that increasing **AMPK** activity can encourage cells to store less fat and burn it as energy.<sup>2,3</sup>

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

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

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A photograph of a group of people running through a field of yellow flowers. In the foreground, a man with a grey beard and hair is running towards the camera, wearing a grey zip-up jacket with a bright yellow-green stripe down the front and black athletic pants. Behind him, a woman with short grey hair is also running, wearing a black jacket with a pink stripe. To the left, another person in a blue jacket is partially visible. The background is a soft-focus landscape with more yellow flowers and a distant shoreline under a hazy sky.

# Major Advance! New Highly Bioavailable **CURCUMIN**





BY DAVID GREENE

For thousands of years, **turmeric root** has been used as a traditional Indian medicine.

The turmeric spice, which gives **curry** its golden color, has been recognized for wide-ranging health benefits.<sup>1-5</sup>

The most beneficial compounds in turmeric are **curcuminoids**, which include **curcumin** and related compounds.

One animal study showed **lifespan extension** up to **26%** with curcumin supplementation.<sup>6</sup>

But there's been a major problem that limits practical use: **curcuminoids** have poor oral **bioavailability**.

That means a large portion of curcumin taken orally never gets **absorbed** into the bloodstream and doesn't reach the tissues.

Scientists have made a major advance in solving this problem. They've perfected a **patented** form of **curcumin** that dramatically *boosts* its **bioavailability**.

This allows more curcumin to circulate throughout the body for a longer time.

For the first time, people have the opportunity to realize the potential of **curcumin** to benefit whole-body health, slow certain aging processes, and reduce risks for age-related disorders.

## Major Advance in Curcumin Bioavailability

In its pure form, curcumin is poorly absorbed into the bloodstream and is quickly metabolized into inactive forms or eliminated from the body.<sup>7</sup>

Normally, much of ingested curcumin is rapidly **conjugated** in the intestines and liver, which means it attaches to another compound. When this happens, most ingested curcumin is not biologically active and very little makes it into the body's tissues. Studies show that only **free curcumin**, which remains **unconjugated**, is bioactive.

In a major advance, scientists used a **water extraction** process and combined **curcumin** with components of another traditional Indian medicinal spice, **fenugreek**. The fenugreek seed contains a unique form of fiber, known as **galactomannan**, which helps protect curcumin from modifications in the gut and greatly increases its **bioavailability**, or absorption into the bloodstream.

This novel formulation of curcumin, boosting its bioavailability and efficacy, has been validated in laboratory studies and **human** trials.

## Improved Bioavailability Demonstrated

Researchers tested the new **curcumin-galactomannan** combination's ability to enhance the bioavailability of curcuminoids in human volunteers.<sup>8</sup> Fifty healthy adults were randomized to receive curcumin from either the new formulation or from a standardized curcumin extract.

The results showed that people who took the new formula had levels of **free curcuminoids** in the blood more than **45 times greater** than those who took pure curcumin alone.

With the new formulation, more than **70%** of the curcuminoids remained in the **free, bioactive form** even **five hours** after ingestion, allowing it to beneficially permeate tissues throughout the body.

An animal study also evaluated bioavailability and tissue penetration of the new curcumin formula.<sup>9</sup> Like the human study, it demonstrated a major increase in blood levels of **free curcuminoids** and found that they remained in the bloodstream longer.

This study, done on rats, was able to delve deeper. By testing various organs following supplementation of the animals with this new curcumin, the researchers evaluated the penetration of **free curcumin** into various tissues. Brain, heart, kidney, and spleen levels were all dramatically enhanced compared with a standard curcumin supplement.

In the brain, curcumin from a standardized turmeric extract only penetrated the tissue in small amounts. With the new formulation, levels of **free curcuminoids** in the brain were **245% higher**. This is vital, since curcumin is known to be one of the most **neuroprotective** compounds found in turmeric, helping to reduce the risk for age-related brain degeneration and cognitive decline.<sup>10</sup>

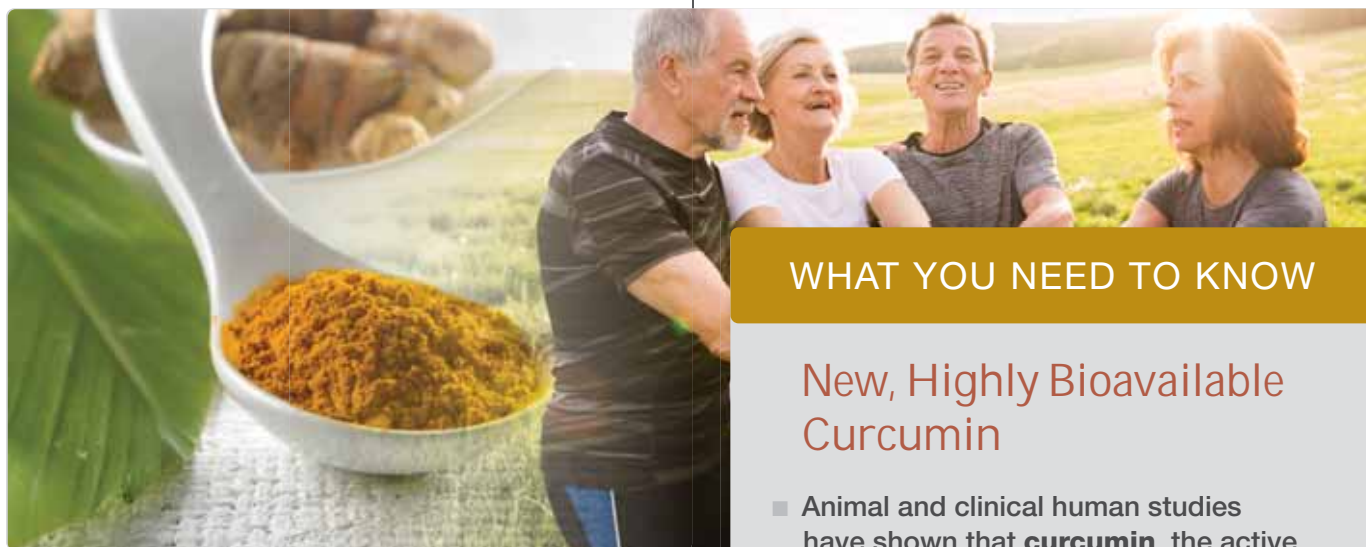
Together, the findings from the animal and human studies show that this new curcumin formulation significantly enhances its ability to circulate and work throughout the body.

## Human Studies of the New Formulation

Multiple human studies have recently been done on the impact of this new curcumin-galactomannan supplement on various ailments. The following are among the impressive results:

- A study of 60 healthy adults found that the new curcumin supplement *improved* markers of oxidative stress, while symptoms of anxiety, stress, and fatigue were *reduced*.<sup>11</sup>
- One study of young, obese men found that curcumin-galactomannan improved cardiovascular risk factors. There was a **34% increase** in HDL ("good") cholesterol and a **29% reduction** in harmful levels of **homocysteine**, an amino acid linked to development of heart disease.<sup>5</sup>
- In two other studies, there was also significant *improvement* in measures of arterial stiffness, a risk factor for cardiovascular mortality.<sup>12,13</sup>
- In alcoholic adults, the new supplement led to an average **30% reduction** in markers of liver damage, an approximately **25% increase** in antioxidant status, and a reduction in markers of systemic inflammation, including an approximately **27% reduction** in C-reactive protein (CRP).<sup>1</sup>
- In human blood cells, the supplement *blocked* the production of **nuclear factor-kappa B (NF-kB)**, which is associated with harmful, chronic inflammatory responses. It also protected the cells by *reducing* dangerous free radicals.<sup>14</sup>





### Extending Healthy Lifespan

By improving the absorption and tissue distribution of free curcumin, it is now possible to maximize its benefits in fighting specific diseases. Perhaps the most remarkable ability curcumin has shown in research is to **enhance longevity and prolong lifespan**.

In animal studies, curcumin supplementation leads to longer life.<sup>6,15-18</sup> For example, a study of curcumin supplementation in fruit flies resulted in as much as a **26%** extension of average lifespan.<sup>6</sup>

How does it work? In studies of longevity, a handful of key mechanisms keep coming up. Each of the following has repeatedly been shown to help slow the aging process and extend healthy lifespan:<sup>2-4,19-22</sup>

- Reducing chronic, low-grade **inflammation**,
- Increasing activity of **sirtuins**, specialized proteins that regulate cellular health,
- Decreasing activity of **mTOR**, a protein associated with rapid aging and cancer,
- Enhancing activity of the enzyme **AMPK**, which improves metabolism,
- Boosting **autophagy**, the cellular “recycling” process that helps keep cells rejuvenated, and
- Protecting against tissue damage caused by **glycation**, when sugars attach to proteins and fats.

Curcumin positively affects **every one** of these targets.

## WHAT YOU NEED TO KNOW

### New, Highly Bioavailable Curcumin

- Animal and clinical human studies have shown that **curcumin**, the active compound in **turmeric root**, has a beneficial impact on lifespan extension, weight loss, cardiovascular health, arthritis, protection from neurodegenerative diseases, cancer prevention and treatment, depression, and more.
- Pure curcumin supplements have low **bioavailability**. They are poorly absorbed and rapidly eliminated from the body.
- A novel, patented technology combining curcumin with components of fenugreek seeds called **galactomannans** boosts the bioavailability and tissue distribution of bioactive free curcumin far beyond that of other commercially available supplements.
- The new supplement has been shown in human studies to lead to an increase of bioactive **free curcumin** in the blood at a level more than **45 times greater** than in those who took unformulated curcumin alone (a regular turmeric extract standardized to **95%** curcuminoids).
- These high levels of free curcumin also circulate in the body longer, allowing for the uptake of curcumin into tissues where it can deliver its whole-body, health-promoting effects.

## Curcumin's Effects on the Diseases of Aging

Curcumin has also been shown to be beneficial against many specific diseases and conditions. Among them are some of the most common and well-studied disorders, including the following:

### Neurodegenerative Diseases

Promising research shows that curcumin has protective effects against **amyloid proteins**, especially **beta-amyloid** and **tau**. A buildup of these sticky proteins is associated with several age-related neurodegenerative diseases and dementias, including **Alzheimer's disease**.<sup>23-29</sup>

In one study, curcumin supplementation in healthy, older adults resulted in immediate and long-term improvements in cognition, compared to a placebo.<sup>30</sup> Both attention and working memory tasks improved **within one hour** of intake, and tests of memory and mood showed long-term improvements as well.

Another study in older adults taking curcumin also demonstrated improvements in attention and memory.<sup>31</sup> This study used PET scanning to evaluate the buildup of amyloid and tau in the brain over a period of 18 months. Scientists found that these accumulations were reduced or remained stable in the supplemented participants, but they tended to worsen in the group that did not receive curcumin.

### Cancer

In addition to reducing chronic inflammation and oxidative damage caused by free radicals, both of which contribute to the development of cancer, curcumin has been shown to have **anti-cancer** effects. It helps prevent the formation of tumors, induce cell death in existing cancer cells, and block their spread in the body.<sup>32-34</sup>

In a study on a strain of hairless mice, curcumin protected against the formation of skin cancer, even when the mice were exposed to UV radiation that would normally cause tumors.<sup>35</sup>

In cell cultures and animal studies, curcumin has shown very promising results in reducing growth and causing cell death in various types of cancer.<sup>34</sup>

### Obesity

Being overweight increases the risks of developing conditions like heart disease, stroke, cancer, and diabetes. Obesity also creates excess inflammation in the body, accelerating the aging process.<sup>36</sup>

By improving metabolic function and reducing inflammation, curcumin helps ameliorate some of these effects. It has also been found to aid in weight loss, as seen with calorie-restricted diets and exercise.

A recent meta-analysis of 876 subjects randomized to receive curcumin supplementation showed a significant reduction in both body weight and body mass index (BMI).<sup>37</sup> On average, subjects lost about **2.5 pounds** with curcumin supplementation alone.

### Metabolic Syndrome

**Metabolic syndrome** refers to a group of disorders, including elevated levels of blood sugar, abnormal lipid profiles, high blood pressure, and excess belly fat.<sup>38</sup> They can lead to type II diabetes and are risk factors for atherosclerosis, heart attack, and stroke.

Curcumin has a powerful impact on metabolism, helping to reduce many of these risk factors.

A recent clinical trial evaluated a curcumin supplement in overweight adults with elevated glucose levels.<sup>39</sup> After eight weeks, many positive changes in markers of metabolic health were noted. Fasting insulin levels, waist circumference, blood pressure, triglycerides, and markers of liver damage were all reduced significantly, while HDL ("good") cholesterol was elevated.





### Cardiovascular Disease

Curcumin protects the heart and blood vessels in numerous ways. As noted, it can reduce risk factors for **cardiovascular disease**, like obesity, high blood pressure, and abnormal blood lipid levels.

Curcumin also does much more. Research has shown that it can reduce *pathological changes* in the blood vessels and heart that contribute to atherosclerosis, aneurysm formation, and heart dysfunction.<sup>40</sup> And when a cardiovascular event like a heart attack or stroke *does* occur, curcumin can lessen the impact.

### Arthritis

A powerful **anti-inflammatory**, curcumin is a way to treat painful ailments related to inflammation. One of the most common of these conditions is **osteoarthritis**, the degenerative joint disease that occurs frequently in older age.<sup>41</sup>

A recent analysis of several studies found that, on average, pain due to arthritis was reduced by curcumin supplementation.<sup>42</sup> The **WOMAC Index** score, widely used in evaluating hip and knee osteoarthritis, was also reduced. That indicates improvement not only in pain control, but also in joint stiffness, limitations of physical functioning, and other symptoms.

Some of these studies compared curcumin to pain medications typically used for arthritis, particularly non-steroidal anti-inflammatory drugs (**NSAIDs**) like ibuprofen. They found that there was no significant difference in pain control between curcumin and these medications. This is an important finding, since prolonged use of NSAIDs is associated with significant side effects, including gastritis, ulcers, and even kidney damage. In comparison, curcumin is generally considered safe, even at relatively high doses.

## Curcumin's Many Mechanisms

Most pharmaceutical drugs act by only one or two mechanisms in the body. Curcumin's remarkable, health-promoting effects result from a long list of abilities, including:

- Powerful **antioxidant** activity, preventing damage done by free radicals,<sup>45</sup>
- Inhibition of **nuclear factor-kappa B (NF-kB)**, a protein complex associated with harmful, chronic inflammatory responses,<sup>14,19,32,33</sup>
- Suppression of **STAT3**, a protein associated with chronic inflammation and some cancers,<sup>33</sup>
- Reduction of **pro-inflammatory** compounds,<sup>41,46</sup>
- Improvement in cardiovascular disease risk factors and components of metabolic syndrome, including support for healthy body weight, cholesterol levels, triglycerides, and blood pressure,<sup>40,47-49</sup>
- Protective effects on aging blood vessels and other **anti-atherosclerotic** activity,<sup>40</sup>
- **Anti-glycemic** effects, enhancing control of blood sugar levels in metabolic syndrome and diabetes,<sup>48,49</sup>
- Stimulation of **sirtuins**, proteins associated with lifespan extension,<sup>3,4,50</sup>
- Inhibition of **mTOR** activity, associated with rapid aging and cancer,<sup>19,51</sup>
- Enhanced activity of the enzyme **AMPK**, supporting healthy metabolism,<sup>4,52</sup>
- Support for healthy **autophagy**, a natural cellular rejuvenation process,<sup>45</sup>
- Protection from tissue damage caused by **glycation**, when sugars attach to proteins and fats in the bloodstream,<sup>20,53-55</sup>
- **Anticancer** and **antimetastatic** activity, both helping to prevent and remove existing tumor cells,<sup>33-35</sup>
- Regulation of **apoptosis**, the process of naturally "pre-programmed" cell death to maintain cell populations and prevent overgrowth,<sup>34,56</sup>
- Protection from abnormal protein, including **beta-amyloid** and **tau**, associated with neurodegenerative diseases such as Alzheimer's disease, and<sup>23-29</sup>
- Neuroprotective effects that reduce dysfunction and promote recovery from brain, spinal cord, and peripheral nerve injuries.<sup>57-61</sup>

## Depression and Anxiety

Several studies have found that curcumin can help control symptoms of major depression.<sup>43</sup>

One study randomized patients to receive either **1,000 mg** of curcumin daily or **fluoxetine** (Prozac®).<sup>44</sup> At the end of six weeks, those receiving curcumin had the *same response rate* to treatment as those receiving the drug, which can cause many side effects.

Some of these studies also evaluated symptoms of anxiety and found a positive response with curcumin as well.<sup>43</sup>

## Summary

**Curcumin**, the active component of **turmeric root**, has numerous health benefits.

It has been shown to reduce risk factors for many diseases, protect the function of various tissues and body systems, and bolster many core components of health, including those directly tied to the aging process.

The low **bioavailability** (how much is absorbed and circulates throughout the body) of curcumin has prevented its more widespread use to prevent and treat various conditions.

By combining curcumin with **galactomannans** from **fenugreek seeds**, curcumin's **bioavailability** has been boosted to far higher levels than in previously available forms.

The results of lab and human studies demonstrate how this new form of **curcumin** penetrates diverse tissues in the body.

This provides a unique opportunity for aging individuals to realize the full potential of curcumin's array of biological benefits aimed at helping to extend healthy lifespans. •

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

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# Berry Extract Eases Dry Eyes

BY MICHAEL DOWNEY

Most people view **dry eyes** as an annoyance.

Left untreated, this condition can lead to serious infection and visual impairment.<sup>1,2</sup>

Dry eye prevalence is increasing and affects up to **34%** of people worldwide.<sup>3</sup>

Too much time staring at a smartphone, computer, or tablet, increases the risk for dry eyes, as can air pollution, air conditioning, wearing contact lenses, and allergies.<sup>2,4-10</sup>

Over-the-counter eye drops, or “artificial tears,” provide relief but aren’t able to address the underlying causes.<sup>11</sup>

A prescription drug for dry eye syndrome can cause side effects. These include burning, itching, stinging, redness, and blurred vision<sup>12</sup>—the very dry eye symptoms you’re trying to eliminate!

Scientists have found a **berry extract** that **boosts our own tear production**. This helps combat dry eyes the natural way.

An initial pilot study showed that taking an oral extract of **maqui berry** leads to a **72% improvement** in dry-eye-symptom scores.<sup>13</sup>

A new double-blind, placebo-controlled study—the gold standard in medical research—confirms that maqui berry extract **improves** dry eye conditions, with rapid and long-lasting effects.<sup>14</sup>

## The Causes of Dry Eyes

**Dry eye syndrome** occurs for one of two reasons:<sup>15</sup>

1. Our tear glands don't produce enough tears, or
2. Our tears are poor quality, which makes them evaporate too quickly or fail to spread evenly over the **cornea** (the clear front surface of the eye).

It's become an increasingly common condition in the U.S. and worldwide.<sup>8,13,16</sup>

Key risk factors are aging, and use of computers, smart phones, and tablets. Dry eye is more prevalent in women.<sup>4-7,10</sup>

Some of the other common risk factors include:<sup>2,4-10</sup>

- Allergies,
- Air-conditioning use,
- Medications such as antidepressants and high blood pressure drugs,
- Autoimmune disorders,
- Flat-screen TV viewing,
- Wearing contact lenses,
- Vision-correcting or cataract surgery, and
- Excessive ultraviolet light exposure.

## Potential Eye Damage

Dry eyes cause stinging, itching, inflammation, light-sensitivity, distraction, and difficulty focusing, which can reduce quality of life. Studies show that eye irritation is associated with lower scores on standard mental-health scales.<sup>17,18</sup>

Additionally, if left untreated, there's a risk of **vision impairment** over time.

That's because tears are essential for protecting both the cornea and the **conjunctiva**, a thin membrane that lines the eyeball and inner surfaces of the eyelids.<sup>8</sup>

Tears provide lubrication and wash away foreign matter.<sup>19</sup> They help heal scratches and other injuries to the cornea or conjunctiva. With untreated dry eyes, injuries linger, which can ultimately impair vision.<sup>19,20</sup>

Tears also carry nutrients and **antimicrobial defenses** that help prevent eye infections, which can damage sight.<sup>19</sup>

Dry eye sufferers usually turn to over-the-counter eye drops. When these "artificial tears" don't work well enough, many individuals try expensive prescription eye lubricants<sup>21</sup> that still fail to deliver effective and lasting relief.

**Restasis®**, a prescription drug specifically approved by the FDA for dry eye syndrome, can cause burning, itching, stinging, redness, and blurred vision—the very symptoms it's designed to eliminate.<sup>12</sup>

The only *true* solution for dry eyes is to increase production and quality of **natural tears**.





## WHAT YOU NEED TO KNOW

### Banish Dry Eyes

- **Dry eye syndrome** is increasingly common, causing burning, eye fatigue, and predisposition to cornea damage and reduced quality of life.
- Commercial drug-store eye drops and lubricants have only a temporary effect and can have bothersome side effects.
- An extract of the **maqui berry**, taken orally, has been shown to stimulate healthy tear production, *improving* dry eye symptoms.
- A placebo-controlled human study has confirmed this extract's ability to offer a safe and effective treatment for dry eye syndrome.

### Importance of Tears' Quality and Quantity

People with dry eyes generally don't produce enough tears, their tears evaporate too quickly, or, most critically, they have a *low quality* of **tear film**.

Tear film contains three layers: oil, water, and mucus.<sup>11</sup>

The surface of the eye can be lubricated, nourished, and protected with the tiny amount of tears normally produced each day, about **1 mL to 3 mL** per eye.<sup>13</sup>

If the water element (the middle layer) **evaporates** too rapidly, the remaining tear fluid becomes excessively concentrated,<sup>22-24</sup> which, in turn, impairs many of the tear film's critical functions.

### Maqui Berry Restores Tears

**Maqui berries**, dark purple fruit native to regions of Chile and Argentina, have long been valued for their free radical scavenging and anti-inflammatory properties.<sup>25-27</sup>



Several years ago, researchers discovered that, when taken orally, a **maqui berry extract** boosts production of the body's own natural tears.<sup>13</sup>

This delivers relief for dry, irritated eyes, while also helping to protect the eyes from long-term damage.

The active compounds in **maqui** are pigments called **delphinidins**. In a preclinical study they showed the ability to protect the eyes by:<sup>28</sup>

- Shielding eye structures from constant exposure to harmful free radicals, and
- Inhibiting damage from light stimulation to the eyes' delicate tissues, such as the **photoreceptor cells**, that convert light into signals sent to the brain.

In a preclinical model, delphinidins also prevented low-grade injury to the **lacrimal glands**, which produce the water layer of tears. This safeguards and *restores* their ability to produce natural, high-quality tears.<sup>29</sup>

Researchers created a rat model of dry eye by suppressing the animals' blink reflex, which led to evaporation of tears and corneal damage.

When one group of the rats was *pretreated* with **maqui berry extract**, it stopped the **loss of tears** and *prevented* corneal damage.<sup>29</sup>

## Pilot Study

In 2014, researchers performed a **human study** on the eye-protecting effects of maqui berry extract.<sup>13</sup>

They enlisted 13 participants with moderate eye dryness, which was evaluated by the **Schirmer's test**.<sup>13</sup> This is a way to assess the amount of fluid produced by the tear glands and whether it is sufficient to keep the eyes moist.<sup>30</sup>

There was no placebo group for this small pilot study. Participants took either **30 mg** or **60 mg** of maqui berry extract daily for 60 days.

Both dosage groups had an approximately **50% improvement** in tear production after 30 days. After 60 days, the lower-dose group's improvement declined, but the **60 mg** group sustained a **45% improvement** in tear production.<sup>13</sup>

Patients also completed the **Dry Eye-Related Quality-of-Life Score** test. This is a questionnaire that consists of six questions about various "bothersome ocular symptoms" and nine questions about their "impact on daily life," including the mental aspect.

The overall degree of impairment to quality of life is calculated as a score—with a lower score indicating a **greater** quality of life.

Both dosing groups had a total composite score—eye and daily-life symptoms—of about **40** at the outset of the study. Scores for both groups fell quickly after treatment with **maqui berry extract** began, indicating a quality-of-life improvement.

Patients taking **30 mg** of maqui berry extract daily experienced a reduction (improvement) to a score of almost **22** (from a baseline of **40**) after 30 days. However, their score didn't drop much further by day 60.<sup>13</sup>

The score for patients taking **60 mg** of maqui berry extract daily dropped to almost **27** after 30 days.

In contrast to the lower (**30 mg**) dose group, the dry eye score of those taking **60 mg** of maqui continued to fall after 60 days to an astoundingly low **11 points**. This constitutes a **72%** improvement in dry eye-related quality-of-life symptoms after just two months!<sup>13</sup>

## New Clinical Trial

More recently, scientists conducted a **randomized, double-blind, placebo-controlled trial**.<sup>14</sup>

It confirmed that **60 mg** of **maqui berry** extract significantly:<sup>14</sup>

- Reduced eye dryness,
- Alleviated eye fatigue, and
- Improved quality-of-life symptoms.

The team selected 74 healthy participants, aged 30 to 60, who experienced moderate eye dryness and eye fatigue. As in the pilot study, eye dryness was evaluated with the Schirmer's test.<sup>14</sup>

Every day for four weeks, 37 subjects took a *placebo*, while the other 37 took **60 mg** of **maqui berry extract**.

Both groups started with the same degree of eye dryness. After treatment, however, the group that took the maqui extract showed significantly **higher production of tear fluid**.

As a result, the maqui group experienced alleviation of eye dryness and reduced eye fatigue.<sup>14</sup>

This clinical trial confirms that taking **60 mg** of maqui berry extract daily can help reduce eye dryness and alleviate eye fatigue.





## Relief for Dry Eye Symptoms

This recent study also looked at **quality-of-life symptoms** caused by dry eyes.

Using the **Dry Eye-Related Quality-of-Life Score** test and a **Visual Analog Scale** test, subjects specified their level of agreement with a number of statements about their symptoms.<sup>14</sup>

Following the four-week treatment period, the **Dry Eye-Related Quality-of-Life Score** test showed that the **maqui group** had substantially *improved* total values for bothersome ocular symptoms, compared to the placebo group.

The **Visual Analog Scale** test showed that the maqui group experienced significant improvements in eye fatigue.<sup>14</sup>

For those who suffer from dry eyes and eye fatigue, this means there is new hope for a safe and effective way to naturally relieve these symptoms in just a few weeks.

## Summary

**Dry eyes** are an increasingly common condition, especially among aging people and computer and smartphone users.

A deficient amount or poor quality of tears causes eye irritation and fatigue and may damage eye tissue and impair vision over time.

An extract of the **maqui berry** has been shown to soothe eyes from the inside out by stimulating the production of healthy tears.

Two clinical trials have confirmed this extract's ability to **restore tear production**, reversing key symptoms and risks of dry eye syndrome and improving quality of life. •

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

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# Wide-Ranging Benefits of SAdMe

BY CHRISTIAN MENDEZ

Since **Life Extension®** first introduced **SAdMe (S-Adenosyl-Methionine)** back in 1997, it's become popular for **boosting mood**.

In addition to fighting depression, SAdMe also stimulates the production of new cartilage in animals and improves symptoms and functioning in **osteoarthritis** patients.<sup>1-3</sup>

In a recent study SAdMe was shown to increase lifespan of yeast.<sup>4</sup>

What's the common link between these benefits and SAdMe?

SAdMe is a cofactor involved in a process called **DNA methylation**, which regulates **gene expression**.<sup>5</sup> In doing so, it can help fight against some of the causes of age-related disease—and it may prolong life itself.<sup>6,7</sup>

## Understanding DNA Methylation

**Genes** are stretches of DNA that determine our traits, from hair and eye color to susceptibility to certain diseases and even lifespan potential.

Genes can also be active or inactive. The science of **epigenetics** studies how and why genes are expressed, or not.<sup>8</sup>

One of the main “switches” that modulates the way genes are expressed is **DNA methylation**, which occurs when methyl groups are added to the DNA.<sup>9</sup>

**SAMe (S-Adenosyl-Methionine)** is a nutrient found naturally in the body that serves as the primary **methyl donor**. That means it’s involved in practically *all* methylation reactions.<sup>9-12</sup>

If we don’t have enough of it, the body cannot methylate properly. That can lead to chronic inflammation, tissue damage, and age acceleration.<sup>13,14</sup>

One lab study showed that treating human cells with SAMe increased **DNA methylation** and modulated the expression of genes associated with **inflammation**.<sup>15</sup>

This has shown benefits in multiple disorders and has the potential to prolong life.

## Osteoarthritis Improvement

**Osteoarthritis** is the most common and disabling joint disease.<sup>16</sup> It can cause loss of the cushioning cartilage that eases joint movement, eventually damaging underlying bone.

It’s chronic and has no known cure.<sup>3,16</sup> But there is new hope for treating it.

Scientists have discovered that **abnormal methylation** in osteoarthritis patients affects genes that **promote inflammation**, which in turn promotes the painful swelling that typifies the disease.<sup>17,18</sup>

By donating methyl groups and getting the methylation cycle back on track, SAMe may modulate those genes and **suppress** inflammation.<sup>19</sup>

Improper methylation disrupts healthy cartilage cells’ activity, leading to cartilage damage that further erodes bone tissue.<sup>16,20</sup>

Numerous studies have shown that **SAMe** may help treat osteoarthritis. Among the results:

- SAMe stimulates production of **new cartilage** in animals.<sup>3</sup> This is crucial to slowing or reversing the progress of osteoarthritis.
- In short- and long-term studies, patients reported improvement of symptoms.<sup>21,22</sup>
- Osteoarthritis patients treated with SAMe experienced pain relief as strong as that delivered by non-steroidal anti-inflammatory drugs (**NSAIDs**), with improvement lasting longer *after* treatment.<sup>1,2,23</sup>
- A meta-analysis of 11 studies showed that SAMe improved functioning in arthritis patients and was comparable to NSAIDs for pain, *without* the side effects common with NSAIDs.<sup>24</sup>

In one study, SAMe also reduced the **depressive feelings** associated with osteoarthritis.<sup>21</sup> That is likely because it eased symptoms of the arthritis *and* because SAMe has a direct impact on mood disorders.





## Depression

Clinical depression affects more than **16%** of U.S. adults over a lifetime.<sup>25</sup>

**Stress** is a contributor to mood and anxiety disorders. Researchers have found that it drives epigenetic changes in the brain that can alter normal methylation patterns.<sup>26</sup>

In fact, abnormal methylation has been linked to depression and mood disorders in multiple ways:

- Prenatal and early childhood exposure to a mother's depression affects methylation patterns in the infant's brain.<sup>27</sup>
- Childhood trauma leads to methylation defects, which can be related to long-term mood and mental health problems.<sup>28</sup>
- Altered methylation is seen in people at high genetic risk for mood disorders, including bipolar and major depression, even before they develop symptoms.<sup>29</sup>

**SAMe** helps regulate the production of neurotransmitters that produce feelings of well-being, potentially alleviating depression.<sup>30,31</sup>

Clinical trials have shown that:

- SAMe improves memory-related cognitive symptoms in depressed patients.<sup>31</sup>
- Over 12 weeks, SAMe (**1,600 mg/day-3,200 mg/day**) proved superior to both a placebo and the prescription antidepressant **escitalopram (20 mg per day)** at improving scores on the Hamilton Depression Rating Scale. Remission rates were **34%** for SAMe, **23%** for escitalopram, and **6%** for a placebo.<sup>32</sup> (Later analysis suggested that the effects were only significant in men, and researchers are exploring the reason for that.<sup>33</sup>)
- Adding **800 mg** of SAMe to antidepressant medications improved results on standard measures of depression.<sup>34</sup>

**Life Extension®** encourages individuals interested in adding SAMe to their regimen to discuss it with their treating physician.



## WHAT YOU NEED TO KNOW

### How SAMe Helps Our Genes Fight Disease

- Humans have about 20,000 genes. Our bodies turn them on or off as necessary.
- One of the main switches that modulate the way genes are expressed is a process called **methylation**, in which methyl groups are added to the DNA.
- The nutrient **SAMe (S-Adenosyl-Methionine)** is the body's preferred methyl donor.
- If we don't have enough of it, the body cannot methylate properly.
- Two seemingly unrelated conditions, **osteoarthritis and clinical depression**, both involve improper methylation. In human studies, both are improved by treatment with SAMe.
- Preclinical studies indicate that increased SAMe also contributes to **longer life and improved health**.

## Prolonging Life

Methylation isn't just linked to the development of age-related diseases. It also has a direct impact on **lifespan** itself.<sup>35,36</sup>

Studies show that aging is associated with *alterations* in DNA methylation.<sup>35,37</sup>

This causes pro-inflammation and disease-causing genes to be expressed and tumor-suppressor genes to be silenced, increasing cancer risk.

Studies of long-lived animal strains show that they use **SAME** much more efficiently than their shorter-lived relatives, leading to activation of lifespan-extending genes, such as those involved in chemical stress defenses.<sup>38,39</sup>

Studies have demonstrated just how **SAME** might extend life:

- Stimulating **SAME** synthesis in yeast extends their lifespan by activating the youthfulness-promoting enzyme **AMP-activated protein kinase (AMPK)**.<sup>4</sup> In humans, AMPK helps the body use calories more efficiently, reduces fat accumulation, and enhances cleanup of cellular "junk."
- Short-term **SAME** use in tumor-prone mice **prevented liver tumor development**, in part by restoring methylation and turning on tumor suppressor genes.<sup>40</sup>



## Summary

The way genes are expressed has a great impact on our health and longevity.

**DNA methylation** is a process that regulates gene expression.

**SAME (S-Adenosyl-Methionine)** is an essential factor involved in DNA methylation.

*Defects* in methylation can lead to diseases.

Increasing **SAME** intake provides the body with a critical methylation nutrient, which can help modulate the way genes are expressed.

**SAME** has so far shown clinical success in treating **osteoarthritis** and **depression**. Early studies suggest **SAME's** status as the body's preferred methylation nutrient may also protect against other diseases and contribute to **longer lifespan**. •

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

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# SAMe

## FOR BRAIN HEALTH

**Life Extension®** first introduced **SAMe** in 1997. Since then, researchers around the world have continued to discover its impressive benefits.

While SAMe is largely known for mood support, it has also shown benefits for the liver and joints.

A study by Harvard Medical School and Massachusetts General Hospital cited the impressive benefits of SAMe for mood elevation.<sup>1</sup>

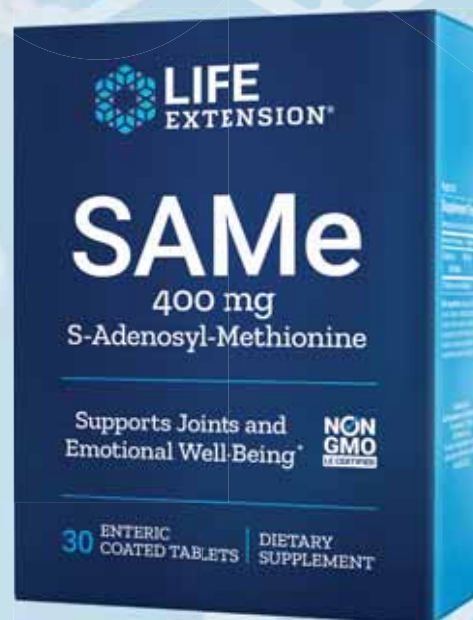
A report published in Germany showed that SAMe may help maintain healthy neurological function. This impressive report found that SAMe:<sup>2</sup>

- **Increased** glutathione levels by **50%** and glutathione enzyme activity by **115%**,
- **Decreased** a measurement of free radical activity by **46%**, and
- **Inhibited** lipid peroxidation by **55%** in culture.

In addition to these findings, SAMe also improves brain cell methylation, thereby facilitating youthful **DNA enzymatic actions**, which may help account for SAMe's mood-boosting properties. These enzymatic reactions are required for the healthy conversion of neurotransmitters such as **serotonin** and **dopamine**.

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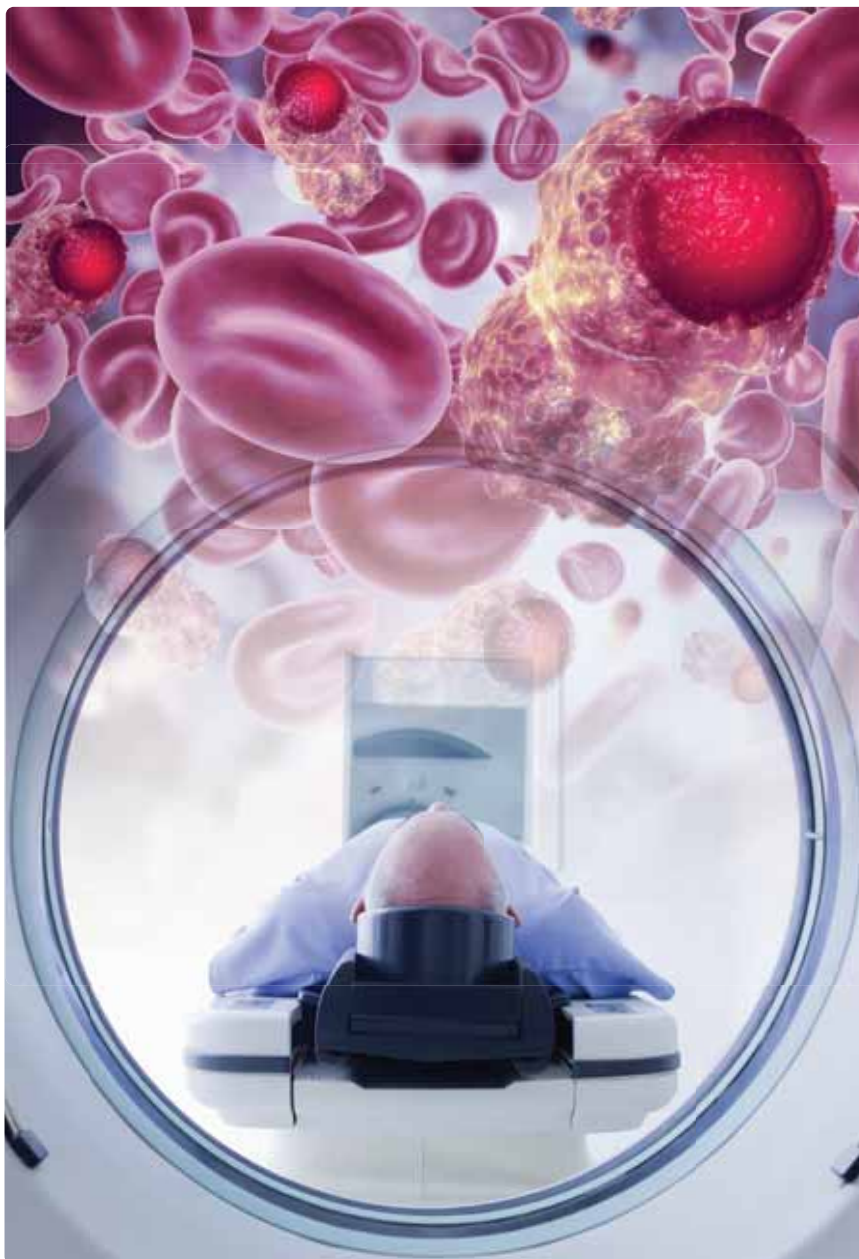
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# A New Cardiovascular Threat: Ionizing Radiation

BY JEAN HALSTEAD

*It is wise to avoid unnecessary radiation exposure, in order to reduce risks of leukemia and other radiation-induced cancers.*



**CT scans** are routine medical diagnostic tools, but the question about their safety has been a subject of debate for many years.

The **ionizing radiation** emitted by CT scanners is a **cancer risk** concern.

Mainstream publications argue the majority of exposure levels to **ionizing radiation** are too low to produce the **DNA damage** needed to initiate a **malignancy**.<sup>1-4</sup>

This is disputed by other researchers.<sup>5</sup>

An analysis published in **Consumer Reports** estimated that the 80 million CT scans performed in 2015 will eventually cause an estimated **29,000** cases of **cancer**.<sup>6</sup>

Medical imaging is a **\$100 billion** per year industry,<sup>7</sup> meaning there are financial incentives to downplay potential risks from radiation-emitting imaging devices.

And **cancer** is not the only health concern.

**Life Extension®** has warned for decades<sup>8-10</sup> that radiation-emitting diagnostics are also linked to increased **heart disease** risk.

What's **new** is a specific mechanism by which **ionizing radiation** damages coronary arteries that feed the **heart muscle**.

In a recent review of preclinical research, scientists have found a possible link between radiation-induced **cell senescence** and acceleration of **cardiovascular disease**.<sup>11</sup>

Exposure to **radiation** can either:

1. Kill cells outright (which is the objective when treating cancer),
2. Damage cellular DNA in ways that lead to malignant changes, or
3. Create **senescent cells** that contribute to degenerative aging.

In this Research Update we'll review recent findings on how **ionizing radiation** can create **senescent cells** that accelerate **heart disease** and other common disorders.<sup>11-13</sup>

### Cancer, Apoptosis, or Senescence

What happens to a cell when it is hit by a beam of **radiation** or a charged particle moving at near light-speed?

That's the question radiation researchers have sought to answer for decades, in an effort to understand how ionizing radiation interacts with living matter.<sup>14</sup>

It has long been known that both acute high-level exposure to ionizing radiation, and low-level chronic exposure could induce cancers.<sup>15</sup>

**Cancers** arise when particles in a beam of ionizing radiation **break DNA strands** in a cell's nucleus.<sup>16</sup> This sets off a potential cascade of events that leads from **DNA damage** to mutated **cancer suppressor genes**, to chaotic cell replication, and from there to a malignant tumor.

But cancer isn't the only outcome facing a cell after being exposed to a beam of ionizing radiation.

Another result of radiation exposure is that the cell dies by a normal process called **apoptosis**. This is the principle behind **radiation therapy** in cancer treatment, whereby apoptosis is induced in most of the cancer cells, leaving the tumor to shrink and eventually undergo destruction by the immune system.<sup>17</sup>

If a cell doesn't turn malignant, or die from apoptosis, it has a third pathway—it can undergo **cellular senescence**.<sup>17</sup>

### Deadly Impact of Senescent Cells

A senescent cell neither dies nor becomes malignant. Rather, it loses its ability to function normally. These senile cells do not replicate or contribute to normal tissue functions.<sup>13</sup>

**Senescent cells** instead are a chronic source of localized and systemic **dysfunction**.

These “zombie-like” cells linger in tissues throughout our maturing bodies and accelerate pathological aging processes.

Senescent cells secrete a wide range of destructive chemicals, including **protein-degrading enzymes** that harm surrounding cells,<sup>18-20</sup> as well as pro-inflammatory-signaling **cytokines**.<sup>13</sup>

### Threat to Cardiovascular Health

In a review of numerous preclinical studies, researchers found evidence that ionizing **radiation** plays a significant role in endothelial cell dysfunction preceding the development of cardiovascular disease.<sup>11</sup>

They found that cells exposed to **ionizing radiation** are converted to **senescent cells** at an alarming rate, producing an inordinate number of senescent cells—particularly in the inner lining of our arteries called the **endothelium**.

Cells lining blood vessels (the **endothelium**) play active and diverse roles in maintaining health, including detecting and managing circulation and blood pressure.<sup>21</sup>

In less than a microsecond after exposure to **ionizing radiation**, endothelial cells undergo a stress response arising from the formation of **reactive oxygen species** induced by the radiation.<sup>11,22</sup>

This can cause endothelial cells to undergo **premature senescence**, which has been linked in preclinical research with **early onset of cardiovascular disease**.<sup>23</sup>

Radiation-induced **senescent** endothelial cells likely contribute to premature cardiovascular problems.





In addition to losing their ability to replicate, senescent endothelial cells develop defects in their ability to sprout, migrate, and form capillaries,<sup>13</sup> meaning that they cannot help repair damage to heart muscle.

### Arterial Damage and Blockage

Senescent endothelial cells lose their ability to respond to **nitric oxide**, the body's natural signal to relax blood vessel walls. This leaves arteries with a permanent "squeeze" that ultimately drives up blood pressure and reduces blood flow.<sup>13</sup>

These senescent cells in the endothelium also stop producing **anticoagulant** factors, while increasing secretions of those that promote clotting. This increases the risk of a disastrous **thrombosis**, or blood-flow-stopping arterial clot.<sup>13</sup>

If all this sounds like a recipe for a heart attack or a stroke, it is.

And what's worse, all this damage is now understood to happen at radiation exposures far lower even than those known to induce cancers.<sup>11,13</sup>

How much lower?

### Even Modest Doses Concerning

Radiation doses are expressed in **grays (Gy)**. A **high** dose is defined as greater than **2 Gy**. A moderate dose is **0.1 Gy** to **2 Gy**.<sup>11</sup>

**Low dose** radiation is at or **below 0.1 Gy**.<sup>11</sup>

A person can receive as much as **0.1 Gy** from a **single CT scan**.<sup>23</sup> This means that people undergoing **repeated CT scans** can be hit with **0.2, 0.3, or more Gy** of radiation.

That's well within the **moderate** range seen in nuclear plant workers and even some survivors of the infamous Chernobyl nuclear power plant disaster.<sup>11,23</sup>

## MAJOR MEDICAL JOURNALS RECOGNIZE ANTI-AGING POTENTIAL OF SENOLYTICS

As seen in Viewpoint, from the *Journal of The American Medical Association*, September 17, 2018

Scientific Discovery and the Future of Medicine

### Aging as a Biological Target for Prevention and Therapy<sup>1</sup>

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

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

Scientific Discovery and the Future of Medicine

### Aging, Cell Senescence, and Chronic Disease: Emerging Therapeutic Strategies<sup>2</sup>

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

References: 1. JAMA. 2018;320(13):1319-1320. 2. JAMA. 2018;320(13):1321-1322.

Published in Perspective, from *The New England Journal of Medicine*, October 31, 2019

### Enabling Healthful Aging for All...

"Moreover, tremendous advances are being made in our understanding of the science of aging, yielding exciting potential treatments that may alter the course of this inevitable process.<sup>1</sup> One aspect of this work relates to 'senolytics,' the study of ways to either eliminate senescent cells that may have deleterious effects or slow or reverse the aging process by restoring cells' lost function."<sup>2</sup>

References: 1. *Nature*. 2019 Jul;571(7764):183-192. 2. *N Engl J Med* 2019; 381:1699-1701.

### Avoid Unnecessary Radiation Exposure

An estimated **30% to 50%** of imaging tests are believed to be medically unnecessary.<sup>7</sup> That's an alarming amount of dangerous radiation for patients that could be avoided, especially when there are alternatives such as ultrasound and MRIs.

Be sure to ask your medical professional if either ultrasound or an MRI could provide the diagnostic information they are looking for.

Many times, these are acceptable alternatives that do not expose you to ionizing radiation, or as much radiation.

**Life Extension®** has been covering the science of **senolytics** to safely remove senescent cells from the body.

Now that we know that CT scans promote **cellular senescence**, it becomes more important to learn about **senolytics** and discuss this with your physician.

**Life Extension®** has published several articles about approaches people are utilizing today to reduce their **senescent cell** burden. To review these articles, log on to:

**[LifeExtension.com/senolyticinfo](http://LifeExtension.com/senolyticinfo)**

## Summary

It is wise to avoid unnecessary radiation exposure. This helps reduce risks of leukemia and other radiation-induced cancers.

But new evidence shows that radiation may represent an under-recognized threat as well: premature **cellular senescence**, especially in endothelial cells, the layer of cells lining our blood vessels.

Unlike cancer-inducing radiation, which damages DNA strands at moderate and high radiation levels, **senescence-inducing** radiation has been shown at much lower levels, including those plausibly received from several CT scans over the course of a year.

CT scans can be lifesaving, and the risk must always be balanced against the benefits. Always discuss with your medical professional whether there are acceptable alternatives that do not expose you to ionizing radiation. •

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

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# COMBAT Senescent Cells and AGING

## Science of *Senolytics*!

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

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

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

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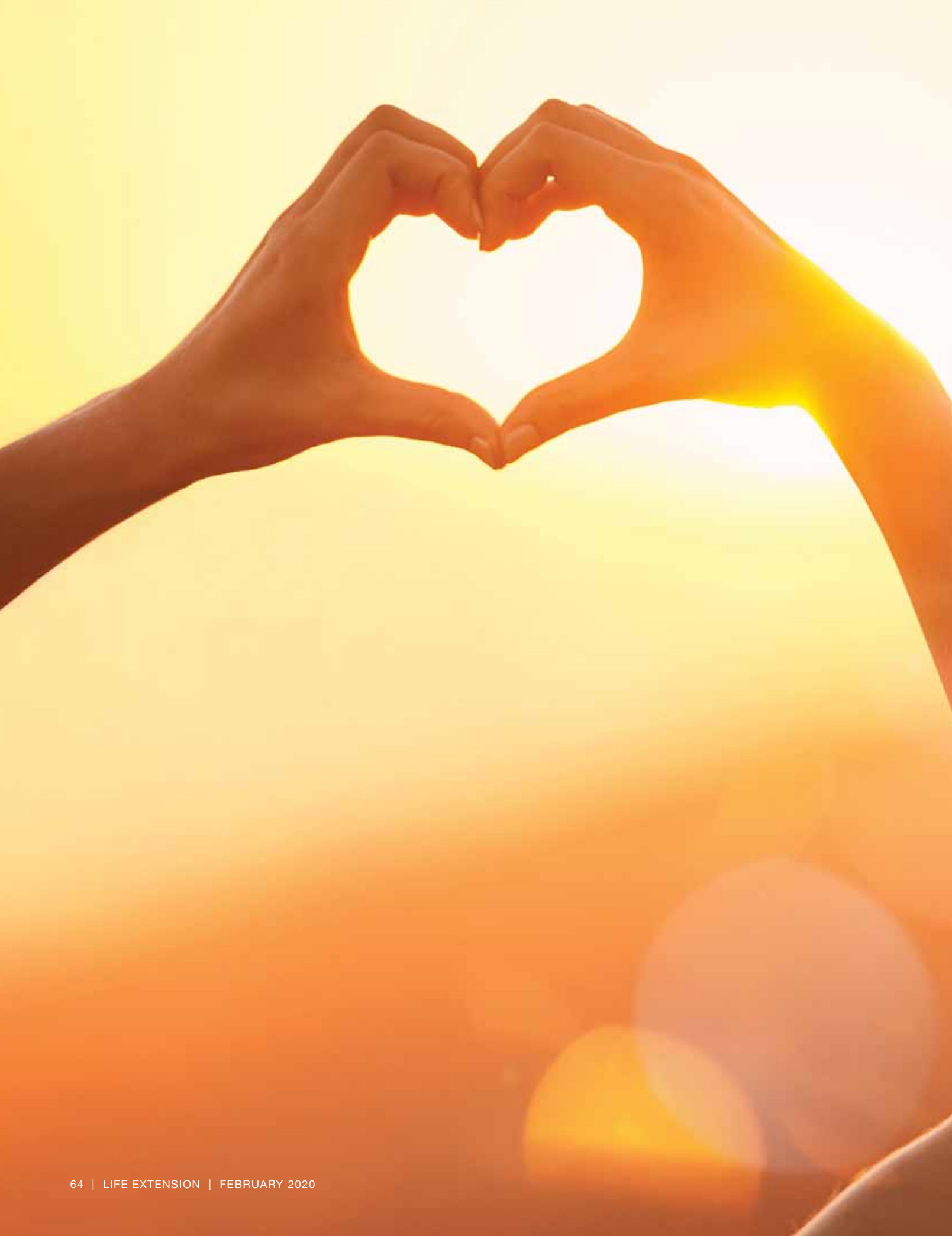
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# Whole-Body Health with VITAMIN D

BY CHRIS FERN

When most of us first learned about vitamins, we were told one thing about **vitamin D**: It's good for our **bones**.

And it is. But in recent years, scientists have found receptors that respond to vitamin D in nearly **every cell in the body**.<sup>1</sup>

There's a reason for that. We now know that vitamin D is vital for the health of our brain and heart, for protecting against premature aging, and for holding off metabolic disorders like type II diabetes.<sup>2-6</sup>

One preclinical study even showed that vitamin D increased **median lifespan** by **33%**.<sup>7</sup>

Researchers have also discovered that **lower** levels of vitamin D in the body are associated with **increased risk** for many age-related chronic diseases.<sup>5,8-11</sup>

In other words, getting enough vitamin D appears critical for nearly every aspect of health.

But a vast majority of adolescents and adults in the U.S. and Europe have dangerously low levels of vitamin D in their blood.<sup>12-15</sup> Correcting this deficiency by taking **5,000 IU** to **8,000 IU of vitamin D daily** could help prevent age-related loss of function and many chronic diseases, and prolong a healthy life.



## What's Behind the Deficiency

In the U.S., **35%** of adults are vitamin D-deficient (defined as levels of *25-hydroxyvitamin D* less than **20 ng/mL**). This rate is even higher in the elderly and other high-risk groups, such as those with darker skin color.<sup>16</sup>

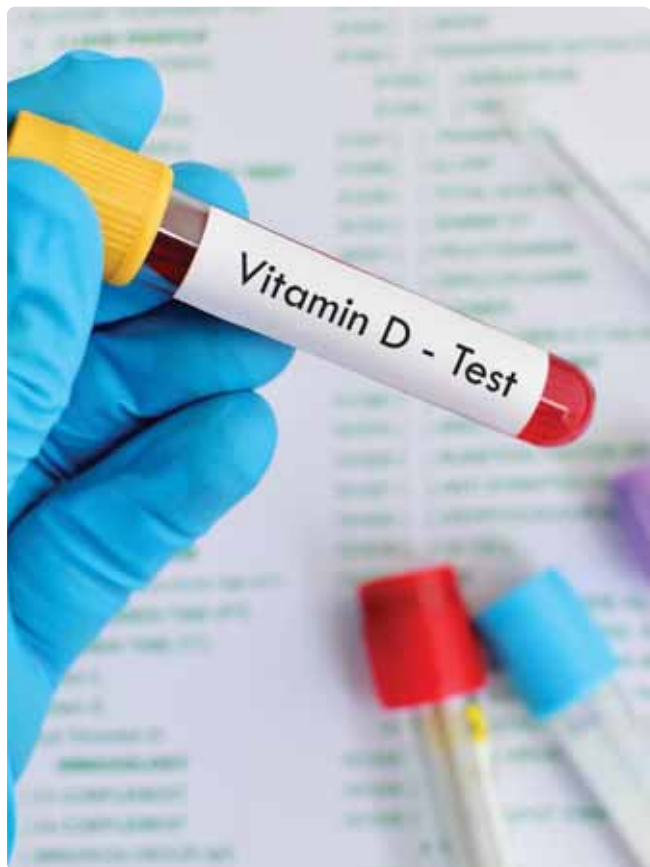
One of the main reasons is lack of **sunlight**.

For the body to produce vitamin D, we *need* direct skin exposure to sunlight. The energy from the sun is the critical ingredient that converts precursor compounds into the biologically active vitamin.

Air pollutants, smoking, and other toxins can interfere with vitamin D metabolism as well, making the problem even worse.<sup>17</sup> And as we age, our bodies produce *less* vitamin D, even though we need more of it.<sup>18</sup>

Spending more time in the sun raises the risk of skin cancer and accelerated skin aging. But there's a simple solution: increasing *intake* of vitamin D to boost our bodily levels.

It's extremely difficult to get enough from food sources like fatty fish or fortified milk. Scientists have determined that supplemental doses ranging from **5,000 IU** to **8,000 IU** daily can bring blood levels of vitamin D up to optimal ranges associated with reduced risk for chronic disease.



## Protecting the Brain

We've long known that adequate vitamin D levels are required for normal brain development.<sup>19</sup> More recently, scientists have found that vitamin D continues to play a critical role in the brain *through old age*.

**Cognitive decline** strikes many elderly people, often culminating in **Alzheimer's disease** and other forms of dementia. Two of the most studied contributors to neurodegenerative disease are **neuroinflammation** and buildup of amyloid protein clusters.

In preclinical studies, vitamin D has been shown to prevent and clean up accumulating amyloid protein.<sup>20,21</sup> It also supports **neurogenesis**, the formation of *new* brain cells.<sup>22</sup>

Vitamin D is also **neuroprotective**, helping to protect brain cells from premature aging, including the related conditions Alzheimer's and Parkinson's disease.<sup>23</sup>

In fact, receptors for vitamin D have been found to be widely distributed throughout the brain.<sup>24</sup>

And studies have consistently shown that:

- *Lower* levels of vitamin D in the blood correlate with a higher risk of cognitive decline and dementia,<sup>2,25-29</sup> and
- *Higher* levels of vitamin D are linked to *better* cognitive function and lower rates of cognitive decline and dementia.<sup>29-31</sup>

Even the *size* of the brain is affected by vitamin D. In older adults, brain volume tends to diminish, but vitamin D stops this loss. Those with the highest levels of vitamin D have greater brain volume than those with lower levels.<sup>30</sup>

## Aging

Researchers studying the aging process have for years been interested in **telomere** length.

**Telomeres** cap our chromosomes and maintain the integrity of our genes. As we age, the **length** of our telomeres decreases and cellular senescence accelerates.<sup>32,33</sup>

Human studies have found that a *higher* level of vitamin D correlates with *longer* telomeres.<sup>34-37</sup> This means that on a genetic level, vitamin D helps protect our chromosomes and DNA against the ravages of time.





## WHAT YOU NEED TO KNOW

### Vitamin D's Many Health Benefits

- **Vitamin D** isn't just good for your **bones**. Recent research has found that it is associated with the health of the **brain** and **heart**, and in extending **healthy lifespan**.
- Low levels of vitamin D have been tied to increased risk for many common chronic diseases, including **cardiovascular disease, metabolic disorders, and Alzheimer's**.
- High levels of vitamin D often correlate with improved overall health and longer life.
- Vitamin D deficiencies are very common and increase in older age. **Life Extension** believes that taking **5,000 IU to 8,000 IU** daily can effectively raise blood levels and improve nearly every aspect of health.
- Regular blood testing is important to guide adjustments to these doses to achieve the maximum benefits.

Other studies confirm that vitamin D can **extend lifespan** and shield against premature aging.<sup>38-40</sup> Preclinical studies have demonstrated that higher intake of vitamin D can promote longevity, with one study showing that it increased lifespan by **33%** in roundworms.<sup>7,41</sup>

Researchers have also found that people with the longest **healthspan**, such as those who live healthily into their 100s, have the *highest* blood levels of vitamin D. People who suffered from chronic disease at a younger age, on the other hand, tended to have dramatically *lower* levels of vitamin D in their blood.<sup>42</sup>

### Cardiovascular Health

Insufficient vitamin D has been linked to increased rates of atherosclerosis, the buildup of plaque in the arteries that leads to **cardiovascular disease**.<sup>8,43-45</sup>

Low vitamin D in the body is also associated with a higher risk for **heart attack** and **overall death due to cardiac causes**.<sup>10,46-49</sup> One recent study found that in elderly people, a vitamin D deficiency was associated with **12.2 times greater** odds for **heart failure**.<sup>50</sup>

Low vitamin D levels are also associated with high blood pressure and high blood glucose, conditions that further increase the risk of heart disease.<sup>51-53</sup>

But research has gone beyond these observational findings and shown that increasing vitamin D intake can help **reverse the progression of cardiovascular disease**.

**Arterial stiffness** is an emerging marker of blood vessel aging and dysfunction.<sup>54,55</sup> It has been linked to cardiovascular disease, and cognitive decline.<sup>56,57</sup>

Research has shown that taking vitamin D can **reduce** arterial stiffness, lowering the risk of cardiovascular disease. One study that used a modest dose of **2,000 IU of vitamin D** daily led to a drop in arterial stiffness of **18%**.<sup>58</sup>

### Metabolic Disorders

**Insulin resistance** is a condition in which cells don't respond to insulin's signal to use glucose for energy. This often results eventually in **high blood sugar, type II diabetes** and **metabolic syndrome**.



Over time, these disorders can cause accelerated aging, loss of vision, cardiovascular disease, stroke, nerve damage, and kidney failure.

Some of the most compelling data on vitamin D use in supporting metabolic health come from studies in people at high risk for type II diabetes, or prediabetics.<sup>59</sup> Such people have **impaired fasting glucose** (fasting sugar levels between **100 mg/dL and 125 mg/dL**), or **impaired glucose tolerance** (an abnormal rise in blood sugar following a metered dose of oral glucose).

In these populations, supplementation with vitamin D daily slowed the rise in fasting blood sugar over time, improved pancreatic insulin secretion, and boosted insulin sensitivity.<sup>60,61</sup>

### Bone Health

The importance of vitamin D to **bone health** has been recognized for decades.<sup>62-64</sup> Strong bones require calcium, and vitamin D helps maintain adequate calcium levels in the body.

Without enough calcium and vitamin D, bones are broken down more rapidly than new bone can be built up. This is one of the main causes of **osteoporosis**, the thinning and weakening of bones that increases the risk for fractures, which can be lethal in the elderly.<sup>62,65</sup>

### Summary

Vitamin D was once thought to be important only for **bone health**. Scientists now know that it influences health throughout the body, from the brain to the heart.

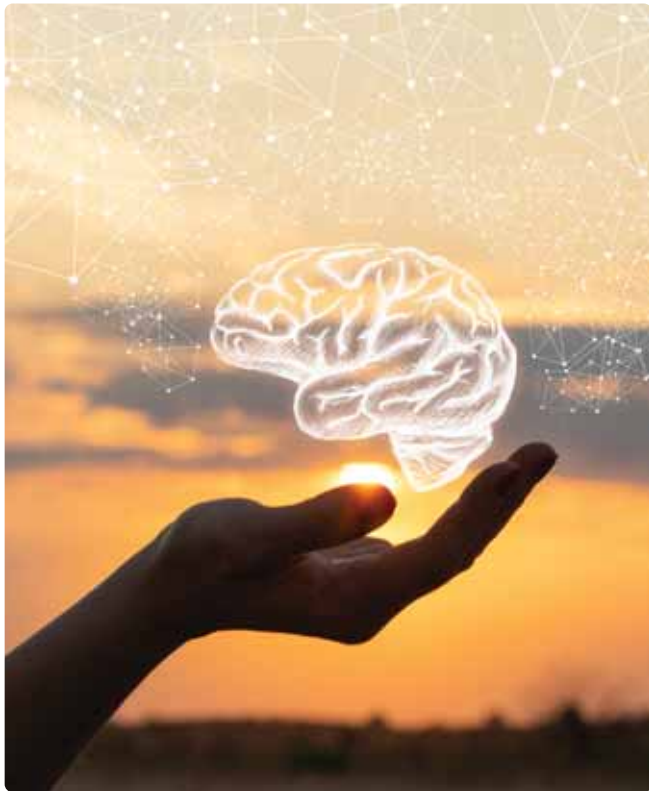
Disorders ranging from **cardiovascular disease to Alzheimer's** have been linked to *lower* levels of vitamin D. Higher vitamin D levels are associated with less risk of those and other diseases.

But it's difficult to get enough from sunlight (without increasing the risk of skin cancer) or from diet. Studies have found that taking higher doses of vitamin D can help raise blood levels and improve **overall health**.

**Life Extension®** recommends that readers consider doses in the range of **5,000 IU to 8,000 IU** daily. Regular blood testing is important to achieve maximum benefits. ●

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





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# The Greek Vegetarian Cookbook

BY HEATHER THOMAS

## Did you know that...

Life expectancy at birth in Greece is 81.2 years, placing it at #25 globally.

The proportion of daily smokers in Greece is one of the highest among the European Union countries.

Greece is considered to have one of the lowest levels of socio-economic development in recent years.

A good approach to a healthy, long life includes a balanced diet, exercise, proper supplementation, smoking cessation, and limiting alcohol intake. Research shows that adherence to the Mediterranean diet can have protective effects against active and passive smoking.\*

\* *Public Health*. 2011 Mar;125(3):121-8.

With the surge in studies showing the health benefits of the Mediterranean diet, Greek food is experiencing a renaissance of its own.

Authentic Greek cuisine consists of the freshest seasonal ingredients, as varied as the topography of the land, ranging from the sea, to the countryside, to the mountains. Staples include olive oil, vegetables, fruit, and pulses (beans, chickpeas, lentils, dry peas), nuts and seeds, and natural grains, among others.

The Greeks tend to practice seasonal eating, consuming primarily locally grown, in-season foods. So, the cuisine is constantly changing, providing variety year-round. This fresh, seasonal diet is believed to be a key reason why Greeks tend to live even longer than their European neighbors.

In *The Greek Vegetarian Cookbook*, author Heather Thomas blends together the best of both modern and traditional Greek cuisine, with a focus on simplicity and authenticity. The cookbook features more than 100 simple and accessible vegetarian Greek dishes, including soups and salads, meatless breakfasts, healthy snacks, street food, contemporary “meze” dishes, and more.

On the following pages, **Life Extension®** presents four signature recipes from the book that highlight the flavor and variety of the region.

—LAURIE MATHENA



## Crunchy Greek Islands Salad

**Preparation time: 15 minutes**

**Cooking time: 8-10 minutes**

**Serves: 4**

2 garlic cloves, peeled and halved

6 slices stale crusty white bread

olive oil, for drizzling

14 oz/400 g juicy plum tomatoes, cut into chunks

1 large red or yellow bell pepper, seeded and cut into chunks

½ red onion, thinly sliced

3 ripe peaches, pitted and quartered

1 quantity Classic Greek Salad Dressing

handful of arugula (rocket) or baby spinach leaves

3½ oz/100 g hard goat cheese, coarsely grated or shredded

sea salt and freshly ground black pepper

**1.** Preheat the oven to 350°F/180°C/ Gas Mark 4.

**2.** Rub the cut cloves of garlic over both sides of the bread. Tear the bread into pieces, lightly drizzle with olive oil, and place on a baking sheet. Bake for 8-10 minutes, or until the rusks are crisp and golden brown. Let cool.

**3.** Put the tomatoes, bell pepper, red onion, and peaches into a large bowl. Stir in the rusks and season with salt and pepper. Lightly toss in most of the salad dressing and let stand for 5-10 minutes for the flavors to mingle.

**4.** Pile the arugula (rocket) or spinach on top and drizzle with the remaining dressing. Sprinkle with goat cheese and serve.

### Variations

Use quartered fresh figs or chunks of watermelon instead of peaches. Any grated strongly flavored hard cheese is suitable, or alternatively you could use feta. Add some cubed cucumber, capers, or olives to the salad.





## Braised Artichoke Hearts and Peas

**Preparation time:** 20 minutes

**Cooking time:** 30 minutes

**Serves:** 4

8 fresh artichokes

1 lemon, halved

½ cup (4 fl oz/120 ml) fruity green olive oil

1 onion, chopped

1 bunch scallions (spring onions), chopped

2 carrots, sliced

1 lb 2 oz/500 g podded fresh peas

2 ripe medium tomatoes

1 cup (8 fl oz/240 ml) vegetable broth (stock)

juice of 1 lemon

bunch of dill, chopped

salt and pepper

**1.** Take a fresh artichoke and remove and discard any tough outer leaves and trim the top level. Scoop out the hairy choke from the base with a teaspoon and trim the stalk almost to the base of the choke. Squeeze the lemon juice into a bowl of cold water and put the artichoke heart into it to prevent it discoloring. Prepare the remaining artichokes in the same way and set aside.

**2.** Heat the oil in a large saucepan over low heat. Cook the onion, scallions (spring onions), and carrots, stirring occasionally, for 10 minutes, or until tender.

**3.** Add the drained artichoke hearts, peas, tomatoes, broth (stock), and lemon juice. Cover and simmer gently for 20 minutes, or until the vegetables are tender and the liquid has reduced. Stir in the dill and season to taste with salt and pepper. Remove from the heat and let cool.

**4.** Serve warm or at room temperature, with some crusty bread to mop up the juices.



## Halloumi and Lentil Salad

**Preparation time: 10 minutes**

**Cooking time: 35 minutes**

**Serves: 4**

- 1 generous cup (7 oz/200 g) brown lentils, rinsed
- 1 vegetable bouillon (stock) cube
- 4 tablespoons olive oil
- 2 red onions, chopped
- 3 garlic cloves, crushed
- 2 large carrots, finely chopped
- 2 celery stalks, finely chopped
- 12 oz/350 g baby plum tomatoes, halved
- juice of 1 lemon
- 1 tablespoon balsamic or red wine vinegar
- handful of dill, finely chopped
- 6 oz/175 g fine green beans, trimmed
- 9 oz/250 g halloumi, cut into 8 slices
- 2 tablespoons green pesto
- sea salt and freshly ground black pepper

**1.** Put the lentils into a saucepan and cover with cold water. Crumble in the bouillon (stock) cube and bring to the boil, then reduce the heat and simmer gently for 20 minutes, or until the lentils are tender but still retain some 'bite.' Drain in a strainer (sieve) and refresh under running cold water.

**2.** Meanwhile, heat 2 tablespoons of the olive oil in a large skillet (frying pan) over low heat. Cook the onions, garlic, carrots, and celery for 8-10 minutes, stirring occasionally, or until softened.

**3.** Add the tomatoes and drained lentils and cook for 5 minutes, stirring occasionally. Squash the tomatoes by pressing down on them with a spatula or wooden spoon. If the lentils start to stick, add a little water. Stir in the lemon juice, vinegar, and dill, and season to taste with salt and pepper. Remove from the heat and let cool a little.

**4.** Cook the green beans in a saucepan of boiling water for 3-4 minutes until tender but not soft. Drain and refresh under running cold water.

**5.** Dry-fry the halloumi in a nonstick skillet (frying pan) or griddle pan over medium heat for about 2 minutes on each side, or until crisp and golden brown.

**6.** Stir the remaining olive oil into the lentils and divide between 4 serving plates. Top with the green beans and halloumi. Drizzle with pesto and serve immediately.





## Warm Griddled Asparagus Salad

**Preparation time: 10 minutes**

**Cooking time: 30 minutes**

**Serves: 4**

- 1 lb 2 oz/500 g thin asparagus spears
- 2 garlic cloves, peeled
- pinch of sea salt crystals
- 4 tablespoons fruity green olive oil, plus extra for brushing
- juice of 1 lemon
- small bunch of Greek basil, chopped
- 3 tablespoons chopped shelled pistachios
- pinch of red pepper (chilli) flakes
- 3 oz/80 g feta cheese, crumbled

**1.** Trim the woody ends off the asparagus or just snap them off with your fingers. Brush them lightly with olive oil.

**2.** Heat a griddle pan over medium-high heat and, when really hot, add the asparagus in a single layer (cook in batches, if necessary – don't overcrowd the pan). Cook for 6-8 minutes, turning occasionally, until the asparagus is just tender and starting to char on both sides.

**3.** In a pestle and mortar crush the garlic and sea salt crystals. Mix with the olive oil and lemon juice in a small bowl until well amalgamated. Stir in the basil.

**4.** Arrange the asparagus on a large serving platter and drizzle the dressing over the top. Scatter with the pistachios and red pepper (chilli) flakes, and crumble over the feta. Serve immediately while it's still warm.

### Tip

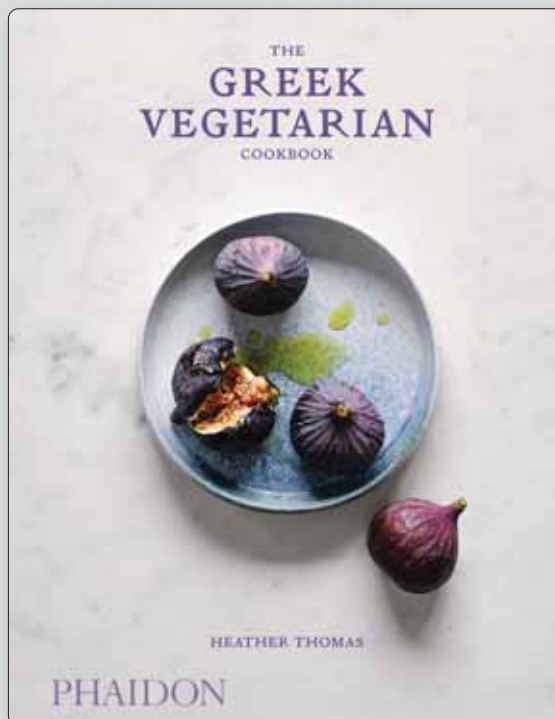
If preferred, you can roast the asparagus in a preheated oven at 400°F/200°C/Gas Mark 6 for about 10 minutes.

### Variations

Use toasted flaked almonds instead of pistachios. Top with goat cheese or shavings of Kefalotyri, Graviera, Parmesan or Pecorino.

Omit the feta and serve with fried or griddled halloumi.

Make the salad more substantial by adding tomatoes and griddled zucchini (courgettes).



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

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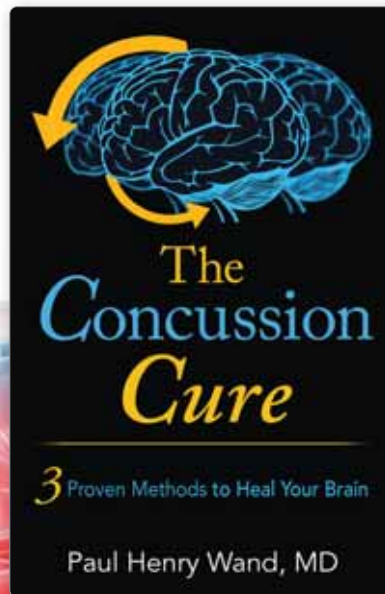


# *The Concussion Cure:*

## *3 Proven Methods to Heal Your Brain*

BY PAUL HENRY WAND, MD

*Oxygen is the single most important element for the healing of human tissues.*



Each year, 43 million concussions are diagnosed around the world.

Victims can suffer debilitating symptoms including headaches, memory loss, confusion, and personality changes.

Paul Henry Wand, MD, has been treating concussion patients for 37 years. Along the way, he made two key discoveries:

1. Most doctors are NOT using the most accurate tests to diagnose brain injuries, and
2. When properly diagnosed, it is possible to reverse the symptoms of a concussion.

Using his **three-step method**, Dr. Wand has treated thousands of concussion patients. He has witnessed his results, both for recent brain injuries and for those that had gone untreated for years.

Dr. Wand is sharing his discoveries with the world in his new book, *The Concussion Cure: 3 Proven Methods to Heal Your Brain*.

In it, he provides critical information on how to properly diagnose and treat concussions, shares three proven methods for reversing concussion symptoms, and details numerous key dietary supplements that are important for helping to restore proper brain function.

In this exclusive interview with **Life Extension®** magazine, Dr. Wand discusses his proven methods, shares stories of dramatic healing, and most importantly—offers hope to all those who have suffered from a brain injury.

—LAURIE MATHENA

**LE:** Who is at risk of suffering from a concussion?

**Dr. Wand:** Traumatic brain injuries, or TBIs, can happen anytime, anywhere, to anyone. Whether the injury is minor, from falling off a bicycle, or major, from a devastating car accident, brain injuries can lead to long-term problems and even death if not appropriately treated.

**LE:** What are some of the symptoms of a concussion?

**Dr. Wand:** A person who has suffered a concussion might have the typical symptoms of headache, dizziness, impaired memory, ringing in the ears (tinnitus), difficulty performing simple math, speaking and comprehending (aphasia), and have difficulty performing higher cognitive functions such as abstraction, planning, and executive functions (memory, self-control, and mental flexibility).

They may also experience personality changes, irritability, aggressive behavior, depression, anxiety, and left-right confusion, to name the most common symptoms.

**LE:** What are the best diagnostic tests for evaluating a brain injury?

**Dr. Wand:** Many types of scans can be performed to evaluate an injury to the brain. However, some scans do not offer any meaningful data, while others offer great detail that would otherwise be overlooked.

I have determined that the most sensitive studies to document an mTBI (mild traumatic brain injury) remain the **QEEG** (quantitative electroencephalography or computerized EEG), the **QEP** (quantitative evoked potentials), and the neuropsychological testing, followed by the SPECT scan, with the MRI being the least sensitive.

These tests should be used in all cases of brain trauma to give accurate diagnoses. The tests should always be done with a normative database to ensure an objective evaluation and not depend on anyone's opinion.

**LE:** In your book, *The Concussion Cure*, you discuss your own personal protocol for treating brain injuries. What kind of results have you seen in your patients?

**Dr. Wand:** As a neurologist, I have treated thousands of brain injuries over more than three decades. During that time, I developed a treatment protocol that has resulted in reversals of the consequences of brain damage. The protocol may even regenerate brain tissue.

From a young man who dropped out of university when his grades declined as a result of several minor concussions as a child, to a young woman who had been confined to a wheelchair for nine years after a severe car accident, my patients come in with injuries that cover the entire range in severity and age.

In every case, their improvements make significant differences in their lives, often dramatically so. After treatment, the man successfully went back to university, and the woman regained some of her vision.

**LE:** What did you discover that all patients with traumatic brain injury have in common?

**Dr. Wand:** In 1990, when I first began to order SPECT scans for many of my patients with TBI, I was impressed with what I saw in nearly all of them: they all had varying degrees of **hypoperfusion**, which is a relative reduction in blood flow in a characteristic pattern.

I hypothesized that if essentially all patients had hypoperfusion, one treatment would be to increase the blood flow. Simple and elegant.

**LE:** Is there a simple way to increase blood flow to the brain?

**Dr. Wand:** What I use to successfully treat traumatic brain injuries is a powerful drug called Nimotop® (brand), or nimodipine (generic).





**Nimodipine** relaxes the smooth muscles inside the artery, which facilitates the artery's dilatation. This, in turn, increases blood flow, so more oxygen is delivered to the cell.

**Nimodipine** works very well to supply blood to the areas of the brain with hypoperfusion, thus leading to improvements, often dramatic. I strongly advocate for its use in most, if not all, TBIs, as its remarkable benefits are undeniable.

I have used nimodipine extensively to treat TBI and other neurological conditions in the outpatient setting with great success and safety.

**LE:** You've also experienced great success with neurofeedback. Can you describe how that works?

**Dr. Wand:** Neurofeedback is a specific treatment modality that retrains the brain by taking advantage of the brain's *neuroplasticity*, the ability of the brain to create new connections between neurons after an injury or other damage to the brain.

Neurofeedback (NFB) changes the brain's electrical function by using positive reinforcement through repeated sessions. NFB converts the dysfunctional state of the brain into a more normal state. The improvement is verified by a scientifically proven comparison to a normal population (normative database).

**LE:** What kind of results have you seen using neurofeedback?

**Dr. Wand:** I recall a patient who had NFB for many years and continued to show gradual improvement. His problem was a seizure disorder with an underlying abnormal brain structure that predisposed him to having seizures.



As his treatments progressed and various abnormalities were resolved, new ones showed up on post-treatment QEEG tests, necessitating further NFB sessions. The continued treatments, combined with a seizure medication, resulted in successfully eradicating his auras (which are warning signs of impending seizure) and eliminating his seizures.

**LE:** What about hyperbaric oxygen therapy for treating traumatic brain injuries?

**Dr. Wand:** Hyperbaric oxygen therapy, or HBOT, is a treatment that pumps pure oxygen under pressure into the blood and body. The normal air that we breathe contains 20 percent oxygen, but HBOT air is 100 percent oxygen, and thus delivers five times more oxygen to the cells.

The benefits of using HBOT include its unique ability to heal any kind of wound, which means it is beneficial for treating brain injuries

in TBI patients. When all factors are considered, the single most important criterion to effect healing is making **oxygen** available to the cells of the body. Without enough oxygen, cells cannot heal or function properly.

**LE:** How does HBOT help heal the brain?

**Dr. Wand:** As previously mentioned, oxygen is the single most important element for the healing of human tissues.

When the diameter of a blood vessel in the brain narrows because of a TBI, the blood flow through it decreases, and stops altogether if the vessel completely closes. When this happens, the oxygen level falls, and then all of the tissues downstream from the point of closure suffer the inevitable fate of dying unless the blood flow is restored. The end result is ischemia (lack of oxygen) and apoptosis (cell death).

The first and most obvious way in which HBOT promotes healing is that it increases the oxygen level in the circulating blood via the respiratory system as the patient simply breathes the enriched air that fills the chamber. There are multiple other mechanisms of action of HBOT, which are described in my book.

**LE:** Have any studies been conducted using HBOT to treat concussions?

**Dr. Wand:** One HBOT human study showed significant improvement of blood flow, an increase of brain tissue seen on MRI scans, and improved results in psychological testing. These included an increase in the speed of thinking, which is always slowed when a brain injury occurs.

SPECT scans were used to document blood flow before and after treatment. The post-treatment scans visually showed a significant increase of blood flow in those areas that had showed significant hypoperfusion.

The authors of this elegant study were able to document for the first time, in humans suffering from persistent post-concussion symptoms (PPCS), that HBOT could induce healing, months or even years after an injury. (This matches my observations using nimodipine.)

They also found improved angiogenesis and an increase in neuroplasticity, which assists in cellular repair and clinical recovery, even years after the injury.

**LE:** You also recommend supplements to help heal the brain. What is one of the most beneficial ones?

**Dr. Wand:** The loss of blood flow, or hypoperfusion, that occurs in a TBI,

and that I consider to be the hallmark injury in concussion, can be combatted with supplements. Many supplements are thought to increase blood flow in the brain if they are able to pass through the blood-brain barrier, which enables them to act directly within the cells.

Probably the most well-known of these is *Ginkgo biloba*, which comes from one of the oldest known tree species.

*Ginkgo biloba* has many health benefits. It supports healthy circulation, helps to maintain the normal function and tone of blood vessels, supports healthy oxygen and glucose metabolism in the brain, stabilizes capillaries and makes them less fragile, supports normal blood coagulation, and supports healthy aging in the brain.

Ginkgo leaf extract contains several active components, including flavonoids, terpenes, lactones, and organic acids, all of which have neuroprotective and cardioprotective properties.

**LE:** Can all concussions be healed?

**Dr. Wand:** The brain is a remarkable organ, unique in its functions and capabilities. New neurons can grow and new synapses form, thus literally growing new brain matter.

Those who are wheelchair-bound from a head injury may be able to walk again. Poor cognitive function can be repaired. Muscle strength and reflexes can return. In fact, all symptoms can be improved if not totally reversed.

It also depends upon the severity of the injury, but even the worst injuries, as documented in my book, do show significant improvement with my treatment known as “The Wand Protocol.”

There is hope for every person suffering the effects of concussion. The brain can be healed. It takes determination, dedication, and working with a physician who supports you in your quest for optimal health. Never give up in your quest to heal your brain.

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

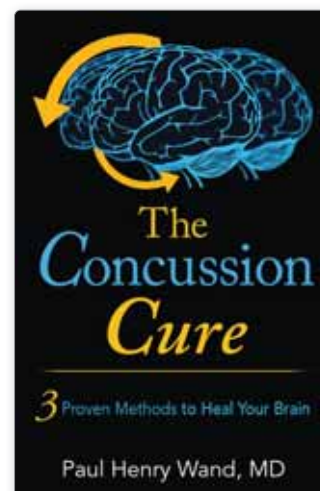
Adapted from *The Concussion Cure: 3 Proven Methods to Heal Your Brain* by Paul Wand, MD.

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Paul Henry Wand, MD, is a clinical neurologist in Fort Lauderdale, FL, with special expertise in treating and reversing diabetic peripheral neuropathy and brain injuries from various causes. He is a member of the **Life Extension®** Medical Advisory Board.

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

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# Imre Nagy: Lessons in Longevity from the Mountains of Hungary

BY LAURIE MATHENA

*Nagy emphasizes the importance of being socially active, which studies have consistently shown contributes to a longer life.*



Born in 1925 into a poor, peasant family, Imre Nagy grew up working the fields on the Great Hungarian Plain.

But after leading a very full life, Nagy didn't find his true calling until he turned 60 years old, when a serious illness changed the course of his life.

Now, Nagy, a subscriber to *Life Extension® Magazine*, continues to take active steps to maintain his health and longevity—and finds fulfillment in helping others do the same.



## Changes Over the Years

Nagy worked as a border policeman for a short time after World War II, but he spent most of his adult life as a restaurant manager. During that time, he met and married his first wife, and they had one child together. They ultimately divorced, after which he re-married and had another son.

"I met my wives randomly," Nagy said. "I never looked for a woman consciously, like today's young people on the Internet."

That's not the only change during his life on which Nagy commented. Over the years, he witnessed inventions like color TV, dishwashers, computers, and even sliced bread—and in his opinion not all of them have been beneficial for our health.

"Technical development changed a lot of things in our life," said Nagy. "Everything became faster, but people became more stressed."

He remembers when life was simpler.

In his early childhood, he worked hard in the fields. To help his family earn extra money, he also caught pheasants by trap near his village, and then traveled to Budapest by train, where he sold them in the marketplace.

As an adult, when he wasn't working at the restaurant, he spent his time beekeeping, breeding rabbits, raising chickens, and growing his own fruit and vegetables.

A Life-Changing Illness

When Nagy turned 60 years old, he began experiencing a burning pain in his stomach, in addition to gas, bloating, and nausea. He had developed gastric and duodenal ulcers, which are open sores that form in the lining of the stomach and the duodenum, the upper part of the small intestine.

Rather than turning to traditional medical treatments, Nagy utilized natural treatments like fasting, consuming herbal teas, and dietary changes. It was during this time that he also discovered bioenergy-increasing exercises, which are breathing exercises designed to increase the oxygen level in the blood.

Studies have shown that increasing blood oxygen levels has health benefits including creating energy, eliminating toxins, strengthening the immune system, boosting mental clarity, reducing stress, and much more.

Nagy’s own success using natural remedies to heal his ulcers inspired him to help others do the same. So, at the age of 60, he studied to become a naturopathic doctor (a doctor who uses natural remedies to help the body heal itself).

He started his own practice, and 30 years later, he still spends his days helping patients.

Treating the “Diseases of Civilization”

Nagy mostly deals with what he calls “diseases of civilization,” which include conditions like high blood pressure, type II diabetes, gastric ulcers, and the like.

And while the recommendations may vary from person to person and condition to condition, he believes every patient can benefit from fasting before and during treatment, taking various herbs and supplements, and doing bioenergy-increasing exercises.

For example, for individuals with high blood pressure, he recommends dietary changes such as cutting out pork and animal fat, and eating more fish, fruit, vegetables, and cold-pressed oil.

He also recommends specific herbal teas such as mistletoe and white horn, and supplements like lecithin, garlic capsules, magnesium, and calcium.

His work as a naturopath led him to discover *Life Extension Magazine*, which he finds especially valuable because, he said, “I can order products that are not available anywhere else, such as senolytics and NAD+.”

The Daily Climb

At 94, Nagy is still going strong. He wakes up every morning, drinks a glass of lukewarm water, and then runs up a nearby mountain with his dog, Buksi. At the top of the mountain, he does bioenergy-increasing exercises.





Nagy explained that for these exercises, he stands by a tree with his legs spread wide apart. “I bend down and then lift up my body while I breathe in deeply. After that, I circle my arms around while holding my breath. I do 100 repetitions two times a day.”

After coming down from the mountain, he spends his days either tending to his patients, gardening, or resting. He recently returned from a health spa resort, where he spent two weeks walking, swimming, hiking, and exercising.

Nagy is proud of the fact that he doesn’t take any medicine.

### The Secret to His Longevity

Nagy believes nutrition plays a key role in health and longevity. He eats mostly fruit and vegetables, drinks 2.5 liters (about 85 ounces) of water per day, and takes supplements including a multivitamin, coenzyme Q10, melatonin, NAD<sup>+</sup>, senolytic activator, astragalus root extract, and a cereal sprout extract.

“I think nutrition is very important, but not alone,” said Nagy. “Balance, temperance, love, getting enough sleep, and bioenergy-increasing exercise are also essential.”

He admitted that he does enjoy a glass of brandy on occasion—but stresses that it is “within bounds.”

He also emphasizes the importance of being socially active, which studies have consistently shown contributes to a longer life.

That’s why he regularly visits the Naturopath Club in the nearby town of Keszthely, a club Nagy established 25 years ago. Nagy himself still gives lectures for the members, although he often invites different naturopaths and doctors to speak as well.



To those wanting to stay healthy and fit well into their 90s, Nagy has a few key pieces of advice.

“It is essential to eat healthy, to cleanse the body regularly, and do bioenergy-increasing training every day,” he said. “But love and faith are the most important things. Individuals should learn how they can be content in life no matter what the circumstances.”

Nagy has accomplished a lot in his 94 years, but when he thinks back to what he’s most proud of, it comes down to three things: “My cured patients, my family, and my long, healthy life.” ●

Imre Nagy is a naturopath practicing in Gyenesdiás, Hungary, helping people to heal themselves using natural remedies. He is a founder of the Naturopath Club in the town of Keszthely.

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



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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  
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  
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  
80133 Anti-Oxidant Facial Mist Hydrator  
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 • 1,000 IU, 90 softgels  
01751 Vitamin D3 • 1,000 IU, 250 softgels  
01713 Vitamin D3 • 5,000 IU, 60 softgels  
01718 Vitamin D3 • 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  
29754 HCAActive Garcinia Cambogia Extract  
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

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Bone Restore with Vitamin K2 combines skeletal-strengthening nutrients in one highly absorbable formula.



**SUPER SALE PRICING!**

Item #01727 • 120 capsules

1 bottle **\$16.20**

4 bottles \$14.85 each

For full product description and to  
order **Bone Restore with Vitamin K2**,  
call **1-800-544-4440** or  
visit **LifeExtension.com**



Note: Those taking the anticoagulant drug Coumadin® (warfarin) should use Bone Restore without vitamin K2.  
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# Your Brain Health Is in Your Hands

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



## Neuro-Mag® Magnesium L-Threonate

SUPER SALE PRICING!

Item #01603 • 90 vegetarian capsules

1 bottle **\$27**

4 bottles \$24.30 each

## Neuro-Mag® Magnesium L-Threonate Powder

SUPER SALE PRICING!

Item #02032 • 93.35 grams of powder

1 jar **\$25.65**

4 jars \$23.40 each



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

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The Science of a Healthier Life™

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### 32 MAJOR CURCUMIN ENHANCEMENT

A **patented** form of **curcumin** is absorbed better, lasts longer in the body, and costs less.



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