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LifeExtension Magazine

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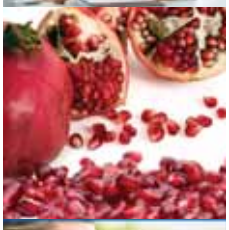

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Scientific Advisory Board

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

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

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

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

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

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

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

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

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

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

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

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

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BY WILLIAM FALOON

How to *Accelerate* Skin Aging

Women who smoke **cigarettes** prematurely age their faces by about **10 years**.[1]

A mechanism of tobacco-induced skin aging is impaired **collagen synthesis**.[1]

Tobacco also stimulates ***enzymes*** that degrade skin **collagen**.[1]

Another proven way to destroy **collagen** is exposure to **ultraviolet radiation**,[2] be it from the sun or tanning beds.

Each year, adults lose about **1%** of their skin **collagen**, which contributes to thinning and wrinkling.[3,4]

While this may not seem like a lot, after several decades individuals may lose half the skin **collagen** they had at age **18**.[3,4]

Readers of ***Life Extension Magazine®*** do a lot to protect their skin. This includes supplementing with **vitamin C** and **pine bark extract** to promote **collagen biosynthesis** and suppress *enzymes* that destroy the skin's collagen matrix.[5]

Astaxanthin also suppresses collagen-damaging enzymes and inflammatory markers, with clinical data showing delayed skin aging.[6]

An often overlooked factor in skin aging is the **cross-linking** of collagen caused by **glycation**.[7]

Even a modest, oral dose of **carnosine** has been shown to improve objective measures of skin appearance in women.[8,9]

Restoring **collagen** lost to decades of normal aging and environmental factors has been challenging up until now.

A Novel Solution

A patented **bioactive collagen peptide** has been shown to replenish and stimulate the production of **procollagen type I** (by **65%**) and **elastin** in older skin.[10]

The result is more youthful skin elasticity and hydration, with a reduced appearance of **wrinkles** under the eyes. We describe this on **page 22** of this issue.

Control Skin Aging

Cosmetic surgery is surging because maturing people are refusing to appear outwardly older.[11,12]

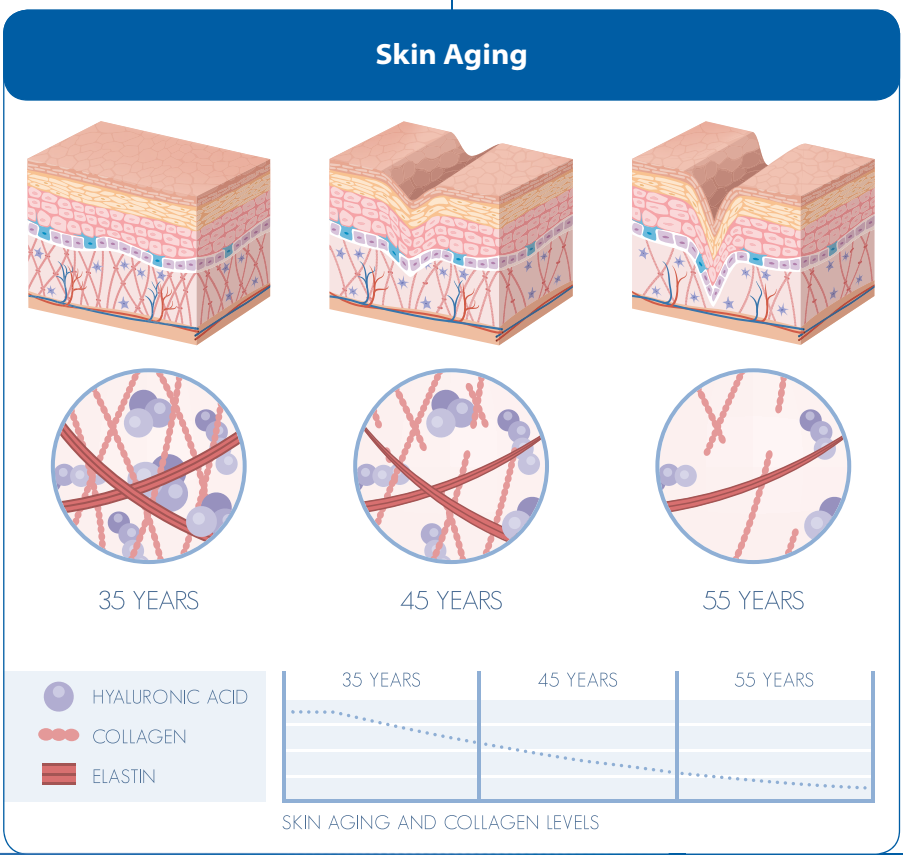
What too many neglect, however, are **nutrients** that have been shown to help rejuvenate aging skin from within.

Irrefutable evidence documents how we can age faster, such as exposing our skin to solar rays or cigarette smoke.[1,2]

On the flip side are studies revealing how **collagen** can be regenerated to restore a more youthful appearance to our facial skin.[10,13]

For longer life,

William Faloon, Co-Founder
Life Extension Buyers Club



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Healthy Brain Aging Tied to Better Nutrition

A study at the University of Illinois found that higher plasma levels of specific nutrients were associated with improved brain connectivity and cognitive performance in older individuals. The findings were reported in the March 2019 issue of the journal *NeuroImage*.*

The study included 116 healthy participants aged 65 to 75. Plasma samples collected from the subjects were analyzed for 32 nutrients that are present in significant amounts in a **Mediterranean diet**. Subjects were tested for general intelligence, executive function, and memory. Functional magnetic resonance imaging (fMRI) of their brains assessed brain network efficiency within 7 connectivity networks.

The nutrient biomarker patterns associated with better cognitive performance included **omega-3 fatty acids**, healthy **omega-3** to **omega-6** fatty acid balance, **carotenoids**, **lycopene,** and **vitamins** including **B2**, **B12**, **D**, and **folate**. Higher levels of omega-3 fatty acids and plant carotenoids were associated with enhanced functional brain network efficiency.

Editor's Note: "Our study suggests that diet and nutrition moderate the association between network efficiency and cognitive performance. This means that the strength of the association between functional brain network efficiency and cognitive performance is associated with the level of the nutrients," senior author Aron K. Barbey concluded.

* *NeuroImage.* 2019 Mar;188:239-251.

Taking Extra Vitamin C Can Help in Recovery from a Cold

The results of a meta-analysis suggest that the addition of extra vitamin C to one's regular, daily supplemental regimen, if initiated at the first sign of a cold, could help shorten the duration and relieve some of the symptoms.*

The meta-analysis included 9 randomized, placebo-controlled trials that evaluated the effects of therapeutic doses of vitamin C consumed at the first signs of a cold, when taken alone, or in addition to regular supplementation.

Editor's Note: In light of their findings, the authors suggest supplementing with a smaller dose of vitamin C each day to boost immunity and adding a larger dose of the vitamin when experiencing a cold to improve recovery.

* *Biomed Res Int*. 2018 Jul 5;2018:1837634.

Feeling Younger May be Good for Your Health

Subjective age—how old you feel, rather than how old you are—may be a contributing factor to health and longevity for older adults. Research results presented at the 2018 American Psychological Association convention indicate that subjective age could be shaped by the level of control individuals believe they have over their lives.*

"Research suggests that a younger subjective age is associated with a variety of positive outcomes in older individuals, including better memory performance, health and longevity," stated presenter Jennifer Bellingtier, PhD.

There were116 participants in the study between the ages of 60 to 90, and 106 participants aged 18 to 36. They all completed surveys daily for 9 days, concerning the level of control they thought they had over the activities in which they participated each day, and how old they felt at that time.

Dr. Bellingtier and co-author Shevaun Neupert, PhD, observed an association between the subjective age and the level of control perceived by older participants, but this was not the case in the younger group.

Editor's Note: "Shaping the daily environment in ways that allow older adults to exercise more control could be a helpful strategy for maintaining a youthful spirit and overall well-being," Dr. Bellingtier said.

* American Psychological Association Annual Convention. 2018 Aug 9.

Postmenopausal Breast Cancer Linked to Low Vitamin D, Higher BMI

A study described in the journal *Menopause* found that postmenopausal women diagnosed with breast cancer were more likely to have insufficient levels of vitamin D and higher rates of obesity than women who didn't have the disease.*

The study included 209 postmenopausal women between the ages of 45 and 75 whose vitamin D levels were measured 10 to 20 days following their breast cancer diagnosis. The control group consisted of 418 postmenopausal women of the same age, who were cancer-free.

Insufficient vitamin D levels, defined as **20** to **29 ng/mL**, were present in **55.6%** of breast cancer patients and in **49.3%** of the control group, and deficient levels of less than **20 ng/mL** were found in **26.2%** of patients and in **20.3%** of the controls.

The postmenopausal women diagnosed with breast cancer were also found to have a higher body mass index (BMI) and a larger percentage of obesity, at **57.4%** compared to **40.2%** for subjects without the disease.

Editor's Note: "Postmenopausal women had an increased risk of vitamin D deficiency at the time of breast cancer diagnosis, associated with a higher rate of obesity, than women of the same age group without cancer," the authors concluded.

* *Menopause.* 2018 Sep 17.

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

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- Support a healthy **immune system**.
- Keep **bones strong**.
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For full product description and to order **Magnesium Caps**, call **1-800-544-4440** or visit **www.LifeExtension.com**

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

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

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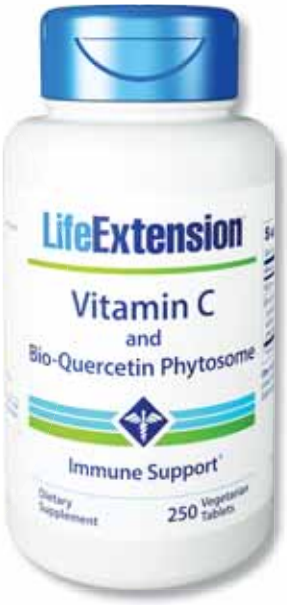

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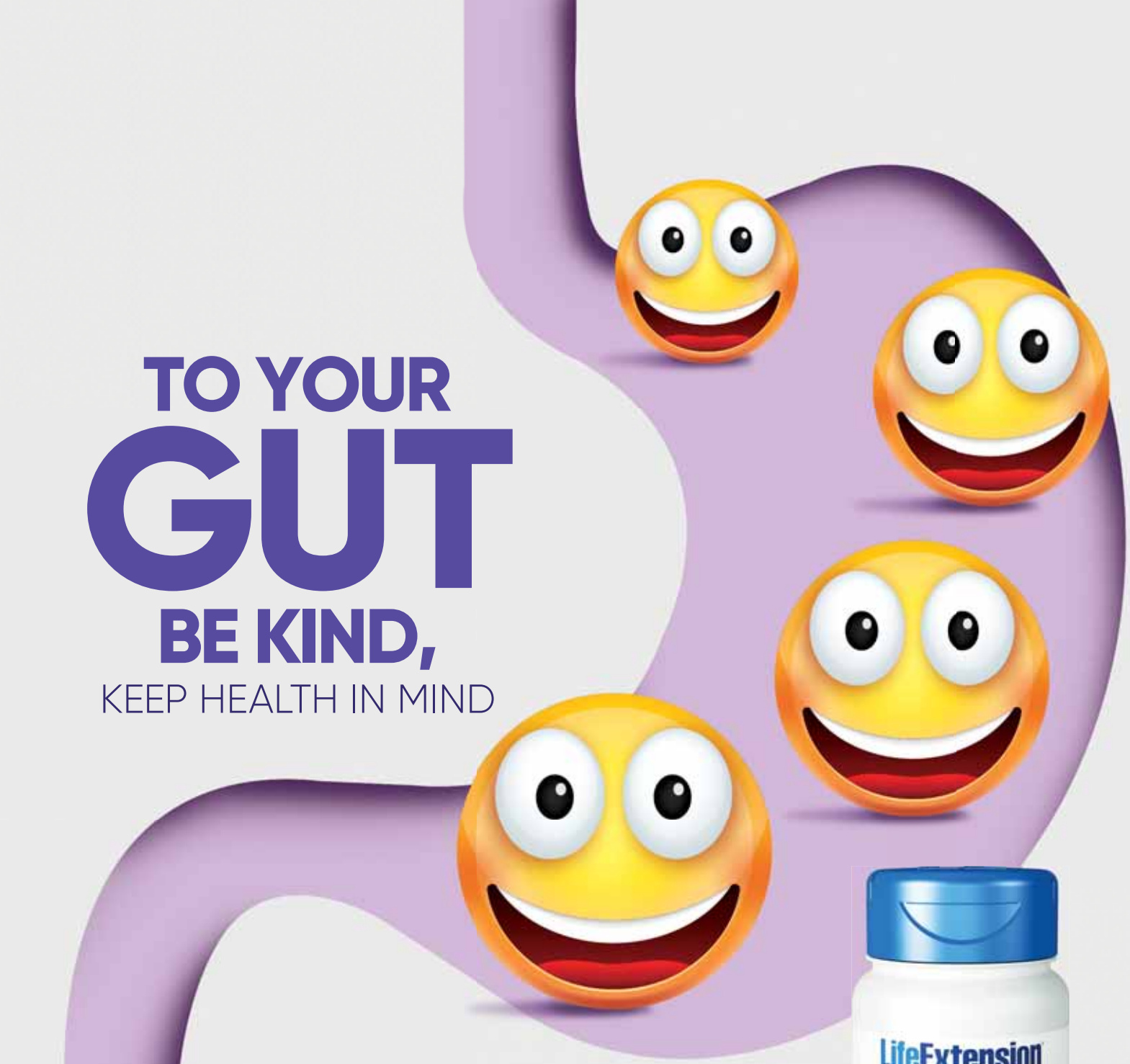

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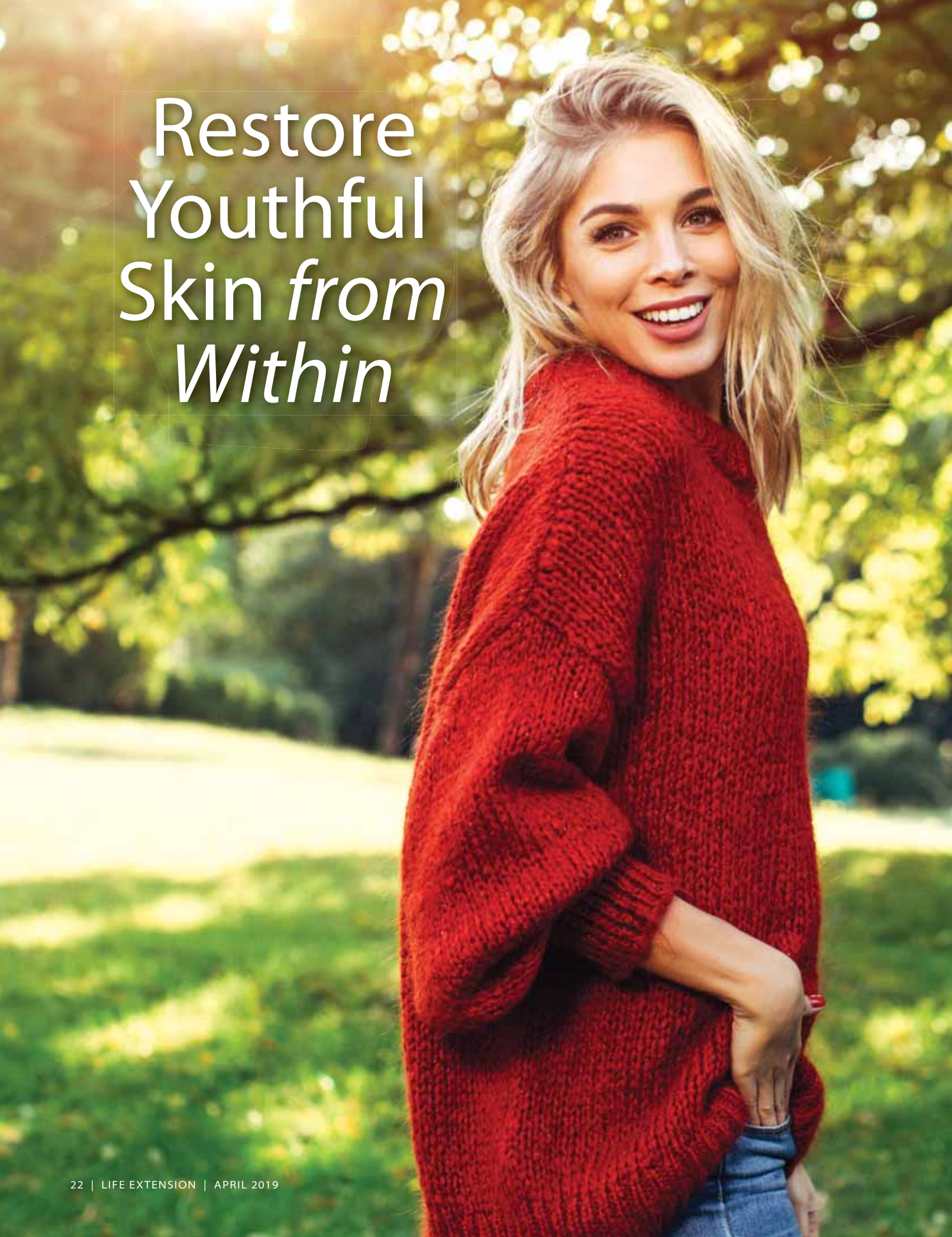


BY MICHAEL DOWNEY

Collagen and **hyaluronic acid** are natural skin components that maintain moisture, support elasticity and promote smoothness.[1,2]

Aging, along with sun exposure, reduces the skin's content of **collagen** and **hyaluronic acid**.

Loss of these components weakens skin structures, leading to age-related ***dryness*** and ***wrinkles***.[1,2]

Clinical trials show that **oral** use of a **collagen peptide** improves skin **elasticity** by an average of **7%**[3] and reduces the depth of **eye wrinkles** by **20%**.[4]

Hyaluronic acid regenerates the skin's underlying architecture by increasing moisture,[5] stimulating collagen-elastin synthesis,[6,7] promoting tissue repair,[8-11] and combating ultraviolet radiation.[12]

Scientists have developed clinically-effective doses of these nutrients in great-tasting **gummies**. This enables aging individuals to replenish the **collagen** and **hyaluronic acid** found naturally in youthful skin.

Collagen Is Essential for Youthful Skin

Collagen is the most abundant protein in the human body. It is the main component of most types of connective tissue, and is vital for healthy, vibrant skin.[13]

Collagen makes up **70%** of the weight of the inner layer of skin.[14] It provides flexibility and is integrated with **elastin** fibers, the protein that allows the skin to stretch and return to its original shape.

As we age, the number of collagen fibers in the dermis declines drastically. The cells that produce collagen fibers slow down, and the remaining fibers stiffen, break, and begin to lose shape. Elastin fibers also begin to fray and lose elasticity. This deterioration of collagen and elastin leads to skin that appears wrinkled and sagging.[15]

To solve this problem, scientists developed **collagen peptides** that provide the building blocks for collagen synthesis and stimulate the production of *new* collagen and elastin in the skin. This leads to increased suppleness and elasticity—and **reduces skin wrinkles**.[4]

Oral Collagen Peptides Block Skin Aging

Preclinical research has shown that hydrolyzed (partially broken-down) collagen peptides *increase* the expression of collagen, which helps to produce stronger, suppler skin. These collagen peptides also *reduce* the activity of a "protein-melting" enzyme (***metalloproteinase 2***) that degrades collagen and hastens skin aging.[16]

In a more recent breakthrough, scientists demonstrated in **human** trials that a collagen peptide **oral** supplement is clinically effective against the appearance of aging skin.

Researchers conducted a double-blind, placebo-controlled study to evaluate the effectiveness of orally-administered **collagen peptides** on ***skin elasticity***. They gave volunteers either a placebo or the oral collagen supplement for 8 weeks. The test group took either **2.5 grams** or **5 grams** of the supplement.[3]

Both doses of the **collagen peptides** demonstrated the same result, which was an average of **7%** improvement in skin elasticity. Even 4 weeks *after* the last dose, the supplemented group retained higher skin elasticity than the placebo group. The improvement in skin elasticity was *greater* in the subgroup of women over age 49.[3]

Next, scientists set up a double-blind, placebo-controlled study to evaluate the effects of **collagen peptides** on ***skin wrinkles***. Study subjects consisted of 114 women, aged 45 to 65, who were given daily oral **collagen peptide** supplements of **2.5 grams**. Wrinkles were measured regularly during the 8-week trial.[4]

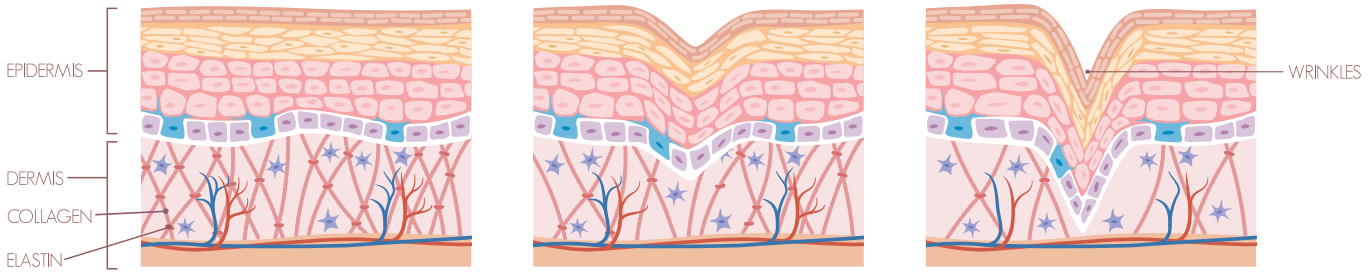
After 4 weeks, the volume of eye wrinkles for the supplemented group had *decreased* by **7.2%**, compared with placebo recipients. And when the trial had run its full 8-week course, those taking the collagen peptide supplements had a stunning **20.1%** reduction in the size of unsightly eye wrinkles.[4]

The researchers also studied the effects of **collagen peptides** on the ***synthesis of the dermal matrix***, the structural framework responsible for skin renewal and vitality.

They did so by evaluating changes in the amount of structural proteins in the dermal matrix. The greater the content of these proteins, the healthier and suppler the skin appears.

Supplemented subjects in this study had a **65%** increase in the accumulation of essential type-I **pro-collagen** and an **18%** increase in **elastin fibers**.[4]

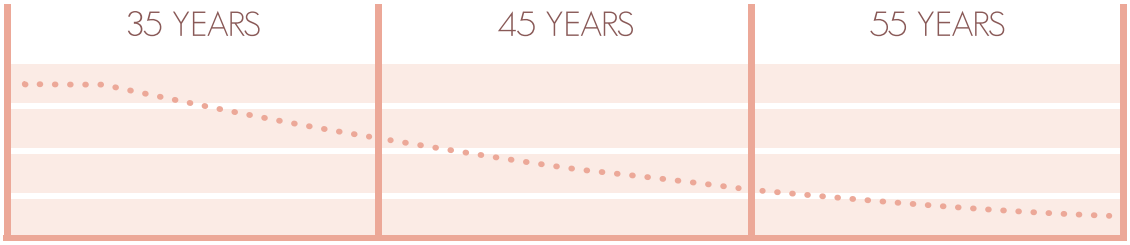
COLLAGEN PROVIDES STRUCTURAL SUPPORT



Collagen and **elastin** provide underlying structural support for youthful skin.

As these proteins (**collagen** and **elastin**) diminish and degrade with aging, fine **wrinkles** appear on the skin's surface.

Decline in Collagen with Age



Collagen levels decrease and become more disordered with aging. Exposure to environmental damage like ultraviolet radiation, excessive alcohol intake, and cigarette smoke accelerates this process significantly.[15,24]

Loss of Hyaluronic Acid Causes Aging of the Skin

Collagen is one of the most well-known components of healthy, youthful-looking skin. But **hyaluronic acid** is just as essential.

Hyaluronic acid has the capacity to attract and retain up to **1,000 times** its weight in water.[17] Although it is found throughout most tissues in the body, more than **50%** of the body's concentration of hyaluronic acid is located in the skin.[1,18] There, it is an essential component of the **extracellular matrix**, a hydrated network that provides structural integrity and cohesion to skin.[19]

Hyaluronic acid is one of the most potent weapons for fighting skin aging and preserving youthful skin. But the body produces less of it as we age—a problem worsened by environmental stress, particularly chronic sun exposure.[20-23]

Together, these factors lead to skin wrinkling, dryness, and the sagging that is characteristic of aging skin.

Collagen Peptides and Hyaluronic Acid for Healthy Skin

- **Collagen**, in the form of **collagen peptides**, improves skin elasticity and levels of essential structural proteins and reduces the depth of eye wrinkles by as much as **20%**.
- **Hyaluronic acid** supplementation has been shown to significantly reverse the loss of moisture content in your skin as you age, helping to restore a more youthful appearance, and to treat dry, itchy skin.
- Clinical studies document that replenishing the age-related decline in the levels of these 2 skin components with **oral** supplements leads to more youthful-appearing and healthier skin.
- A novel way to take these 2 essential nutrients has been developed in the form of great-tasting **gummies** that provide clinically effective doses and have less than 1 gram of sugar per serving.

What You Need to Know

Fortunately, scientists made a dramatic finding: **Oral** supplementation with hyaluronic acid can slow, and even ***reverse***, these effects.

Oral Hyaluronic Acid Replenishes Skin Moisture

A team of scientists analyzed several studies on the skin-improving effects of orally ingested hyaluronic acid.[1]

Participants in most of the studies were diagnosed with "chronically rough and dry skin" prior to the trial. For people like them, moisturizers and other treatments did little to help. But hyaluronic acid made a radical difference. Compared to volunteers who received the placebo, the hyaluronic-acid-treated subjects had a ***significant increase*** in skin moisture after **4-6 weeks** of oral supplementation.[1]

Furthermore, the moisturizing effects of oral hyaluronic acid were found to continue for a full **2 weeks** after supplementation had been discontinued.[1]

The scientific team also reported another benefit: Not only did consuming hyaluronic acid significantly moisturize the skin, but it also reduced the itching that comes with dry skin.[1]

Their published review included the clear conclusion that "*employing HA [hyaluronic acid] as a dietary supplement makes the skin healthy*."[1]

A New Way to Take Oral Collagen Peptides and Hyaluronic Acid

Oral supplementation with **collagen peptides** and **hyaluronic acid** has been shown clinically to ***reverse*** the harsh effects of declining levels of these essential skin components.

But scientists have gone a step further. They've developed a novel and convenient way to **orally** supplement with potent doses of these nutrients.

These two clinically-validated "beauty-from-within" skin components—**collagen peptides** and **hyaluronic acid**—are now available in a great-tasting, easy-to-chew and swallow **gummy** supplement.

This delivery system is different from other supplement gummies for 2 key reasons. First, taking **4 gummies** provides a ***clinically effective dose*** of each of these skin-rejuvenating components. Many other gummies provide woefully insufficient doses of nutrients.

Second, while most gummies contain high amounts of sugar as the first ingredient, these gummies have **less than 1 gram** of sugar per serving — and taste great.

So it is easy to enjoy a few, delicious gummies each day to replenish the skin's decreasing supplies of collagen and hyaluronic acid, which have been clinically shown to:

- Increase skin moisture,
- Improve elasticity,
- Decrease wrinkle depth,
- Boost levels of structural proteins pro-collagen and elastin, and
- Provide more youthful-appearing skin.

Summary

Collagen, when supplemented in the form of specialized **peptides**, is easily ***absorbed*** by the body.

These collagen peptides boost skin elasticity, reduce eye wrinkle depth up to **20%**, and increase procollagen and elastin levels. This provides strength and resilience to the **dermal matrix**.

Hyaluronic acid protects and nourishes the skin by pumping up its moisture content, which addresses dry and itchy skin.

Impressive clinical studies have demonstrated that **orally** taking these **two** "beauty-from-within" skin components provides noticeable improvements in the appearance of aging skin.

Scientists have developed a novel way to take these 2 key nutrients together—in great-tasting **gummies** that deliver clinically effective doses. ●

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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LIPOIC ACID and *Healthy* Weight Loss

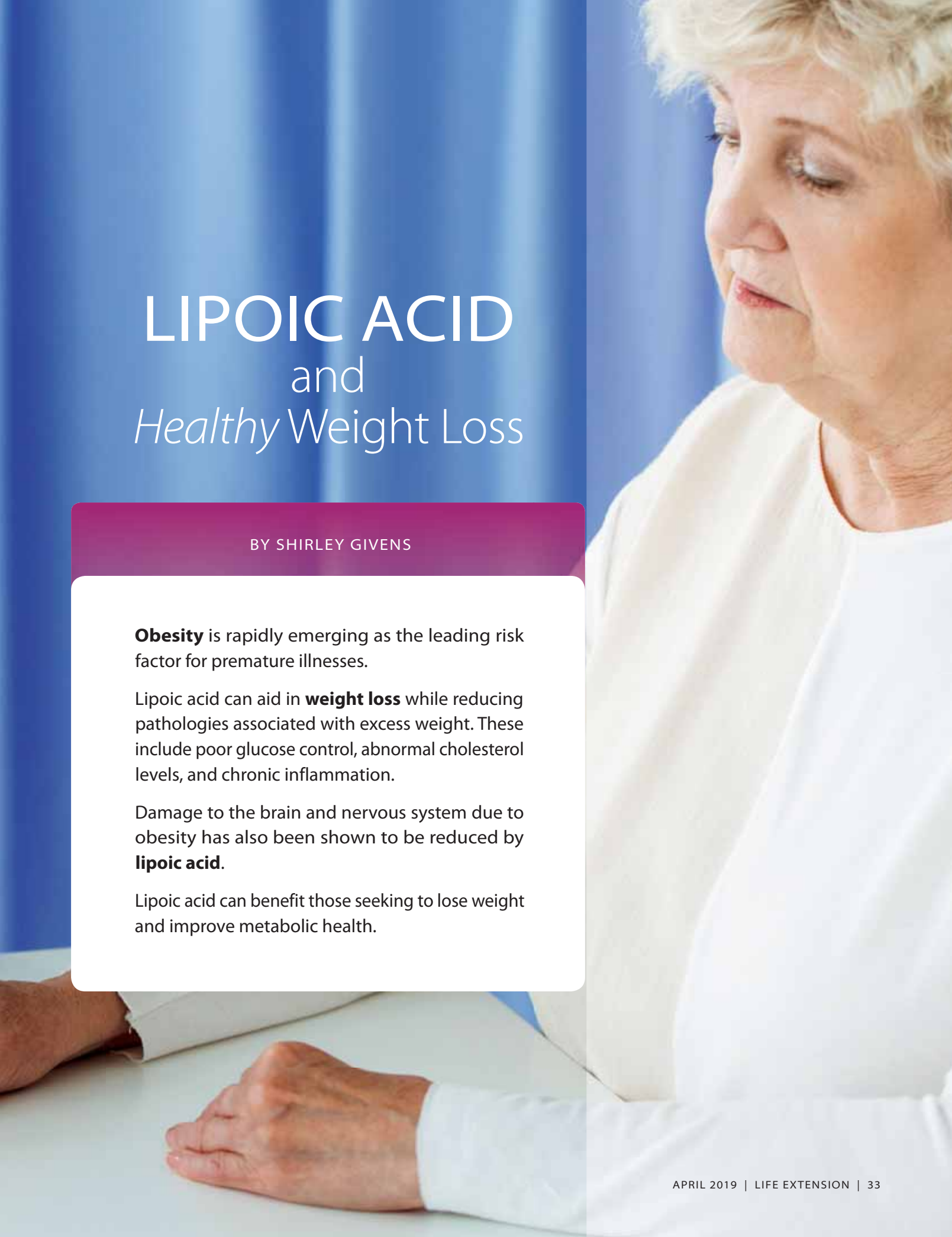
BY SHIRLEY GIVENS

Obesity is rapidly emerging as the leading risk factor for premature illnesses.

Lipoic acid can aid in **weight loss** while reducing pathologies associated with excess weight. These include poor glucose control, abnormal cholesterol levels, and chronic inflammation.

Damage to the brain and nervous system due to obesity has also been shown to be reduced by **lipoic acid**.

Lipoic acid can benefit those seeking to lose weight and improve metabolic health.



The Dangers of Obesity

Obesity is a perfect storm of health problems.

Fat cells churn out an enormous amount of **inflammation** that contributes to chronic disease.[1,2]

Obesity also causes metabolic changes throughout the body, such as high blood pressure, blood lipid abnormalities, and elevated blood sugar, that further increase disease risk.

These abnormalities are components of **metabolic syndrome**, a major cause of common illnesses. Metabolic syndrome affects more than 1 in 3 people in the U.S.[3]

All told, obesity is associated with:[1,2,4-8]

- Increased risk of **death** from any cause,
- High blood pressure,
- Blood lipid abnormalities,
- High blood sugar,
- Type II diabetes,
- Cardiovascular disease (such as heart disease and stroke),
- Some common types of cancer (breast, colon, and others),
- Kidney disease,
- Mental illness (depression, anxiety, and more),
- Sleep apnea and other respiratory issues,
- Pain (due to arthritis and/or nerve damage, for example), and
- Impaired brain function, including cognitive decline and dementia.

Lipoic Acid Aids in Weight Loss and Metabolic Health

The dangers associated with obesity, coupled with its prevalence (more than **70%** of U.S. adults are overweight or obese[9-11]) make finding a solution more important than ever.

The results of **3 studies** published in **2018** show that **lipoic acid** is uniquely suited to aid in weight loss and reduce associated metabolic disease.[12-14]

Reduces Body Weight

In a meta-analysis published in the journal *Clinical Nutrition*, researchers reported on 12 placebo-controlled trials evaluating lipoic acid in the treatment of obesity.[14] These studies revealed that supplementing with lipoic acid reduced **body weight** and **body mass index (BMI)**.

Improves Metabolism

In another meta-analysis, published in the journal *Metabolism,* researchers evaluated 24 clinical trials to determine lipoic acid's impact on patients with metabolic diseases.[12]

More specifically, they evaluated the impact of lipoic acid supplementation on abnormal blood glucose levels and lipid profiles. Both are components of metabolic syndrome and are commonly associated with obesity.

The studies showed that supplementation with lipoic acid improved fasting blood glucose, insulin levels, insulin resistance, and long-term control of blood sugar.

Blood lipid profiles were also improved, with reductions in LDL cholesterol and triglyceride levels.

Anti-Inflammatory Effect

Researchers conducted a third meta-analysis of 18 studies with similar patients to assess the impact of lipoic acid on **inflammation**.[13]

Their analysis revealed that lipoic acid has a profound **anti-inflammatory** effect.

Supplementation was associated with a reduction in **C-reactive protein**, an important marker of systemic inflammation.

Tumor necrosis factor-alpha and **interleukin-6** were also reduced. This is an important finding because these pro-inflammatory cytokines are produced by excess fat tissue. They also contribute to the chronic inflammation associated with obesity and risk for disease.[1]

Most of the studies included in the latter 2 meta-analyses utilized lipoic acid doses ranging from **300-600 mg** daily.

Overall, these 3 studies indicate that lipoic acid contributes to weight reduction while also ameliorating many of the harmful metabolic and inflammatory abnormalities associated with obesity.

Implications for Cardiovascular Disease

Given lipoic acid's benefits for healthy weight loss, glucose control, and lipid profiles, it should come as little surprise that it is also protective against **cardiovascular disease**. Reducing weight, blood sugar, and bad cholesterol can all help reduce cardiovascular risk.

Lipoic acid has also been shown to reduce **blood pressure**, another important risk factor for blood vessel disease and heart disease. In a study of hospitalized patients recovering from stroke, those patients given **600 mg** of lipoic acid daily experienced a reduction in blood pressure and fasting blood-sugar levels.[15]

Lipoic acid may also protect against **atherosclerosis** or hardening of the arteries. Atherosclerosis is the blood vessel disorder that underlies much of what we tend to think of as heart disease.

Atherosclerotic arteries are narrowed and jagged, leading to increased risk of clotting and blockages that underlie many heart attacks and strokes.

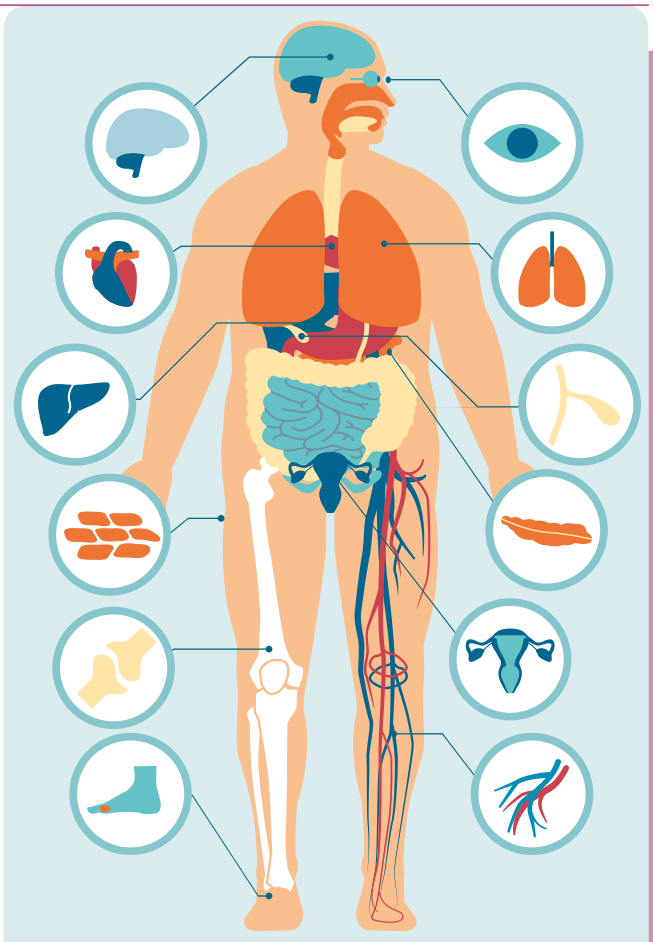
In an animal model, lipoic acid reduced the progression of atherosclerosis. And in human aortic endothelial cells, lipoic acid produced several effects that could help **prevent** atherosclerosis, such as reducing inflammatory changes in blood vessel walls, reducing oxidative stress, and preventing cell death.[16]

Lipoic Acid and Diabetes

Obese people are more likely to develop **type II diabetes**.[17,18]

Poorly controlled diabetes can lead to cardiovascular disease, vision loss, kidney failure, and neuropathy (damage to nerves).[19]

In addition to improving blood glucose control, lipoic acid can prevent or reduce the severity of many of these complications.



Lipoic Acid Combats Obesity and its Complications

- **Overweight and obesity affect more than 70% of U.S. adults.**
- **Excess fat tissue can cause chronic inflammation and metabolic abnormalities throughout the body that can contribute to an increased risk for many chronic diseases.**
- **Many studies now demonstrate that lipoic acid can aid in weight loss, while also reducing inflammation and improving metabolic parameters.**
- **By helping to reduce weight, and improve blood sugar control and blood lipid profiles, lipoic acid supplementation can help reduce the risk for premature aging and disease.**

What You Need to Know

For example, in several human studies, lipoic acid has consistently been shown to improve symptoms of **diabetic neuropathy**.[20-23]

The velocity of electrical impulses in peripheral nerves is often diminished with nerve disease. Lipoic acid was shown in a clinical study to *increase* the velocity of nerve impulses in peripheral nerves, while reducing related symptoms, such as weakness, numbness, and pain.

In one study, R-lipoic acid, the more biologically active form of lipoic acid, was administered to patients with diabetic neuropathy.[21] Within 30 days, nerve-signal velocities were increased, both in motor and sensory nerves. The patients also reported subjective improvements in sensation and a reduction in limb pain.

Several mechanisms of activity contribute to this protection, such as improvement of glucose control, prevention of oxidative stress, and reduction of inflammation.

Obesity's Impact on the Brain

Studies show that obesity contributes to premature cognitive decline and risk for dementia, such as Alzheimer's disease.[2,5,7]

Obesity essentially *accelerates* brain aging.

Highlighting this fact, researchers evaluated 299 healthy, young women aged 18-35. A total of 157 of the women were normal weight while the others were obese.

The researchers found that the obese women displayed significantly lower performance on attention tasks and greater impulsivity than non-obese women. They concluded that this difference may be indicative of an early stage of cognitive decline associated with obesity.

In addition to contributing to weight loss and metabolic health, lipoic acid has profound neuroprotective effects.

Neuroprotective Effects

In animal models of stroke, **lipoic acid** was shown to help reduce the resulting brain damage.[24]

And in 2 animal studies, researchers found obesity to be associated with several forms of brain impairment, some of which were related

The Benefits of R-Lipoic Acid

Lipoic acid occurs in 2 different forms: **R-lipoic acid** and **S-lipoic acid**.

Most supplement production methods result in an equal mixture of these 2 forms.[30,31]

The 2 forms, however, are not equally beneficial.

The "S" form is not very biologically active. The "R" form is the biologically active component (native to the body) that is responsible for lipoic acid's phenomenal antioxidant effect.[30,31]

Some lipoic acid formulas provide the isolated "**R**" form. These supplements provide **100% R-lipoic acid**, which can be readily utilized by the body, maximizing its potential health benefits.

Both animal and human studies demonstrate that **R-lipoic** acid provides the clinical benefits associated with lipoic acid, but with much greater biological activity.[21,32,33]

to poor insulin function. Survival of brain cells, learning, and memory were all impaired in these animals.[25,26]

Remarkably, treatment with lipoic acid prevented many of the detrimental brain effects of obesity, preserving healthy brain plasticity and metabolism.[25,26]

Lipoic acid has also shown promising results in supporting brain function and protecting against the pathology of Alzheimer's dementia.[27-29]

Summary

Obesity wreaks havoc on the body's metabolism and is a major contributor to chronic diseases.

Chronic inflammation, oxidative stress, and metabolic abnormalities are all amplified by excess body fat, which accelerates the aging process and damages tissues.

In addition to contributing to weight loss, lipoic acid combats many risk factors associated with excess weight, such as poor glucose control, abnormal cholesterol levels, and chronic inflammation.

These benefits can result in reducing the risks associated with chronic diseases, such as diabetes, cardiovascular disease, and cognitive decline. ●

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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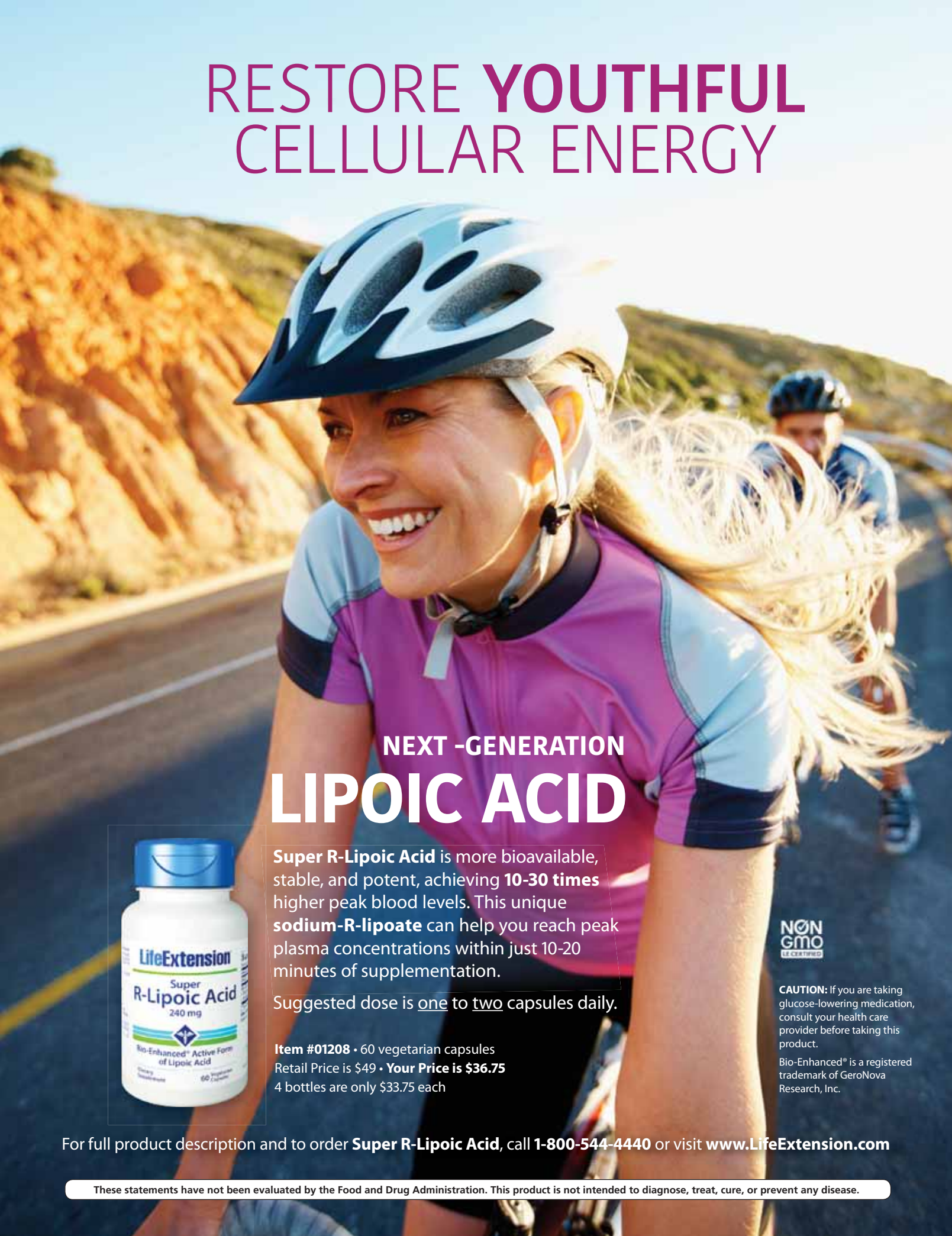

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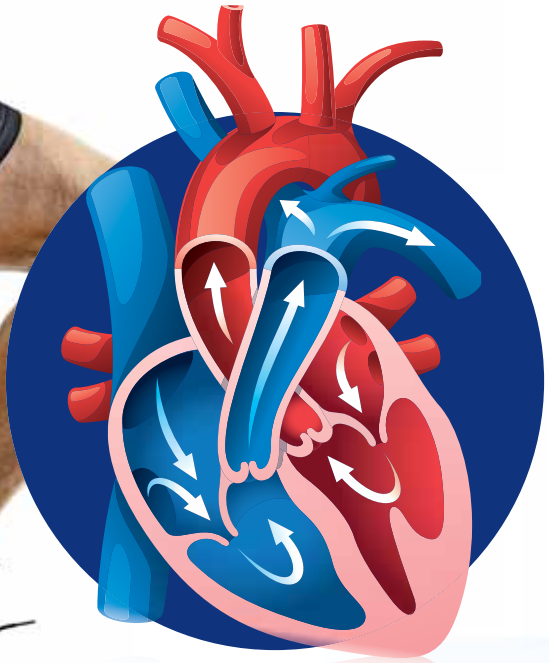

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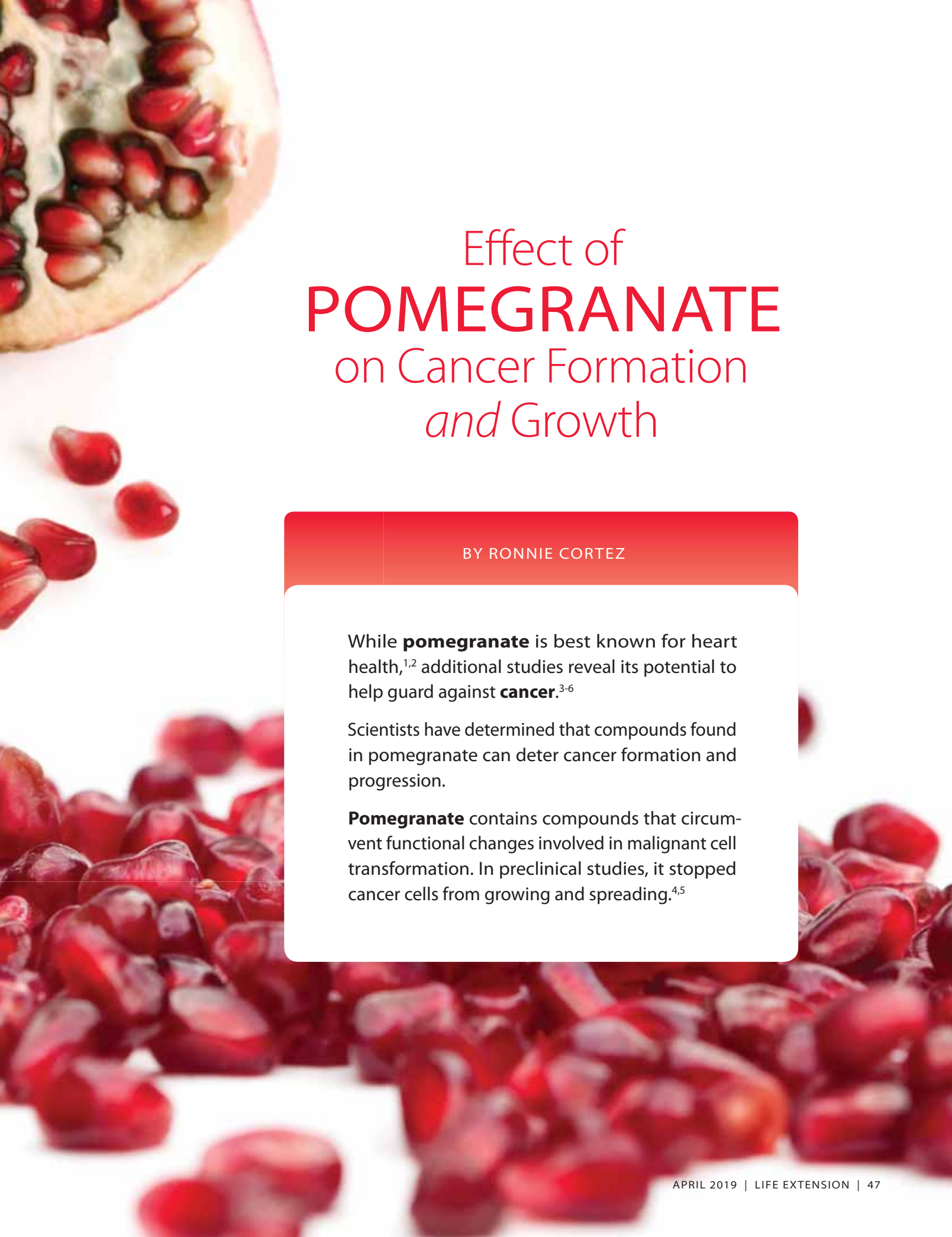


Effect of POMEGRANATE on Cancer Formation *and* Growth

BY RONNIE CORTEZ

While **pomegranate** is best known for heart health,[1,2] additional studies reveal its potential to help guard against **cancer**.[3-6]

Scientists have determined that compounds found in pomegranate can deter cancer formation and progression.

Pomegranate contains compounds that circumvent functional changes involved in malignant cell transformation. In preclinical studies, it stopped cancer cells from growing and spreading.[4,5]

Cancer Prevention

Pomegranates contain compounds that have a positive impact on health.

These include **punicalagin**, **luteolin**, **ellagitannins**, and assorted polyphenols that can impede many steps involved in the formation, growth, and spread of cancer.[4,5]

Rather than preventing cancer by a single mechanism, pomegranate blocks *many different targets*. A primary mechanism is to inhibit **inflammation**.

Pomegranate accomplishes this by turning off genes related to inflammation, such as reducing activity of pro-inflammatory **NF-kappaB**.[9,10]

Such actions can help to **prevent** the formation of **cancer cells**. In one study, pomegranate significantly reduced the formation of tumor growths in the lungs of mice exposed to cigarette smoke over a long period of time.[11]

It also reduced cancer formation in the breast tissue of mice exposed to a known carcinogen (DMBA), a type of polycyclic aromatic hydrocarbon found in cigarette smoke and overcooked meat.[12,13]

How Pomegranate Fights Cancer

In addition to preventing cancer from developing, in preclinical studies, pomegranate has shown multiple effects that help **block the growth** of existing cancer cells and *prevent them from spreading*. These effects include:[4,5]

- **Blocking the cell cycle**: Pomegranate can shut off a cancer cell's ability to divide, limiting its growth by affecting multiple genes related to the *cell cycle* (the cell's pattern of growth). However, it does not block healthy cells from dividing normally.
- **Inducing cell death**: Compounds in pomegranate directly cause cancer cells to die by inducing **apoptosis** (programmed cell death).
- **Stopping new blood vessels that feed cancer**: Angiogenesis is the formation of new blood vessels. Cancer cells require new blood vessels in order to support their growth with an ample blood supply. Pomegranate blocks growth factors related to angiogenesis, which limits the formation of new blood vessels in tumors.
- **Preventing cancer spread**: Cancer cells are often able to separate from other cells and migrate through tissues, eventually spreading to distant organs in the body. Pomegranate limits a cancer cell's ability to spread by affecting gene expression related to invasion, migration, and metastasis.

Taken together, the various compounds found in pomegranate appear tailor-made for preventing cancer and reducing its spread by attacking these diseased cells at many steps of their development and growth.

Pomegranate and Prostate Cancer

There are promising studies on pomegranate's anti-cancer actions against **prostate cancer**, the second most common cause of cancer-related deaths in men in the U.S.[6,14]

One study showed that a prominent **polyphenol** (called *punicalagin*) found abundantly in pomegranate **blocks the growth** of human prostate cancer cells, while also inducing cell death by **apoptosis**.[15]

In another study, a pomegranate extract initiated prostate cancer cell death by apoptosis.[16] It also limited the ability of these cells to migrate, suggesting it can help prevent the spread of prostate cancer.

Animal Studies

In a study published in the journal *Carcinogenesis*, researchers implanted human prostate cancer cells into mice with impaired immune function.[17]

They found that pomegranate compounds (luteolin, punicic acid, and ellagic acid) significantly inhibited the growth and spread of highly invasive prostate tumors.

Specifically, the tumors from treated mice were approximately **25%** smaller.

The tumors metastasized in 5 out of 7 mice that did not receive the pomegranate supplement. None of the mice receiving the **pomegranate** compounds experienced tumor spread.

Human Studies

Some of the most exciting research on pomegranate demonstrates its ability to slow the increase of **PSA**, a blood protein that is a marker of the progression of prostate cancer as well as an indicator of response to treatment.

One study evaluated the effect of pomegranate juice on PSA levels in men *after* they had been treated for prostate cancer.[7]

All patients had rising levels of PSA prior to intervention, an indication that their cancer was very likely progressing. But *following* supplementation with pomegranate, the rate of PSA increase was slower.

This suggests that pomegranate slowed cancer growth.

A subsequent study confirmed the finding that pomegranate extract slowed the rate at which PSA levels increased.[8]

More human studies are urgently needed.

Pomegranate and Cancer

- **Pomegranate contains several beneficial compounds with powerful anti-cancer properties.**
- **It has been shown to interfere with pathways that promote the development of cancer, while also contributing to mechanisms that inhibit the growth and spread of existing cancer.**
- **Studies show that pomegranate holds promise in the fight against cancers of the prostate, breast, colon, liver, lung, and more.**
- **Pomegranate has also been shown, in preclinical studies, to boost the effectiveness of certain chemotherapy drugs while protecting against their harmful side effects.**

What You Need to Know

Pomegranate and Breast Cancer

Preclinical studies using pomegranate have demonstrated effects against **breast cancer**.

Research shows that pomegranate can prevent breast cancer cell growth, induce cancer cell death, block inflammation, and reduce the potential for breast cancer cells to spread.[4]

Pomegranate may also prevent the initial formation of breast cancer. In one study, researchers administered a cancer-causing toxin to rats to induce breast cancer.[10] They found that supplementation with pomegranate **blocked** many of the harmful effects of the toxin. This included altering pathways in cells related to inflammation and oxidative stress.

An extract of pomegranate was also found to prevent the migration of breast cancer cells and to induce cell death.[18]

Additional Anti-Cancer Effects

In addition to targeting pathways that promote breast and prostate cancer, pomegranate has demonstrated, in preclinical studies, beneficial effects against several other types of cancer.

Studies confirm pomegranate's anti-cancer activity in cell and animal models of leukemia, as well as in cancer of the bladder, brain, cervix, colon/rectum, liver, lung, ovaries, skin, and thyroid.[4,5,19,20]

Pomegranate is also being explored as an **adjuvant** to conventional cancer treatments like chemotherapy. It has been shown to bolster the effect of such treatments, while also offering protection against some of their deleterious side effects.[21]

For example, a chemotherapy drug called **fluorouracil** is commonly used in the treatment of various forms of cancer. This drug often causes side effects, such as damaging the lining of the intestines.

A study in rats revealed that combining a pomegranate extract with fluorouracil protected the intestinal lining from fluorouracil-induced injury.[21] The combined treatment also enhanced the cancer-killing effect of the drug, killing more cancer cells than using chemotherapy alone.

Summary

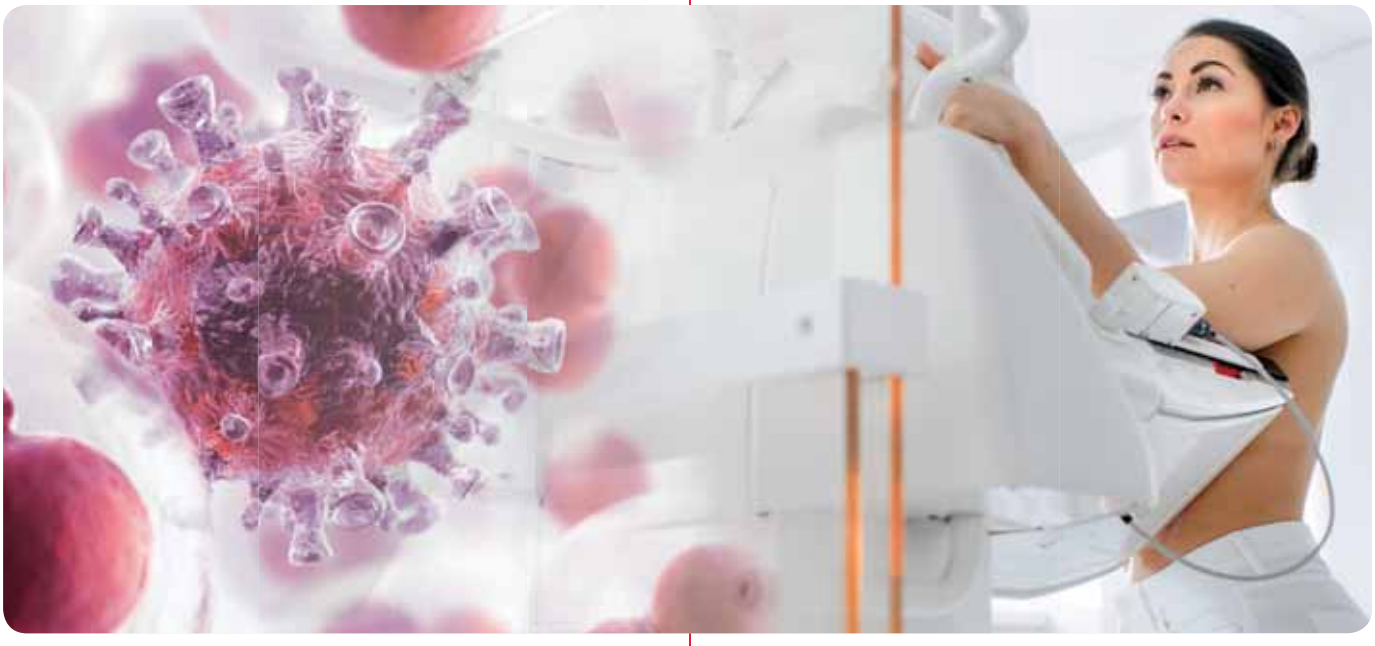
Pomegranate contains compounds that attack cancer cells in cultures by several different mechanisms.

Its anti-inflammatory properties may help reduce the risk of developing cancer.

In preclinical and animal models, pomegranate has been shown to reduce existing cancer cell growth, induce cell death, prevent blood vessel growth associated with tumors, and inhibit the spread of cancer cells in the body.

Pomegranate shows promise to help combat some of the most common types of cancer and may potentially boost the effectiveness of existing cancer chemotherapy treatments. More research clearly needs to be done.

Individuals concerned about cancer should consider adding a **pomegranate extract** (standardized to **30%** punicalagins and **22%** punicic acid) to their supplement regimen. ●



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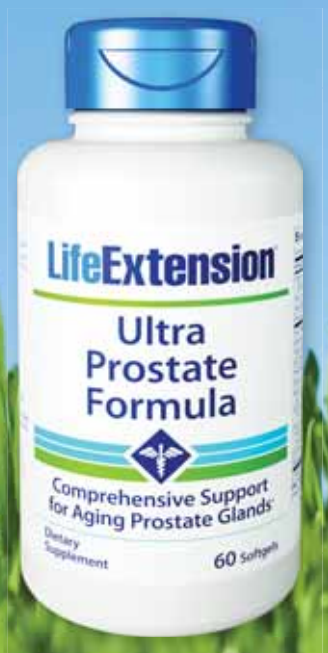

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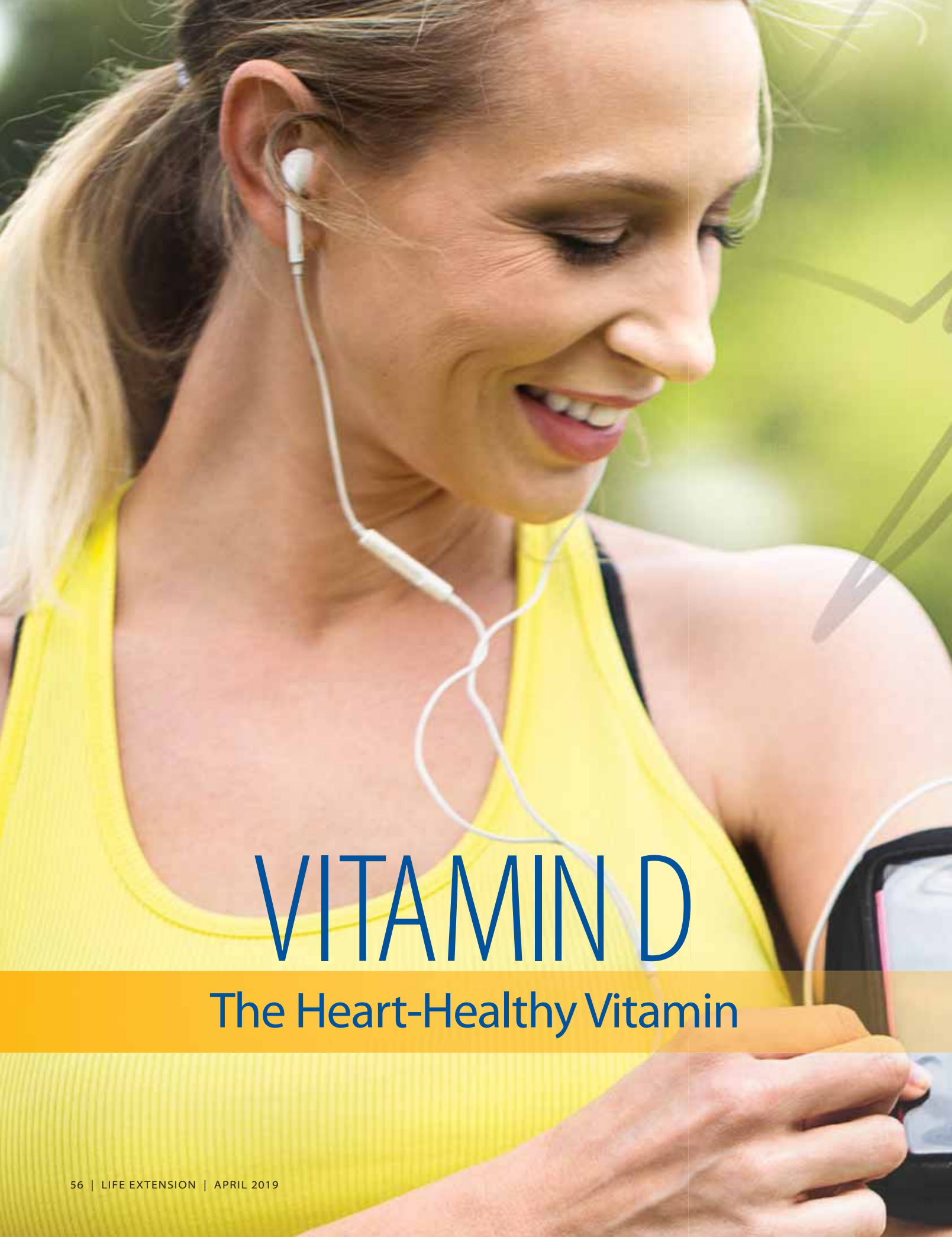


VITAMIN D

The Heart-Healthy Vitamin

BY JULIE MYERS

Researchers have added another reason to optimize vitamin D intake—**prevention** of **heart disease** and **stroke**.

Scientists discovered that, in a cell study, vitamin D ***restored*** a healthy balance between 2 key compounds required to maintain **endothelial function**.

The beneficial compound is **nitric oxide** that maintains youthful blood vessel elasticity. The toxic one is **peroxynitrite** that inflicts blood vessel damage.[1-4]

This study showed that the addition of vitamin D to the cell culture resulted in an increase in *protective* **nitric oxide** and a decrease in *destructive* **peroxynitrite**.[4]

Restoring this balance represents a novel approach to reducing overall risk for cardiovascular disasters.

Low blood levels of vitamin D are also associated with *increased* **arterial stiffness**—the loss of youthful *suppleness* that allows arteries to properly regulate blood flow and pressure.[5]

In addition to causing **high blood pressure**,[6] stiff, inflexible arteries contribute to heart attack, stroke, cognitive decline, and more.[7-11]

More than **40%** of Americans have insufficient blood levels of vitamin D (defined as less than **30 mg/dL**).[12]

Supplementing with **vitamin D** helps reduce **arterial stiffening** and may improve **endothelial function**.[5,13,14]

Vitamin D and Heart Health

Research shows a dangerous relationship between **low vitamin D levels** and heart failure, heart attacks, and high blood pressure.[15] Low levels of vitamin D are also associated with cardiovascular risk factors such as obesity, diabetes, and lipid disturbances.[16]

When vitamin D was administered to rats with high blood pressure, it helped keep their aortas loose, relaxed, and able to move blood with minimal resistance.[17]

This suggests that there's a connection between vitamin D and how blood vessels respond to changes in flow and pressure.

A New Way to Improve Heart Health

Scientists at the Nanomedical Research Laboratory at Ohio University wanted to find out more about the connection between vitamin D and **arterial function**.[4] Their findings take a giant step towards understanding the phenomenon of ***arterial stiffness***.

The researchers used **nanosensors** to measure levels of 2 opposing chemicals inside of endothelial cells: **nitric oxide** and **peroxynitrite**.[4]

Beneficial **nitric oxide** helps keep blood vessels *dilated*, while peroxynitrite is highly reactive and destabilizing.[1-4]

In an experiment, just before measuring nitric oxide and peroxynitrite levels, researchers treated endothelial cells with the human hormone *angiotensin-II*, which produced a state of **endothelial dysfunction** identical to that seen in living people.[4]

Initially, the distressed endothelial cells produced far too much of the destructive peroxynitrite and very little beneficial nitric oxide. This resulted in very low nitric oxide/peroxynitrite ratios (between 0.11 and 0.20), an indicator of endothelial dysfunction.[4]

But when tiny amounts of vitamin D3 were added, something remarkable happened.

In the presence of vitamin D3, the nitric oxide/peroxynitrite ratios *immediately* rose to between 2.1 and 3.0. That represented a more than **10-fold** increase, ***restoring*** (and even exceeding) the normal ratio in healthy endothelial cells.

The improved ratio resulted from an *increase* in protective **nitric oxide** and a *decrease* in destructive **peroxynitrite**.[4]

This study suggests that vitamin D supplementation can *restore* normal endothelial function, supporting healthy blood flow and returning youthful suppleness to blood vessels.[18]

Arterial Stiffness: A Major Cardiovascular Risk Factor

Arterial stiffness is precisely what it sounds like. Numerous factors—such as aging, and exposure to oxidative stress, glycation, and inflammation—cause artery walls to lose their *youthful elasticity* and begin to behave more like stiff-walled pipes.[19-22]

As a result, instead of buffering the rapid rise in pressure following a heartbeat, old, stiff arteries transmit that pulse wave fast and hard to the organs they feed. Delicate organs, tissues, and cells are hammered by large fluctuations in blood pressure

and flow with each heartbeat, which is harmful to their normal function.

In addition to contributing to hypertension, heart attacks, and strokes, **arterial stiffness** plays a role in kidney and liver disorders, type II diabetes, cognitive decline, and neurodegenerative disorders like Alzheimer's and Parkinson's.[7-11]

Vitamin D has properties that help *reduce* oxidative stress, glycation, and inflammation,[23-27] suggesting that it may play a role in **preventing** the arterial stiffening induced by these age-accelerating events.

Human Studies

Compelling human studies show that vitamin D supplementation ***reduces*** arterial stiffness and blood pressure, *directly reducing the risk of heart disease and stroke*. As discussed next, in human cases where subjects have chronic kidney disease, obesity or type II diabetes, the addition of vitamin D lessened arterial stiffness.

Chronic Kidney Disease

In individuals with chronic kidney disease and vitamin D deficiency, supplementation with vitamin D caused arterial **flow-mediated dilation** to nearly double. **Flow-mediated dilation** is a measure of the ease with which arteries relax.

In addition, a marker of **endothelial dysfunction** (adhesion molecules that raise the risk of a clot forming or sticking) fell significantly.[28]

Obesity

Studies of obese people who were vitamin D deficient showed similar findings.

In one study of overweight/obese adults with high blood pressure, a monthly oral dose of vitamin D3 (**100,000 IU**) for 3 months produced significant reductions in the **augmentation index**, a measure of arterial stiffness.[29]

A similar study showed significant reductions in **pulse wave velocity**, another measure of arterial stiffness. The higher the dose of the vitamin, the better the response.[13]

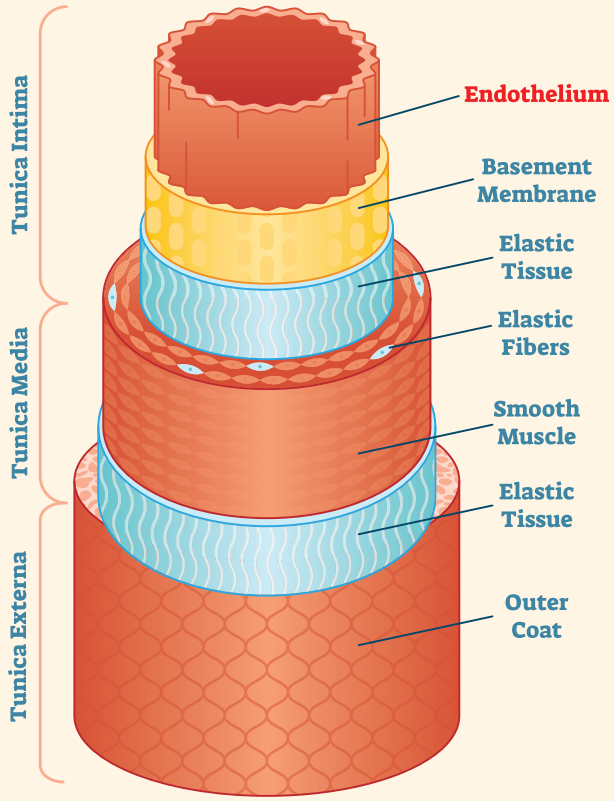
Type II Diabetes

Diabetes is known to produce increased arterial stiffness,[30] and it is closely associated with vitamin D insufficiency.[31] A study of type II diabetics showed that vitamin D supplementation significantly reduced arterial stiffness, as measured by **pulse wave velocity**.[32]

The Heart-Healthy Vitamin

- **Arterial stiffness is a major risk factor for heart attack and stroke.**
- **Vitamin D has been shown to reduce arterial stiffness and may improve endothelial function.**
- **A recent study found that vitamin D restores the balance between protective nitric oxide, which is vessel-dilating, and peroxynitrite, a destructive free radical.**
- **This improves endothelial function, resulting in healthy blood flow and a healthy cardiovascular system.**
- **Life Extension® suggests daily supplementation with 5,000 to 8,000 IU of vitamin D3 and annual blood testing.**

Arterial Anatomy



What You Need to Know

Benefits for Healthy Individuals

Even otherwise healthy people who have deficient or insufficient vitamin D levels benefit from supplementation.

In 2 studies of vitamin D-deficient individuals, vitamin D3 supplementation significantly reduced both systolic and diastolic blood pressure. It also reduced pulse wave velocity and augmentation index.[33,34]

A short study that used a modest dose of **2,000 IU** daily in healthy individuals produced impressive results. Compared to baseline, in those receiving vitamin D3:[35]

- Arterial stiffness dropped by **18%**,
- Systolic (top number) blood pressure fell by **8.2%**, and
- Diastolic (bottom number) pressure fell by **9.1%**.

And, in a study of healthy, older adults with vitamin D deficiency, a single intramuscular injection of **100,000 IU** triggered a significant reduction in arterial stiffness (measured by augmentation index).[36]

LIFE EXTENSION® RECOMMENDATIONS

There are no universal guidelines for frequency of vitamin D testing. However, given the high prevalence of vitamin D deficiency and the strong association of low vitamin D levels with several health issues, annual testing and supplementation to achieve adequate blood levels is highly recommended.

Annual blood tests can let people know whether they are taking the correct dosage to ensure optimal blood levels of vitamin D.

If you do not already maintain an optimal blood level of 25-hydroxyvitamin D of **50** to **80 ng/mL**, then take between **5,000** to **8,000 IU** of vitamin D daily with a meal for better absorption.

Summary

New research into vitamin D3 indicates it is a heart-healthy vitamin.

Deficiency in vitamin D promotes arterial stiffness, which raises the risk of cardiovascular disease. Supplementation with vitamin D can prevent or reduce arterial stiffness.

One major way vitamin D accomplishes this is by restoring a healthy ratio between nitric oxide, which relaxes blood vessels, and peroxynitrite, a destructive free radical.

Since more than **40%** of Americans have insufficient vitamin D levels, supplementation represents a major opportunity for improving public health and reducing cardiovascular risk. ●

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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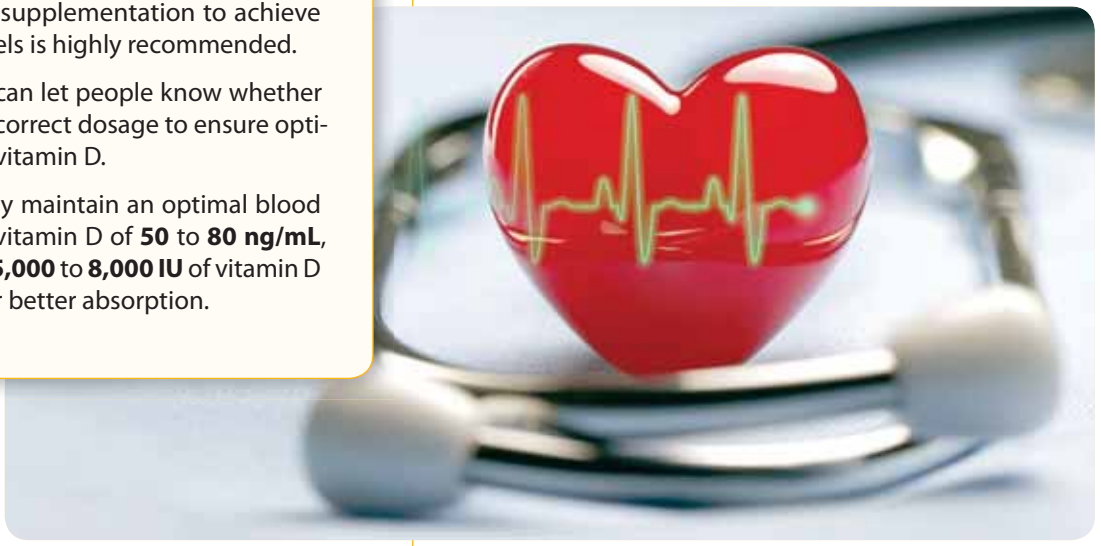

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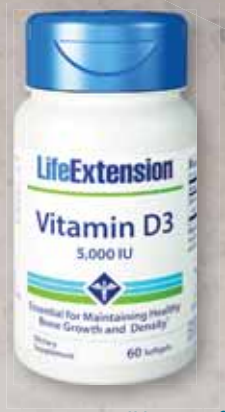

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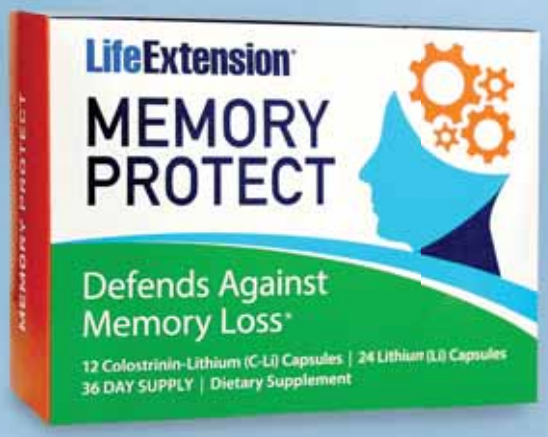

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Link Between Magnesium Deficiency and Heart Disease

BY CARL ROSEN

High blood pressure, or ***hypertension***, is a contributor to the development of atherosclerosis, stroke, kidney failure, dementia and heart disease.[1-5]

The root cause of high blood pressure in adults is often unclear.

Certain conditions, like diabetes, increase the chances of developing high blood pressure.

Unhealthy behaviors that put individuals at greater risk for developing high blood pressure include lack of physical activity and obesity.[6,7]

The medical profession is coming to the realization that **magnesium deficiency** is another risk factor.

A recent article published in the *International Journal of Molecular Sciences* provides an updated overview of the evidence linking **hypertension**—and the vascular diseases it causes—with ***magnesium deficiency***.[8]

Magnesium deficiency is more common than most people realize. It has been estimated that **64%** of all men and **67%** of women in the U.S. have inadequate dietary intake of magnesium. More than **80%** of people over the age of 71 have an inadequate dietary intake of magnesium.[9]

Low-cost **magnesium supplements** provide an easy and effective solution.

Hypertension Causes Heart Disease

Heart disease is the leading cause of death in the U.S. and worldwide.[1]

There are many risk factors for heart disease, including elevated blood lipids, smoking, advancing age, obesity, and elevated blood glucose levels.[1]

Hypertension is one of the most prevalent risk factors.[1] According the American Heart Association, an estimated **41.4%** of Americans will have high blood pressure by 2030.[10]

Over time, high blood pressure inflicts damage on the blood vessels and heart, accelerating the development of coronary artery blockage and heart failure.[8]

How Low Magnesium Leads to Hypertension

Several conditions contribute to the development of high blood pressure, such as whether blood vessels are flexible (constricted or relaxed), stress responses, and structural changes in the blood vessels themselves.

Low magnesium levels impact *all* these conditions.

Blood Vessel Constriction

Magnesium keeps blood pressure down by aiding blood vessel **relaxation** and **dilation**.[11-13]

Magnesium is a cofactor, or "helper compound," required for hundreds of reactions throughout the body. One of those reactions leads to the production of ***prostaglandin E1***, an important *vascular relaxant* which also helps prevent clots from forming inside blood vessels.[14]

Magnesium also tempers the secretion of the hormone ***aldosterone***, which causes the kidney to hold on to sodium and water. This can affect blood pressure.[15-17]

When there's a *deficiency* of magnesium, blood vessels are chronically *constricted* and sodium and water are retained, resulting in hypertension.

Stress Responses

Stress is a physiological risk factor that leads to elevated blood pressure.[8]

Sympathetic nervous system reflexes, often referred to as our "fight or flight" responses, cause the release of neurotransmitters and hormones known collectively as ***catecholamines***. These compounds exert a powerful constricting effect on blood vessels, raising blood pressure.

In lab studies, magnesium was shown to *reduce* the amount of catecholamines released in response to stressors.[15,18]

A deficiency of magnesium lets stress responses run amok, leading to vascular constriction and resulting hypertension.

Blood Vessel Structure

Magnesium deficiency causes several changes that accelerate the aging and **hardening of arteries**.

It leads to low-grade inflammation and oxidative stress in blood vessel walls.[19] Over time, this causes dysfunction of the blood

Hypertension Caveats

For many aging individuals, blood pressure lowering medications are essential to bring blood pressure to optimal ranges of around **115/75 mmHg**.

Beta-blocker drugs like **carvedilol** in the dose of **12.5 mg** a day may be considered as a first choice to optimizing blood pressure.

Carvedilol and other beta-blockers have some interesting side benefits, such as reduced risk of certain cancers, reduced risk of sudden heart attack, and possible slowing of certain aging processes.

Since the early 1980s, **Life Extension®** has urged people to keep their systolic pressure below **120 mmHg**. Back in those days, doctors did not usually start treating blood pressure until systolic pressure reached **160 mmHg**. A consistent flow of published data supports the benefit of maintaining one's blood pressure in the low normal ranges (around **115/75 mmHg**).

An important caveat relates to older people with damaged vascular systems often caused by decades of chronic hypertension. The capillary beds of these individuals are sometimes so broken that a higher level of blood pressure may be required to sustain life, which is ironic since these higher blood pressure levels cause even more vascular damage.

A solution for people with chronic vascular insufficiencies (such as atherosclerosis and/or reduced brain-kidney blood flow) is to gradually reduce blood pressure and use nutrients, hormones and drugs that may help reverse arterial damage by improving endothelial (inner arterial wall) function.

vessel that results in arterial stiffness and, ultimately, atherosclerosis—which raises blood pressure.[20]

Low levels of magnesium also increase the "permeability" of the blood vessel lining, allowing more LDL (or "bad") cholesterol to get into the vessel wall.[21] This leads to an increase in the atherosclerotic plaque that narrows the blood vessel, which can result in heart disease.

Magnesium deficiency has also been tied to metabolic syndrome and type II diabetes, characterized by elevated blood glucose levels.[22-25] This further contributes to blood-vessel wall damage and the progression of atherosclerosis.

Magnesium Intake and Blood Pressure

Critical Factors for Success

Many factors conspire to create magnesium insufficiency in our bodies.

Some of these factors include poor dietary intake, accelerated loss from the body (impaired absorption, excessive urinary loss), alcohol intake, and some types of medications, especially drugs (both over-the-counter and prescription) for treatment of acid reflux (antacids, and other acid blockers like H2-receptor antagonists and proton pump inhibitors). Some blood pressure medications (especially diuretics) and even some types of antibiotics can contribute to inadequate magnesium status, too.

The good news is that in most cases, magnesium intake in the range of **500** to **1,000 mg** per day may help reduce systolic blood pressure as much as **5 mmHg**; however, not all data indicate success.[30-33]

The reason for this apparent inconsistency is because of a failure to adequately control for both sodium and potassium intake.

In fact, *reducing* sodium intake while also *increasing* both potassium and magnesium intake helps to optimize healthy blood pressure levels.

Published research suggests that magnesium has a far greater beneficial impact on blood pressure reduction when combined with both an increase in potassium intake and a reduction in sodium intake.[34,35]

Magnesium competes with sodium for binding sites on vascular smooth muscle cells and binds to potassium in a cooperative manner, increases prostaglandin E, helps support endothelial-dependent vasodilation and reduces endothelial dysfunction.[36-38]

For optimal results, maximize blood pressure reduction with magnesium, between **500** and **1,000 mg** daily from combined food sources (e.g. nuts, whole grains, beans) and dietary supplements. Obtain about **4,000 mg** of **potassium** from dietary sources (nuts, whole grains, beans) and potassium supplements if needed. (Food sources of potassium are listed on next page.) Reduce **sodium** intake to less than **1,500 mg** daily.[39]

Furthermore, in patients with pre-existing hypertension (high blood pressure), a comprehensive analytic review of 44 human studies of oral magnesium supplementation for hypertension showed that magnesium supplements enhanced the blood pressure-lowering effect of antihypertensive medications.[27]

In regard to the "ideal" or "best" form of magnesium for dietary supplementation, there are many factors to consider. In fact, the idea of a single "optimal" form of magnesium for supplementation is debatable. Instead, it is important to consider the **reason** for the supplement.

One approach for ideal magnesium supplementation is to use a **2-part supplement** composed partly of magnesium citrate in a **quick-release form** and magnesium oxide in an **extended-release form**.

Magnesium oxide is highly concentrated, allowing a lot of magnesium to go into a relatively small pill. Because magnesium oxide is somewhat less bioavailable, it is ideal for an extended-release formulation, which gradually makes its way into the circulation.

Magnesium citrate, on the other hand, is less concentrated but is highly bioavailable, which allows for quick release of the mineral in a form that is readily absorbed.

This kind of innovative combination provides extended magnesium benefits in a single supplement.

What Human Studies Reveal

Numerous human clinical trials have found an association between magnesium and hypertension.[26-28]

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

Other studies, including a meta-analysis of trials that enrolled more than 2,000 subjects, have found that supplementation with magnesium reduces **systolic** and **diastolic blood pressure** in hypertensive patients.[29]

Human studies have also demonstrated an association between low magnesium and risk for cardiovascular events, including **heart attack** and **stroke**.[9,12]

A meta-analysis that looked at 5 studies with 58,750 participants found that there was a **9%** reduction in risk for cardiovascular events with every **0.12 mg/dL** increase in serum magnesium levels.[9]

Food Sources of Potassium

Food Sources of Potassium ranked by milligrams of potassium per standard amount, also showing calories in the standard amount. (The AI for adults is **4,700 mg/day** potassium.)

Food, Standard Amount	Potassium (mg)	Calories
Sweetpotato, baked, 1 potato (146 g)	694	131
Tomato paste, ¼ cup	664	54
Beet greens, cooked, ½ cup	655	19
Potato, baked, flesh, 1 potato (156 g)	610	145
White beans, canned, ½ cup	595	153
Yogurt, plain, non-fat, 8-oz container	579	127
Tomato puree, ½ cup	549	48
Clams, canned, 3 oz	534	126
Yogurt, plain, low-fat, 8-oz container	531	143
Prune juice, ¾ cup	530	136
Carrot juice, ¾ cup	517	71
Blackstrap molasses, 1 Tbsp	498	47
Halibut, cooked, 3 oz	490	119
Soybeans, green, cooked, ½ cup	485	127
Tuna, yellowfin, cooked, 3 oz	484	118
Lima beans, cooked, ½ cup	484	104
Winter squash, cooked, ½ cup	448	40
Soybeans, mature, cooked, ½ cup	443	149
Rockfish, Pacific, cooked, 3 oz	442	103
Cod, Pacific, cooked, 3 oz	439	89
Bananas, 1 medium	422	105
Spinach, cooked, ½ cup	419	21
Tomato juice, ¾ cup	417	31
Tomato sauce, ½ cup	405	39
Peaches, dried, uncooked, ¼ cup	398	96
Prunes, stewed, ½ cup	398	133
Milk, non-fat, 1 cup	382	83
Pork chop, center loin, cooked, 3 oz	382	197
Apricots, dried, uncooked, ¼ cup	378	78
Rainbow trout, farmed, cooked, 3 oz	375	144
Pork loin, center rib (roasts), lean, roasted, 3 oz	371	190
Buttermilk, cultured, low-fat, 1 cup	370	98
Cantaloupe, ¼ medium	368	47
1%–2% milk, 1 cup	366	102–122
Honeydew melon, ⅛ medium	365	58
Lentils, cooked, ½ cup	365	115
Plantains, cooked, ½ cup slices	358	90
Kidney beans, cooked, ½ cup	358	112
Orange juice, ¾ cup	355	85
Split peas, cooked, ½ cup	355	116
Yogurt, plain, whole milk, 8 oz container	352	138

Source: Nutrient values from Agricultural Research Service (ARS) Nutrient Database for Standard Reference, Release 17. Foods are from ARS single nutrient reports, sorted in descending order by nutrient content in terms of common household measures. Food items and weights in the single nutrient reports are adapted from those in 2002 revision of USDA Home and Garden Bulletin No. 72, Nutritive Value of Foods. Mixed dishes and multiple preparations of the same food item have been omitted from this table.

Summary

Magnesium is a mineral that is required for the healthy function of hundreds of enzymatic reactions in the body.

Magnesium deficiency is increasingly common. A recent review article reveals that low magnesium is a major contributor to the development of hypertension, which leads to atherosclerosis and heart disease.

Maintenance of normal magnesium levels helps keep blood pressure in the normal range and reduces the risk for cardiovascular disease, including the incidence of heart attack and stroke.

Supplementation with low-cost magnesium is recommended to treat deficiency and maintain optimal levels. ●

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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* US Patent 6,723,368; 8,357,419.

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Natural Plant Extracts Protect Skin Barrier Function

BY ROBERT GOLDFADEN AND GARY GOLDFADEN, MD

For skin to maintain youthful hydration, a strong supporting **barrier** is required to lock in **moisture** and keep out irritants that accelerate the appearance of wrinkles.

Loss of barrier function occurs in response to normal aging, ultraviolet radiation, and other external factors.[1,2]

Scientists have identified 2 plant-stem cell extracts that have been shown to rebuild and protect the skin's surface.

This topical formula can induce meaningful rehydrating effects on aging skin.

Importance of the Skin Barrier Function

The skin's outermost layer (stratum corneum) acts as a barrier to the external environment.[3-5] Preserving skin barrier integrity as we age is crucial for keeping skin hydrated, soft, and youthful.

Repeated sun exposure,[6] extreme temperatures,[7,8] and over-cleansing[9] take their toll on barrier function, creating cracks that allow moisture to escape. What ensue are dryness, flakiness, and wrinkles characteristic of dehydrated skin.

Euterpe oleracea Fruit Extract

Plants survive harsh environmental conditions due to their reservoirs of **stem cells**, which generate protective compounds when under extrinsic stress.[10,11]

For example, *Euterpe oleracea* (açaí or cabbage palm fruit) is a fruit tree that withstands high levels of ultraviolet radiation in Central and South America, thanks to its ability to synthesize a secondary metabolite called ferulic acid.[12,13]

When topically applied to human skin, *Euterpe oleracea* fruit extract prevents sun-induced oxidative stress and inflammation by neutralizing toxic free radicals.[14-17] This finding is noteworthy since chronic sun exposure is one of the primary causes of decreased skin barrier function and increased moisture loss.

Additional research shows that *Euterpe oleracea* fruit extract rejuvenates aging skin by replenishing its energy supply in the form of *adenosine triphosphate* (ATP), which naturally decreases with age.[17,18] This increased fuel availability promotes continuous cell renewal of the skin's surface to leave it looking younger, healthier, and refreshed.

By strengthening and defending the skin's barrier function, *Euterpe oleracea* fruit extract produces immediate and long-term rehydrating effects. In a human study, topical application of *Euterpe oleracea* fruit extract improved skin moisture by **51%** within 24 hours and by **102%** after 4 weeks.[17]

Centella asiatica Extract

Centella asiatica (also known as gotu kola) is another plant that depends upon secondary metabolites called **triterpenoids** to thrive in the different climate zones of subtropical and tropical regions.[19-21]

As the skin ages, it has a diminished capacity to bounce back from the damaging effects of environmental stressors. Researchers are finding that *Centella asiatica* extract has potent free-radical scavenging and anti-inflammatory actions that accelerate wound healing. This in turn repairs cracks to improve the protective barrier function.[22-25]

This effect was demonstrated in a clinical study in which healthy volunteers topically applied *Centella asiatica* extract or a placebo to their forearms twice daily for 4 weeks.[25] At the end of the study, participants underwent exposure to a common skin irritant called methyl nicotinate and 2 hours later were evaulated for erythema, skin pH, and transepidermal water loss.

The results showed significant reductions in all of these skin parameters on the side treated with *Centella asiatica* extract compared with the placebo side, indicating better preservation of barrier function integrity.[25] Researchers believe that *Centella asiatica* extract rapidly increased epidermal renewal through antioxidant and anti-inflammatory activity to reduce skin irritation.

The same study also observed a significant **12%** increase in stratum corneum hydration on the side treated with *Centella asiatica* extract compared with the placebo side.[25] This might be due to triterpenoids in *Centella asiatica* extract that act as powerful

sponges to attract and capture water molecules within the epidermis.[25] Another possible mechanism relates to its strong inhibition of the *enzyme* hyaluronidase.[26] This translates to higher levels of hyaluronic acid in the stratum corneum, which is shown to boost hydration and support barrier function.[27,28]

Seaweed Extracts

Few plants stack up to the wealth of skin nourishing nutrients found in *Chondrus crispus (*Irish moss), a red seaweed that lives off the rocky shores of the North Atlantic Ocean. With its high content of essential vitamins, minerals, and phytonutrients, *Chondrus crispus* naturally drives cellular repair and regeneration in response to external enemies.[29,30] When you add in its well-known moisturizing compound, carrageenan,[31] *Chondrus crispus* is a potent and often overlooked weapon to hydrate skin optimally.

Laminaria digitata (brown seaweed) is rich in compounds called fucoidans. These polysaccharides quell inflammation and inhibit protein-degrading enzymes that destroy skin from the inside out.[32,33] Remarkably, *Laminaria digitata* facilitates cell-to-cell signaling to maintain the function and structure of youthful skin.[34]

Unique Plant Extracts Enhance Skin Hydration

- **The skin's outer surface (stratum corneum) acts as a barrier to retain moisture and nutrients, while defending against the entry of harmful bacteria and irritants, to keep skin healthy, smooth, and supple.**
- **Barrier function naturally declines with age and is exacerbated by chronic sun exposure and other external factors.**
- **Scientists have identified 2 plants—*Euterpe oleracea* and *Centella asiatica*—that produce secondary metabolites to help them survive some of the harshest environmental conditions.**
- **Extracts of both plants have been shown to repair and protect skin barrier function from ultraviolet radiation and other environmental stressors.**
- **Seaweed extracts provide an impressive repertoire of skin-supporting nutrients that further support barrier function and skin vitality.**
- **These compounds have now been incorporated into one topical formula that restores optimal hydration in aging and dehydrated skin to leave it visibly smoother, softer, and younger looking.**

What You Need to Know

Summary

Loss of moisture as we mature causes smooth, vibrant, and healthy skin to take on a rough, uneven, and dull appearance that makes wrinkles and fine lines more apparent.

Two plant-stem cell extracts—*Euterpe oleracea* and *Centella asiatica*—synthesize secondary metabolites shown to stimulate epidermal renewal of barrier function, combat sun-induced inflammation, and enhance the water-holding capacity of skin surface cells.

These natural extracts, along with skin-supporting seaweed extracts, have been combined into one topical formula to optimize skin hydration and promote a more youthful appearance. ●

Gary Goldfaden, MD, is a clinical dermatologist and lifetime member of the American Academy of Dermatology. He is the founder of Academy Dermatology in Hollywood, FL, and Cosmesis Skin Care. Dr. Goldfaden is a member of the *Life Extension*® Medical Advisory Board. All Cosmesis products are available online.

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 Turkish Cookbook

By Musa Dagdeviren

Culinary Traditions and Recipes from Turkey

A country's cuisine helps to define its culture. This is especially true of Turkey, a country that in many ways serves as a bridge between the Mediterranean and the Middle East.

Musa Dagdeviren has been highlighting Turkey's vibrant, bold cuisine in his Istanbul restaurants since the 1980s.

Considered the leading authority on Turkey's unique food traditions, Dagdeviren says his restaurants have gained a reputation as a "culinary wonderland of discovery." But you don't have to travel to Turkey to experience the flavor of the region. Dagdeviren has captured the best that Turkey has to offer in his latest book, *The Turkish Cookbook* (Phaidon 2019).

Full of hearty, healthy cuisine, this book truly celebrates Turkey's unique blend of Mediterranean and Middle Eastern culinary heritage. But ultimately, *The Turkish Cookbook* is more than a collection of recipes—it's a journey deeper into a diverse culture with a rich history.

"There is a strong bond between our culinary culture and traditions," said Dagdeviren. "Food is a constant link to our heritage."

Here, ***Life Extension***® highlights a few of the 550 recipes featured in *The Turkish Cookbook*. The book includes a wide selection of both little-known regional dishes, as well as globally recognized fare such as chicken kebabs, tahini, halva, and tabbouleh.

In addition to providing recipes, Dagdeviren includes an explanation of food rituals and folklore with each dish. After all, understanding the rich history of a dish can help unlock the full flavor embedded in its ingredients.

—Laurie Mathena

SHEPHERD'S SALAD (COBAN SALATASI) REGION: BOLU, ALL REGIONS

Preparation time: 10 minutes • Serves: 4

2 cups tomatoes, diced into ¼ inch cubes
1 cup cucumber, diced into ¼ inch cubes
2 banana peppers (mild sweet peppers), sliced into crescents
1 medium onion, sliced
¼ bunch flat-leaf parsley, finely chopped
¼ bunch basil, finely chopped

FOR THE DRESSING:

2 tbsp olive oil
2 tbsp lemon juice
1 tbsp grape vinegar
¼ tsp salt

Put all the salad ingredients into a large, deep bowl.

TO MAKE THE DRESSING:

Mix the dressing ingredients in a separate bowl, then drizzle the dressing over the salad, toss gently and serve.

There is no mention of this popular salad anywhere until the 1950s. Shepherds probably took a few tomatoes and an onion in their sacks to eat for lunch. They smashed the onion, halved the tomatoes and ate them together in a rudimentary salad. City restaurants eventually refined the shepherd's salad, chopping the ingredients more finely. Some versions omit the olive oil; some add cottage cheese.

CHICKPEA SALAD (NOHUT PIYAZI) REGION: ADIYAMAN, SOUTHEASTERN ANATOLIA

Preparation time: 10 minutes, plus overnight soaking • Cooking time: 1 hour 40 minutes • Serves: 4

- **1 cup chickpeas (garbanzo beans), soaked overnight**
- **¼ cup olive oil**
- **1 medium onion, sliced into crescents**
- **2 garlic cloves, roughly chopped**
- **1 small, hot, red bell pepper, sliced into crescents**
- **2 sundried tomatoes, finely sliced**
- **½ tsp ground cumin**
- **½ tsp dried chili (red pepper) flakes**
- **1 tsp ground sumac**
- **2 tbsp lemon juice**
- **½ bunch flat-leaf parsley, finely sliced**
- **6 fresh basil sprigs, finely sliced**

Drain the soaked chickpeas (garbanzo beans), then cook in a saucepan of simmering water until soft, about 1.5 hours. Drain and put the cooked chickpeas into a large bowl.

Heat the oil in a large saucepan over medium heat, add the onions and garlic and cook for 2 minutes. Add the bell pepper and sundried tomatoes and cook for a further minute. Add ½ teaspoon salt, then pour the mixture over the chickpeas and mix gently. Add the cumin, dried chili (red pepper) flakes, sumac, lemon juice, parsley and basil, mix gently and serve.

This is popular street food in the region. Vendors cook the chickpeas (garbanzo beans) in a lamb stock and serve them in this fresh salad. Chickpea rolls are sold in front of bakeries and enjoyed in the early morning in homes and workplaces. This tradition is still strong in Gaziantep, Sanliurfa and Adiyaman.

COURGETTE FRITTERS (MÜCVER) REGION: SINOP, ALL REGIONS

Preparation time: 15 minutes • Cooking time: 25 minutes • Serves: 4

A summer dish, traditionally made after making stuffed courgettes (zucchini), so that the leftover courgette flesh does not go to waste. Some versions add 50 g/2 oz feta cheese to the recipe below.

3⅓ cup courgettes (zucchini)
1 medium onion
4 spring onions (scallions)
1 fresh garlic clove
½ bunch flat-leaf parsley
½ bunch dill
1 tsp dried mint
5 eggs
⅓ cup plain (all-purpose) flour
1 cup olive oil, for frying

FOR THE SAUCE:

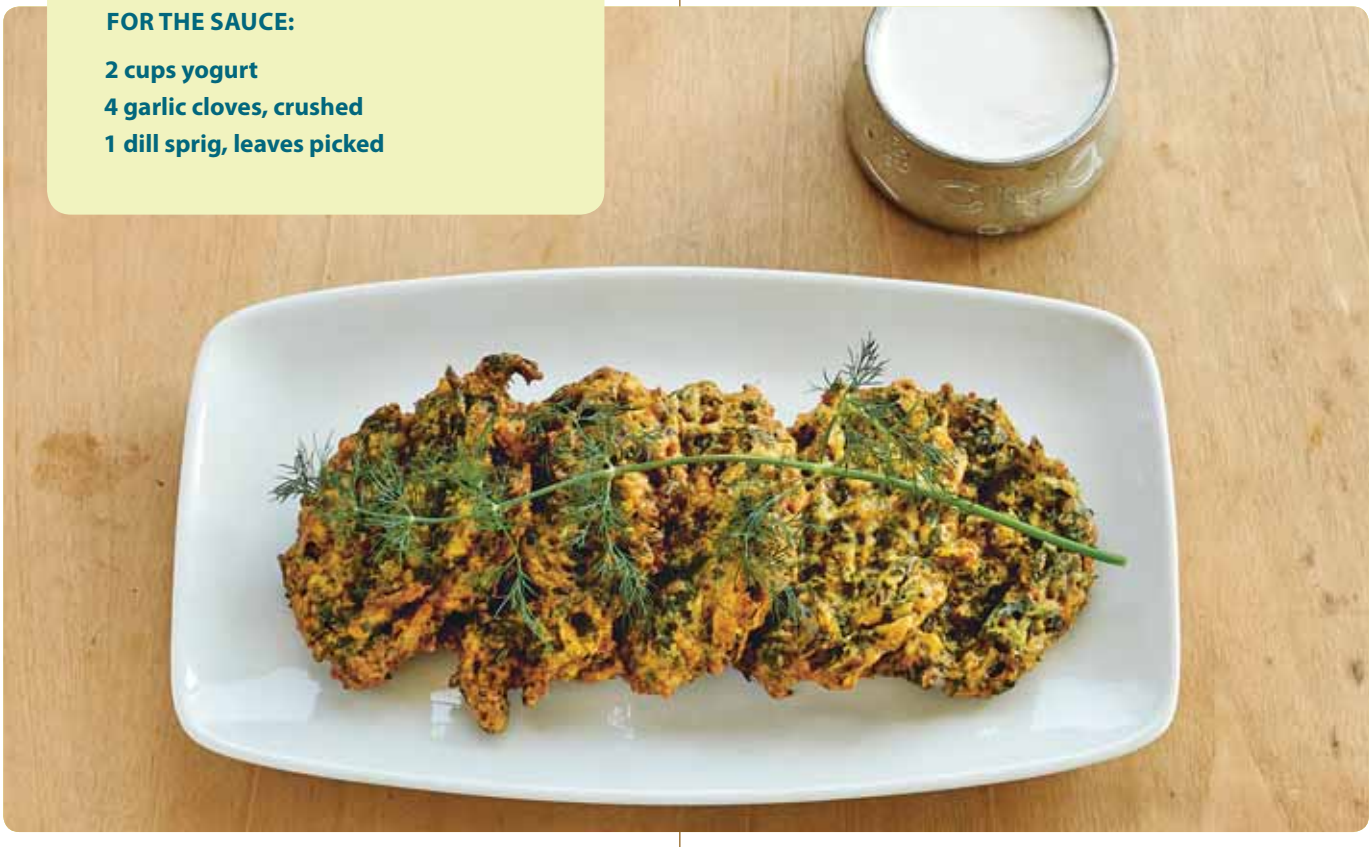
2 cups yogurt
4 garlic cloves, crushed
1 dill sprig, leaves picked

Peel the courgettes (zucchini) and grate into a bowl. Finely slice the onion, spring onions (scallions), garlic, parsley and dill. Add to the courgette flesh. Add the dried mint, then season with ¼ teaspoon black pepper and ½ teaspoon salt. Knead for 3 minutes, until well incorporated.

In a separate bowl, whisk the eggs and flour. Add the whisked egg mixture to the other ingredients and knead for a further 2 minutes to combine.

In a large saucepan, heat the olive oil over medium heat to 155°C/310°F. Place ¼ cup of the fritter mixture into the hot oil and fry for 2 minutes on each side. Use a slotted spoon to remove and place on paper towels while you prepare the rest, until all of the mixture is used up.

To make the sauce: Mix the yogurt and garlic in a separate bowl, then season with ¼ teaspoon salt and garnish with dill. Arrange the fritters on a platter and serve with the yogurt sauce.



HUMMUS (HUMUS) REGION: MERSIN, ALL REGIONS

Preparation time: 30 minutes, plus overnight soaking • Cooking time: about 11 hours • Serves: 4

- **1 cup chickpeas (garbanzo beans), soaked overnight**
- **4 garlic cloves, crushed**
- **1/8 tsp ground cumin**
- **1 cup tahini (sesame seed paste)**
- **2 tbsp sesame oil**
- **1 cup lemon juice**
- **1 tbsp ground sumac**
- **1 tsp dried chili (red pepper) flakes**
- **6 sprigs flat-leaf parsley, finely sliced**
- **2 tbsp olive oil**

Drain the soaked chickpeas (garbanzo beans), then cook in a pan of simmering water until soft, about 11 hours. Drain and let cool, then remove the skins.

Mash the chickpeas with the crushed garlic, cumin and 1 teaspoon of salt, either with a fork or in a food processor.

In a separate bowl, whisk the tahini, sesame oil and lemon juice, then add to the chickpea mash gradually, making sure all is smooth and well combined. If you prefer a runnier consistency, add a small amount of water to loosen the hummus.

Divide among serving plates, sprinkle with sumac, dried chili (red pepper) flakes and parsley, then drizzle with olive oil and serve.

Some local versions add butter, and some add *pastırma* (cured beef).

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

Reprinted with permission from *The Turkish Cookbook* (Phaidon 2019).

The Turkish Cookbook, scheduled for release on April 1, 2019, is available from bookstores and online retailers.

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