



The Science of a Healthier Life®

November/December 2023

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Keep Your Pet HEALTHY LONGER



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for Dry Eyes

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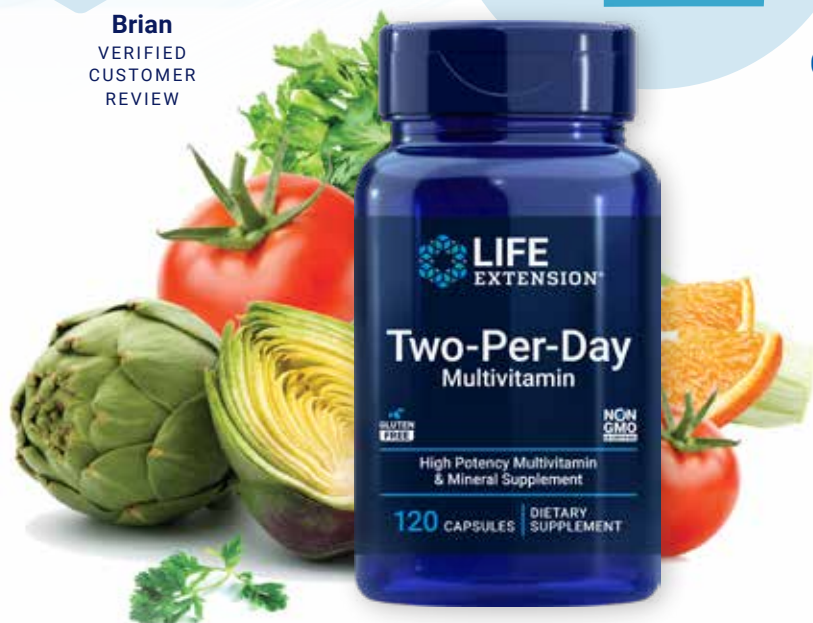
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REVIEW



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Can't
Compete

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† Ratings based on results of the 2023 ConsumerLab.com Survey of Supplement Users. More information at www.consumerlab.com/survey.

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- Prebiotic fiber
- Already healthy blood sugar and insulin levels

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References:

1. *Nutrition* 22 (2006) 1112–1119.
2. *J Am Coll Nutr.* 2008 Feb;27(1):102-8.
3. *Med Sci Monit.* 2005 Jan;11(1):PI5-8.
4. *Ann Nutr Metab* 2020;76:259–267.
5. *Am J Clin Nutr* 2017; 1239-1247.

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



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Protect Your Canine Companion

Like people, **dogs** face age-related ailments, from joint pain to behavioral issues. More veterinarians today recommend specific **nutrients** to address dog health.



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CoQ10 + selenium improves aging biomarkers; quercetin speeds muscle recovery after exercise; healthier eating lowers mortality risk; EGCG in green tea could target uterine fibroids; Omega-3s benefit polycystic ovary syndrome; supplements reverse measure of brain aging; higher vitamin D levels help overactive bladder; pain relieving property of PEA.

18 TAURINE SHOWN TO IMPROVE HEALTHY AGING

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Nutrition Tailor-Made for Men.

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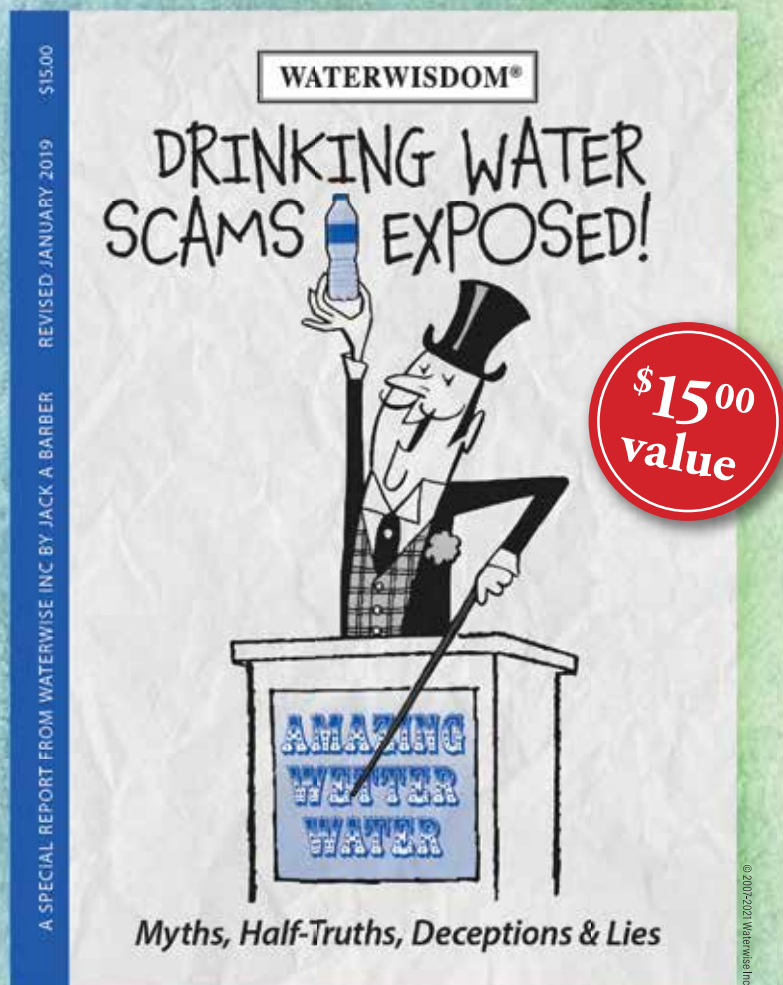
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In the News

Brain Aging Measure Reversed by 2.8 Years

Biological brain aging was reversed among participants who were in a nutritional supplement program for an average of 13 months, a clinical study in *Brain Science* reported.*

The study included 47 people who were assigned lifestyle changes and 42 who were assigned an individually tailored program of supplements that included, but was not limited to, vitamins **A, B complex, C and D, alpha-lipoic acid, CoQ10, magnesium, omega-3 fatty acids, zinc**, and *Bifidobacterium* and *Lactobacillus* probiotics.

Brain biological age was estimated before and after the intervention using a quantitative electroencephalogram.

Participants who consumed the supplements had a brain biological age that averaged **2.83 years younger** than the age measured at the beginning of the intervention. Those in the lifestyle group had a brain age that averaged only **0.02** years younger than it was at the start of the study.

Editor's Note: "...brain biological age *deceleration*, and even *reversal*, with accompanying improvements in mental-physical health comorbidities, is possible in humans using accessible interventions, such as lifestyle changes or nutraceutical supplementation, within a practical time frame," the authors concluded.

* *Brain Sci.* 2023 Mar 21;13(3):520.





Meta-Analysis Affirms Pain-Relieving Property of PEA

A systematic review and meta-analysis of clinical trials affirmed the association between supplementing with palmitoylethanolamide (PEA), a naturally occurring fatty acid amide, and improvements in **chronic pain**, **functional status**, and **quality of life**.*

The research team selected 11 double-blind randomized controlled clinical trials that included 774 men and women with **chronic pain**.

The conditions responsible for their chronic pain included gynecologic disorders, neurologic diseases, temporomandibular joint arthritis, knee arthritis, irritable bowel syndrome, and others.

The studies evaluated the effects of oral PEA in doses of **300–1,200 mg** per day administered in one or two doses. Treatment periods ranged from 10 days to 12 months.

Pooled analysis of the studies found a reduction in **pain intensity** among participants who received PEA compared to the control group. No major side effects were attributed to PEA in any study.

Editor's Note: "PEA is a well-tolerated approach for chronic pain," the researchers stated.

* *Nutrients*. 2023 Mar 10;15(6):1350.

Overactive Bladder Improvement Linked to Higher Vitamin D Levels

A systematic review and meta-analysis showed an association between *higher* vitamin D levels and a *lower* risk of overactive bladder or urinary incontinence. A decreased risk of incontinence was also revealed among people who used vitamin D supplements.*

The investigation included four randomized controlled trials, three cohort studies, three cross-sectional studies and three case-control studies that examined the relationship between vitamin D levels and overactive bladder or urinary incontinence. Vitamin D levels were lower in participants with either condition in comparison with control groups.

Participants who were vitamin D deficient had over **four times** the odds of overactive bladder, and a **30%** greater risk of incontinence compared with those who were not deficient. Analysis of articles that reported the effects of vitamin D supplementation found a **66%** lower risk of incontinence among supplemented participants.

Editor's Note: "Vitamin D deficiency increases the risk of overactive bladder and urinary incontinence, and vitamin D supplementation reduces the risk of urinary incontinence," the authors concluded.

* *Nutr Rev.* 2023 May 17;nuad049.



Omega-3s and Polycystic Ovary Syndrome

Improvements in insulin resistance and lipids were shown among women with polycystic ovary syndrome (PCOS) in association with omega-3 supplementation, according to a meta-analysis published in the *Journal of Ovarian Research*.*

PCOS is a hormonal and metabolic condition that can include ovarian cysts, menstrual irregularities, infertility, and other conditions.

The meta-analysis of 11 clinical trials included 816 women with PCOS. The trials studied changes in metabolic status associated with omega-3 supplementation or with the consumption of foods that provided at least **1,000 mg** per day of omega-3 for at least eight weeks.

Compared with the control group, women who received omega-3 supplements experienced reductions in waist circumference, fasting plasma insulin, fasting glucose, insulin resistance, triglycerides, total cholesterol, and LDL cholesterol.

In the omega-3 group there were also increases in levels of adiponectin, a hormone involved in regulation of glucose levels, fatty acid metabolism, and **insulin sensitivity**.

Editor's Note: "Omega-3 fatty acids may be an effective intervention for alleviating metabolic status in PCOS," the authors concluded.

* *J Ovarian Res.* 2023 Mar 17;16(1):54.

CoQ10 Plus Selenium Linked to Lower Biomarkers of Aging

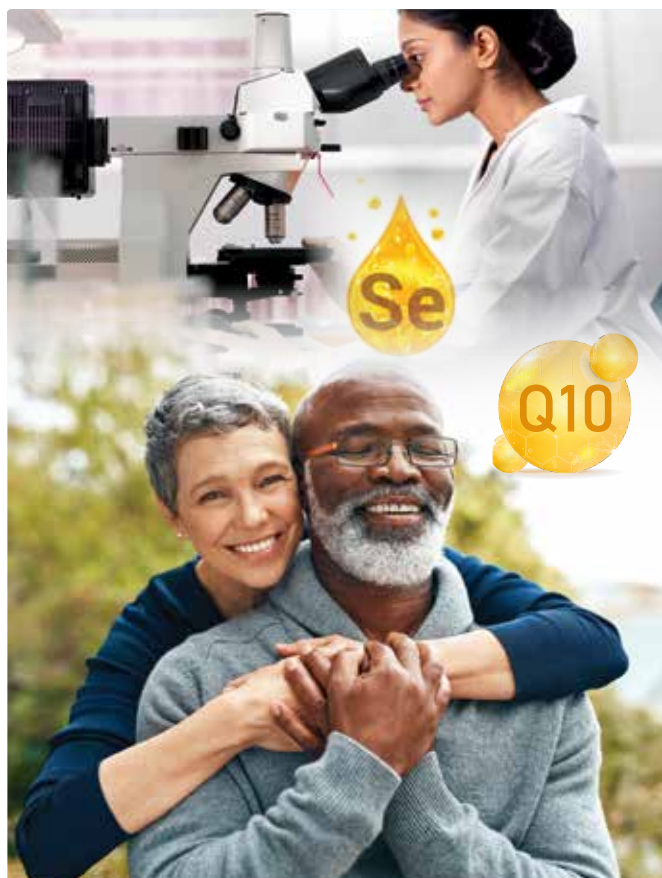
People who received the combination **CoQ10** plus **selenium** experienced beneficial changes in biomarkers of **aging**, while the placebo group had unfavorable modifications. These findings were from a sub-study of a previous prospective double-blind placebo controlled randomized clinical trial.*

The trial included 441 older individuals with low selenium levels who received a placebo or **200 mg** per day **CoQ10** plus **200 mcg** per day **selenium** for 48 months. Blood samples were analyzed before and after the treatment period.

At the end of the trial, five aging-associated biomarkers were significantly lower among participants who received **CoQ10** plus **selenium**, and higher in the **placebo** group.

Editor's Note: "Supplementation with selenium/Q10 influenced the analyzed biomarkers in ways indicating an anti-ageing effect," the researchers concluded.

* *Cells*. 2023 Jul; 12(13): 1773.



Quercetin Supports Post-Exercise Muscle Recovery

A review and meta-analysis concluded that supplementing with the plant compound quercetin speeds muscle-function recovery and reduces muscle soreness following exercise.*

The researchers selected 13 studies that included 249 sedentary to well-trained participants. The studies compared the effects of quercetin supplementation to a placebo or control when administered prior to an exercise protocol designed to induce muscle damage. All but one study used a supplementation dosage of **1,000 mg** per day.

Among the five studies that assessed muscle function, four studies found significant improvement among groups that received quercetin compared with the control groups. Meta-analysis of the four studies that evaluated muscle soreness revealed a decrease in association with quercetin supplementation.

Editor's Note: Pooled analysis of six studies that measured creatine kinase, a marker of muscle tissue damage, found a significant decrease 24 hours to 48 hours after exercise among participants who received quercetin.

* *Biol Sport*. 2023 Jul;40(3):813-825.

Healthy Eating Lowers Risks of Disease and Mortality

Greater adherence to several healthy eating patterns was associated with a lower risk of disease and mortality, according to an article published in *JAMA Internal Medicine*.*

The participants in the cohort study, with up to 36 years of follow-up, included 44,085 men enrolled in the Health Professionals Follow-up Study, and 75,230 women who took part in the Nurses' Health Study. Their responses to questionnaires were scored for adherence to the **Healthy Eating Index 2015**, **Alternative Mediterranean Diet**, **Healthful Plant-based Diet Index**, and **Alternate Healthy Eating Index**.

Individuals whose adherence scores to these four healthy diets were among the top **20%** of subjects had **19%**, **18%**, **14%**, and **20%** lower risks of mortality, respectively, compared to those whose scores were among the lowest **20%**.

Those with the highest **20%** adherence also had lower risks of cardiovascular disease and cancer mortality.

The inverse associations between these scores and risk of mortality were consistent in different racial and ethnic groups.

Editor's Note: "These findings support the recommendations of Dietary Guidelines for Americans that multiple healthy eating patterns can be adapted to individual food traditions and preferences," the researchers stated.

* *JAMA Intern Med.* 2023 Jan 9.



Green Tea Compound Shows Promise Against Uterine Fibroids, Cell Study Shows

Research findings from a cell study, published in *Scientific Reports* suggest that a compound occurring in green tea may be beneficial against benign fibrous uterine tumors that occur in a significant number of women.*

Scientists probed the mechanism of epigallocatechin gallate (EGCG), a compound in green tea, based on findings of an early phase clinical trial that showed EGCG was effective in reducing fibroid size and associated symptoms.

The investigation utilized lab-grown human fibroid cells that were treated with EGCG. The researchers observed that EGCG disrupted fibroid tumor cell growth, movement, signaling and metabolism, and reduced specific proteins (fibrotic).

When compared with five synthetic inhibitors of fibrosis, EGCG's ability was more effective than three and equal to that of two.

Editor's Note: "These results provide insight into mechanisms behind the observed clinical efficacy of EGCG against uterine fibroids," the researchers concluded.

* *Sci Rep.* 2023 May 25;13(1):8492.



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TAURINE

Improves Health
and May
SLOW AGING





BY PAUL RANKIN

A study on the connection between **taurine** and **longevity** made major headlines around the world, from the BBC to the *New York Times*.^{1,2}

Published in the prestigious medical journal **Science**, an international collaboration of researchers discovered that older adults suffer a dramatic decrease in levels of **taurine**. On average, they have levels **80%** below those found in *younger people*.³⁻⁶

These *declining* taurine levels have been tied, in preclinical models, to **rapid aging** and increased rates of age-related disease.^{6,7}

In clinical trials, **taurine** has been shown to blunt **inflammation** as well as improve **cardiometabolic** health—actions that would be expected to help defer aging.^{6,7}

In **humans**, *lower* levels of taurine-related metabolites are associated with age-related conditions such as obesity, chronic inflammation, and metabolic disease such as **type II diabetes**.⁶

Clinical intervention studies have demonstrated that taurine supplementation can benefit cholesterol and lipid levels, the stress hormone norepinephrine, and body weight.⁸



H₂

In the June 2023 published study that made headline news worldwide, daily **oral taurine** intake increased the **life expectancy** of elderly mice by up to **25%** while reducing body weight, improving strength and brain function, lowering inflammation, and boosting function of energy-generating **mitochondria**.⁶

Maintaining youthful **taurine** levels into older age may help to **slow aging** and promote **healthy longevity**.

What is Taurine?

Taurine is an amino acid found in the diet.

Most taurine in the human body, however, is synthesized internally from the amino acid cysteine. With age, the *enzyme* that transforms cysteine into taurine declines.

The result is sharply lower taurine levels as people age.

As far back as the 1990s, taurine was used in Japan to improve **heart function** and **exercise capacity** in patients with **heart failure**.⁹⁻¹²

Scientists have also discovered that cells contain dedicated **protein transporters** that are *specific* to taurine.^{3,4} These transporters actively move taurine into cells where it is required for numerous processes.¹³

In addition, experimental animals that are missing taurine transporters develop significant health problems and have a **shortened lifespan**.^{3,4}

Another clue to taurine's importance comes from animals like cats and foxes, that cannot synthesize it in sufficient quantities. If they do not get enough taurine from diet, they may develop heart disease, blindness, **impaired immune function**, neurological abnormalities, and other disorders.⁴

In an animal model, taurine injection into the peritoneum in the abdomen prevented **sarcopenia**, likely through an anti-inflammatory effect and by preserving the quality of muscle fibers.¹⁴

Young humans are able to produce abundant taurine. But as the study in *Science* found, production rapidly drops in later life, with the elderly having taurine levels that are about **80% lower** than in youth.^{6,7}

Human Studies on Taurine and Aging

In animals, taurine deficiency results in health problems and shorter lifespan.

Findings in **humans** suggest adequate taurine may be essential for optimal health.

One observational study compared elderly individuals with and without **dementia**. Those with **dementia** reported consuming significantly less **taurine** in their diets. Among all the participants, those with a history of more **taurine** in their diet had better **cognition**.^{4,15}

A study in a Japanese population found that *greater* taurine consumption is associated with *reduced* rates of cardiovascular problems, metabolic disorders including obesity, and other common age-related disorders.^{6,7}

As part of the study published in *Science*, levels of taurine, its precursor, and its metabolites were measured in a large cohort of European adults, and an association analysis was performed.

Higher blood taurine and related compounds were associated with lower body mass index (BMI), waist-to-hip ratio, and less **abdominal obesity**, as well as lower levels of the inflammatory marker **C-reactive protein** (CRP).

Higher taurine metabolite levels were associated with less chance of type II diabetes as well as with lower glucose levels.⁶

Prolonging Healthy Life

Low taurine levels may contribute to human aging and disease. Some evidence suggests that increasing **oral intake** of taurine may prevent or *reverse* these problems.





WHAT
YOU
NEED
TO
KNOW

In the study published in *Science*, giving mice daily taurine increased **median lifespan** by **10%-12%** and increased life expectancy in **elderly mice** by **18%-25%**, compared to a placebo.^{6,7}

Taurine intake also improved the **health** and **functioning** of bone, muscle, brain, the gastrointestinal system, the immune system, and more.^{6,7} Similar results were observed in monkeys given taurine.

Several **human** trials have demonstrated positive impacts on health:

- Daily doses of taurine improved exercise capacity and several markers of **heart function** in patients with heart failure.⁹⁻¹²
- In subjects with **hypertension** (high blood pressure) or prehypertension, taurine intake lowered blood pressure and improved blood vessel function.^{16,17}
- In obese women, oral taurine reduced markers of harmful **inflammation** and **oxidative stress**, which are normally elevated in obesity.¹⁸
- In people with **type II diabetes**, taurine also reduced inflammation and oxidative stress. Even more impressively, there was a *reduction* in common diabetic complications, including kidney, eye, and nerve disease.¹⁹⁻²¹

Although further human studies are warranted to fully explore the benefits of taurine, evidence strongly suggests it can improve health and may increase lifespan.

Taurine's Longevity Benefits

- A recent study found that elderly humans on average have **80%** lower levels of the amino acid **taurine** than young adults.
- These lower levels of taurine correlate with higher rates of obesity, chronic inflammation, and **type II** diabetes.
- In animals, daily taurine intake extends **longevity** by as much as **25%** while improving muscle and brain health, immune function, and more.
- Early **human** studies of taurine have shown that it can improve heart and blood vessel function, reduce chronic inflammation and oxidative stress, boost exercise capacity, and help prevent diabetic complications.

How It Works

Exactly *how* taurine promotes **longevity** is still being studied, but it has benefits at a **cellular level**.

In animal models, taurine *deficiency* mimics the aging process.

Factors that are associated with **aging**—including reduced mitochondrial health, cellular stress, shortening of telomeres (protective caps on the ends of chromosomes), and chronic inflammation—are all *accelerated* with taurine depletion.⁵

Preclinical and clinical studies show that *increasing* taurine intake impacts biological functions that promote **longevity** and **health**, including:^{4-7,22}

- Improving mitochondrial function and cellular energy metabolism,
- Stabilizing telomeres and reducing DNA damage,
- Reducing cellular senescence, when cells become old and dysfunctional,
- Increasing antioxidant capacity and protection against oxidative damage,
- Reducing dangerous chronic inflammation,
- Improving neurotransmitter function in the nervous system, and
- Facilitating absorption of nutrients and improving gastrointestinal health.

Together, these effects may slow the aging process, leading to better health and **longer life**.

Summary

Research has found that the amino acid **taurine** may impact several distinct aspects of health.

Levels of taurine tend to drop by as much as **80%** in older adults. These lower levels are hypothesized to contribute to **rapid aging** and increased risk for age-related disease.

In animals, daily taurine intake **extends lifespan** and improves health.

Studies in **humans** have also shown health benefits from taurine intake, including improved heart and metabolic function, reduced oxidative stress and chronic inflammation, and lower blood pressure. •

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36 gummy bites



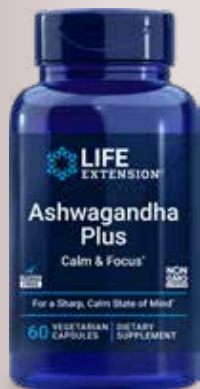
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A close-up photograph of a golden retriever dog's head, facing right. The dog has light-colored fur and is holding a dark, textured stick in its mouth. A person's hand, wearing a red knitted sleeve, is visible on the right side of the frame, near the dog's head. The background is blurred, showing green foliage and a bright light source, possibly the sun, creating a warm, golden glow. In the top left corner, there is a faint, light blue paw print graphic.

Protect Your **CANINE**
Companion's Health



BY MICHAEL DOWNEY

About **65 million** American households include at least one canine member.¹

Many dog owners feel their pet is part of the family.

Less known are health benefits that dogs provide to owners, from reduced anxiety to lower blood pressure.²

Dogs have unique nutritional needs that may not be met by commercial foods.

Commercial pet foods do not always provide nutrients that dogs need. Many contain cost-cutting “fillers” that along with inadequate nutrition can trigger health issues.

That’s why more **veterinarians** are recommending a mix of vitamins, minerals, probiotics, and other compounds that address the health concerns of **dogs**.

These nutrients can contribute to a pet’s overall vitality as well as address specific concerns such as behavioral and joint issues.³



Choose the Best Formula

How can you be sure you're giving your dog optimal nutrition beyond providing high-quality food? Simple. Choose a formula that is scientifically **targeted** for specific canine health issues.

Dog supplements fall into four main categories: Overall health, skin and coat, hip and joint structure, as well as stress.

To select an ideal supplement:

- Avoid cheap fillers, such as soy, grain, and gluten,
- Choose clinically validated ingredients,
- Stick with a **science-based** manufacturer known for top-quality products,
- Opt for **human-grade** ingredients,
- Use dosages appropriate for your dog's weight, and
- Select a **chewable** format, since dogs don't like swallowing pills or capsules.



Overall Health

Just like humans, dogs can benefit from a good **multivitamin** with **probiotics**. Most dog multivitamins may leave out vital, but little-known ingredients such as **colostrum** for immunity, **turmeric** for inflammation, and a blend of **probiotics** for digestive health.

VITAMINS AND MINERALS:

Your dog benefits from the “insurance policy” afforded by a **multivitamin**. However, canine nutrient requirements are different from yours.

As opposed to humans, dogs are able to synthesize vitamin C on their own. Fortifying their diet with vitamin C may offer additional health benefits.⁴

Dogs need dietary sources of vitamins A, D, E, B6, B12, niacin, folic acid, and pantothenic acid,⁵ plus the mineral manganese.^{5,6}

COLOSTRUM:

Human trials show that bovine colostrum supports **immunity**, gastrointestinal balance, and microbial infection resistance.⁷

Colostrum is the early milk mothers produce after a baby is born. For puppies it is an important source of key nutrients such as lipids, carbohydrates, immunoglobulins, and growth-promoting factors.⁸

TURMERIC:

Compounds such as **curcumin** have been shown to improve overall health, suppressing inflammation,⁹ supporting brain/heart function, and promoting longevity.¹⁰

PROBIOTICS:

Many dogs get inflammation in the lining of their stomach or intestines which leads to diarrhea and vomiting. This can result from inadequate nutrition and even food sensitivities.

Adding certain **probiotic strains** to the diet may improve canine gut microbiota and immune response:^{11,12}

- *Lactobacillus acidophilus*,
- *Bifidobacterium bifidum*,
- *Lactobacillus casei*,
- *Lactobacillus fermentum*,
- *Lactobacillus reuteri*, and
- *Lactobacillus plantarum*.



 WHAT
YOU
NEED
TO
KNOW

Skin and Coat

A dog's skin and coat are good indicators of its health. A healthy and groomed coat is shiny and smooth, and healthy, well-nourished skin is supple and clear.

Dogs can suffer greatly due to **dry, itchy skin** and patchy fur. The most common cause is allergies.¹³

Fish oil rich in **omega-3 fatty acids** may help *prevent* these conditions. It delivers an anti-inflammatory effect in dogs.¹⁴

In studies on dogs, **omega-3 intake** resulted in:

- Reduced itchy skin,¹⁴
- Less fur loss,¹⁴
- Improved coat character,¹⁴ and
- Overall improvement in skin and coat health.¹⁵

A systematic review of animal studies found that use of **omega-3** fatty acids had therapeutic effects on canine allergic dermatitis, haircoat disorder, and also canine and feline osteoarthritis (among the other benefits).¹⁶

Optimal Canine Care

- **Dogs** can develop joint pain, itchy skin, lackluster coats, stress, diseases, and anxiety-driven behaviors, often as a result of poor nutrition.
- A **multivitamin** with **probiotics**, designed **specifically** for canines, based on scientific research, can help promote overall health and longevity.
- Additional ingredients may help protect your dog against specific health concerns, including joint degeneration, dry skin and patchy fur, and stress.
- Since dogs don't like tablets or capsules, the best way to deliver vital nutrients is in a **chewable** form.

Hip and Joint Health

Osteoarthritis is chronic, painful, degenerative inflammation of the joints commonly experienced by aging dogs, affecting mobility, and impacting quality of life.

As with most chronic conditions, long-term management of the disease can be challenging for the owners and dogs.^{18,19} Climbing into the car becomes difficult. Your dog may start holding up one limb or holding it oddly and may seem less inclined to run or jump.

Canine joint issues primarily stem from developmental or degenerative problems. Developmental problems include hip or elbow **dysplasia**, when joints don't develop correctly. Degenerative problems include **arthritis**.¹⁷

The following nutrients may help prevent or improve hip and joint problems, decreasing joint pain, swelling, and immobility.

PALMITOYLETHANOLAMIDE (PEA):

Produced by the body, **PEA** supports healthy inflammatory response and has pain-relieving properties.²⁰

In human trials, PEA was shown to reduce pain associated with chronic conditions such as arthritis, migraine headache, carpal tunnel syndrome, and other types of nerve and joint pain.²¹

One human study showed that it reduced temporomandibular-related joint pain (in and around the jaw) **more than ibuprofen**.²⁰

GLUCOSAMINE:

Glucosamine inhibits inflammation, potentially improving joint discomfort.²² It is used in humans, dogs, and other animals to manage damage caused by arthritis. In canines it supports joint wear and pain.

In a review of 16 clinical trials on treatment options of osteoarthritis in **dogs** it was found that preparations containing glucosamine provided a moderate level of comfort.¹⁹

METHYLSULFONYLMETHANE (MSM):

MSM exerts anti-inflammatory effects, which help mitigate joint discomfort, inflammation, and physical function.²³

A clinical trial of humans with osteoarthritis of the knee joint demonstrated improvement in pain and physical function after 12-week supplementation with MSM.²⁴

In veterinary practice MSM is used most often in dogs and horses for its anti-inflammatory and antioxidant properties for conditions such as arthritis.²⁵

Stress and Behavior Problems

Like humans, dogs can experience **anxiety** disorders and behavioral issues (separation anxiety, anxiety on visit to vet, or car ride).

Without intervention, dogs can develop aggressiveness, drooling, excessive barking, panting, trembling, growling, destructive behaviors, pacing, and compulsive actions.²⁶

Two nutrients may help manage canine fear, anxiety, and **stress** problems.²⁷

L-THEANINE:

Found in green tea, **L-theanine** acts on the central nervous system and inhibits the excitatory neurotransmitter **glutamate**, decreasing stress and anxiety.²⁸

Supplementation with L-theanine may help your furry friends deal with their **anxiety** and stress.

MELATONIN:

A narrative review of studies showed that melatonin promotes faster, longer, higher-quality **sleep**.²⁹ Veterinary handbooks mention **melatonin** as beneficial for sleep, **phobias**, and separation anxiety management.³⁰ Melatonin appears to act on the central nervous system to reduce anxiety.³¹ In other words, melatonin will take the edge off your dog's stress.

A targeted combination of beneficial compounds, vitamins, probiotics, and other nutrients can help keep your canine companion healthy and happy.

Summary

Like people, **dogs** are at risk for many ailments, from joint pain to behavioral problems.

Most dogs are missing out on key nutrients necessary to keep degenerative conditions, pain, and diseases at bay.

The best solution is to give your dog high-quality vitamins, probiotics, and other health-promoting compounds scientifically targeted for **canine health** issues. •

Scientists Have Embarked on Dog Longevity Study³²

Researchers are tracking genetic, metabolic, and microbiotic factors in **tens of thousands of dogs** in a massive bid to learn more about **aging**—both for the dogs and for us.³³

The **Dog Aging Project** may reveal secrets about healthy canine **longevity**. It could also generate insights into human longevity.³³

Among the specific aims for the project are to identify **biomarkers** of canine aging. The project team hopes to better understand the mechanisms by which genetic, environmental, and lifestyle variation influence aging.

Studying **dogs** could greatly boost our understanding of **human** aging. Their lifespans are shorter than ours. And instead of living in a cold and sterile lab, they largely share our lifestyle, environment, and daily routines.³⁴

Owners track their dogs' diet, exercise, and other factors **at home**. They periodically fill out surveys and take measurements of their dogs for the duration of the **multi-year project**.

The dogs periodically have blood drawn to investigate factors relating to their genes, molecules, microbiome, and other biological factors. Some owners may be asked to collect cheek swabs for **DNA** sampling.

Over a **dozen** research institutions have partnered to enroll companion dogs for the project, which is expected to run for at least **10 years**.³³ Initiated in 2018, the ongoing **Dog Aging Project** is well short of its goal of **60,000 dogs**.

The researchers are still actively seeking canines of *all* breeds, sizes, ages, and U.S. locations—as well as **donations** of funds that could ultimately determine the number and full extent of the data sets investigated and analyzed.

Because the **Dog Aging Project** is an open data study, scientists around the world will have access to the vast amounts of data generated. The implications for human longevity could be substantial.³⁵

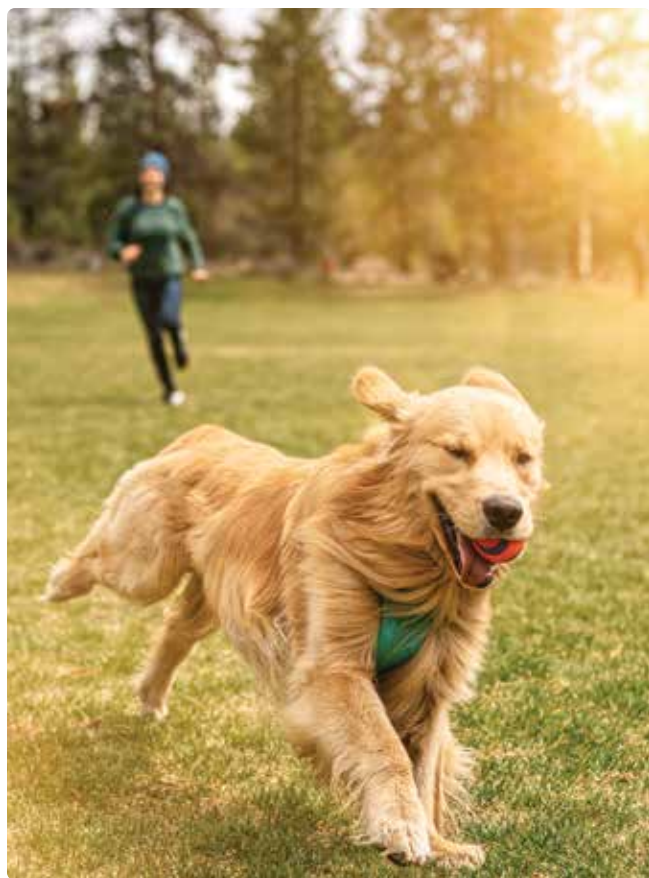
For more information on the **Dog Aging Project**, enrolling your dog, or making a tax-deductible charitable donation, visit:

<https://dogagingproject.org/>



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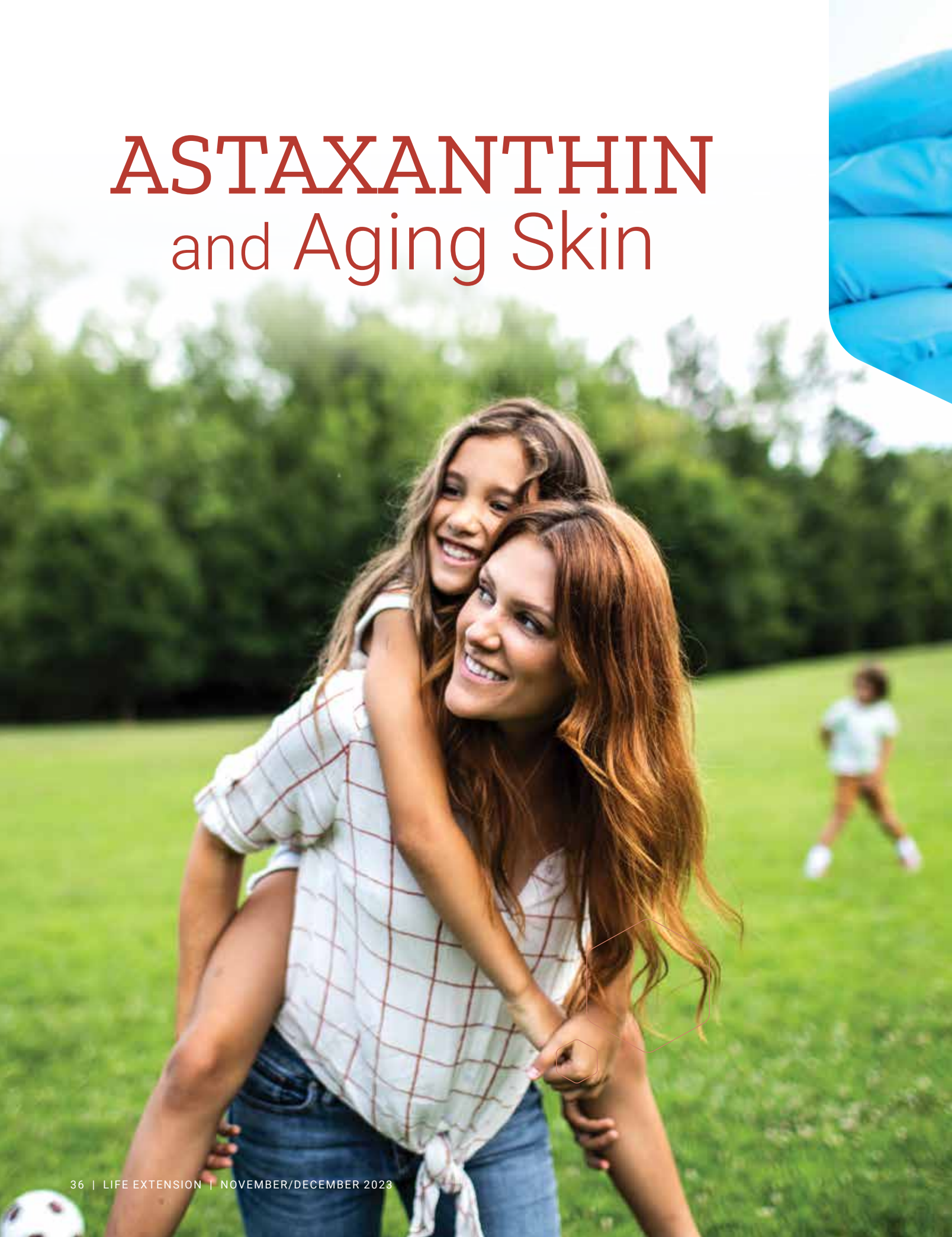
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ASTAXANTHIN and Aging Skin





BY MICHAEL DOWNEY

Astaxanthin has long been associated with eye,¹ brain,² and heart health.³

Scientists have also demonstrated that this **carotenoid** protects the health of the **skin**.

It does so by inhibiting drivers of **skin damage**, helping to maintain skin function and structural integrity.^{4,5}

Aging skin is more than a cosmetic issue. Loss of skin integrity and functionality can impair overall health.⁶

Clinical trials show that oral **astaxanthin** can help protect skin against sun damage, loss of moisture, and development of wrinkles, while improving skin health.



RED ALGAE

Importance of Skin Health

The **skin** serves many functions, including:⁷

- Acting as a barrier against **infection**,
- Helping maintain the body's **hydration** and temperature, and
- Serving as the frontline of **immune** protection against environmental toxins.

Wrinkles and dry, damaged skin are signs of deterioration with age.⁶

When skin structure starts to deteriorate, it can weaken its essential **barrier** function against the external environment.

Age isn't the only factor behind skin **damage**. Skin integrity is also degraded by **ultraviolet (UV) radiation** from the sun.^{8,9}

The damage inflicted results in reduced **firmness** and **elasticity**.

This may lead to deeper wrinkles, mottled pigmentation, roughness, drying, scaling, sagging, photoaging, precancerous lesions, and even skin cancers.⁹

Astaxanthin has been shown to help protect the appearance *and* function of the skin.

How Astaxanthin Reduces Skin Damage

Astaxanthin is a red carotenoid found at high concentrations in certain microalgae.^{1,2}

It is a powerful **antioxidant** and **anti-inflammatory** that provides a wide range of health benefits.¹ In the last several years, researchers have discovered the role it plays in protecting the **skin**.

Evidence shows that astaxanthin combats the negative effects of two underlying causes of skin aging: environmental pollutants and UV light exposure.

Preclinical and clinical data demonstrate that **astaxanthin** can:

- Reduce the secretion of a protein-degrading enzyme called **MMP-1**.^{4,10} MMP-1 *increases* when skin is exposed to air pollution¹¹ and breaks down youthful structure of skin.^{4,11-13}
- Suppress the production of harmful inflammatory cytokines that follows exposure to UV rays.^{4,10,14}

Furthermore, by reducing **MMP-1**, astaxanthin may be able to fight **wrinkles** from multiple other causes.

Protection Against Skin Aging

Researchers investigated astaxanthin's ability to protect the skin against the effects of **pollutants** and **aging**. Studies showed that **astaxanthin**:

- Improved skin wrinkles, elasticity, and texture,^{15,16}
- Boosted skin moisture content while reducing skin water loss,^{15,16}
- Inhibited the **underlying processes** that produce wrinkles and age spots,¹⁵⁻¹⁸ and
- Enhanced **collagen** production in skin cells, which helps maintain or restore skin's youthful plumpness and firmness.¹⁹

These findings show that **astaxanthin** can help prevent the **visible** signs of skin aging and pollutants—and protect some of its critical barrier functions, such as water retention.

Defense Against UV Damage

UV radiation is the most powerful driving force behind skin deterioration.

Studies suggest that astaxanthin provides **targeted UV protection**. Astaxanthin has been shown in a clinical and multiple preclinical settings, to:

- Prevent UV-induced loss of the body's antioxidant **glutathione**,²⁰
- Restore UV-diminished levels of the body's antioxidant **superoxide dismutase (SOD)**,²⁰
- Fight UV-induced increases in numerous enzymes that damage skin and promote wrinkles,^{4,21} and
- Reduce UV-induced expression of pro-inflammatory **cytokines** that damage skin integrity.^{18,21}

One study showed that giving **astaxanthin** to mice exposed to UV radiation **suppressed** the harmful molecular responses seen in UV-exposed mice that were *not* given astaxanthin.

WHAT
YOU
NEED
TO
KNOW

The damaging responses **prevented** by astaxanthin included:⁵

- Water loss across the skin barrier,
- Accelerated formation of wrinkles,
- Increased expression in the top layer of skin (epidermis) of **enzymes** that cause skin cells to break down, and
- Increases in the bottom layer of skin (the dermis) of the **MMP-13 enzyme** (MMP-1 alternate in rodents), a contributor to loss of skin tone and elasticity.

This study demonstrated that, preclinically, astaxanthin taken **orally** makes its way to multiple layers of skin,⁵ where it can inhibit or reverse the destructive effects of **UV radiation**.

Real-World Clinical Trial

In one clinical study, **astaxanthin** was “real-world tested” on 65 healthy Japanese women who went about their daily lives between August and December.⁴ Skin damage during these months is generally at its *highest* in Japan because of environmental factors such as UV light and low humidity.

Subjects took either a **placebo** or **astaxanthin** in **6 mg** or **12 mg** doses daily.

In just **16 weeks**, the **placebo** group had:⁴

- Significant worsening of **wrinkles**,
- Reduced **moisture** content, and
- Increased skin markers of **inflammation**.

Women taking either dose of **astaxanthin** showed no **significant skin deterioration** and no increase in **inflammatory** markers.

UV Protection

Another clinical (human) trial was conducted in a lab, where volunteers were exposed to controlled levels of UV rays.²²

For nine weeks, subjects took either a placebo or **4 mg** of astaxanthin daily, after which they were tested with UV exposure.



Maintain Skin Health

- **Astaxanthin** is a carotenoid that supports eye, brain, and heart health. It now shows promise for maintaining **skin** integrity and function as well.
- Studies demonstrate that oral astaxanthin safely slows skin deterioration caused by **age**, **pollution**, and **sun** exposure.
- In clinical studies, astaxanthin helps prevent skin wrinkles, moisture loss, and UV-induced burning, improving skin appearance and health.
- Taking astaxanthin combined with **phospholipids** makes it more bioavailable (absorbable).

Compared with the placebo group, those taking **astaxanthin** had:²²

- *Increased* time before UV exposure caused burning,
- *Reduced* loss of skin moisture in the UV-exposed area, and
- Significant *improvement* of skin roughness and texture in **non-irradiated** areas.

That means both UV-exposed *and* non-UV-exposed skin health was **improved** by astaxanthin.

In addition, a 2021 **meta-analysis** of studies concluded that **astaxanthin** improves moisture content and elasticity, and reduces **wrinkles**,²³ adding clear evidence that astaxanthin may be used to maintain skin health and fight skin damage.²⁴

Summary

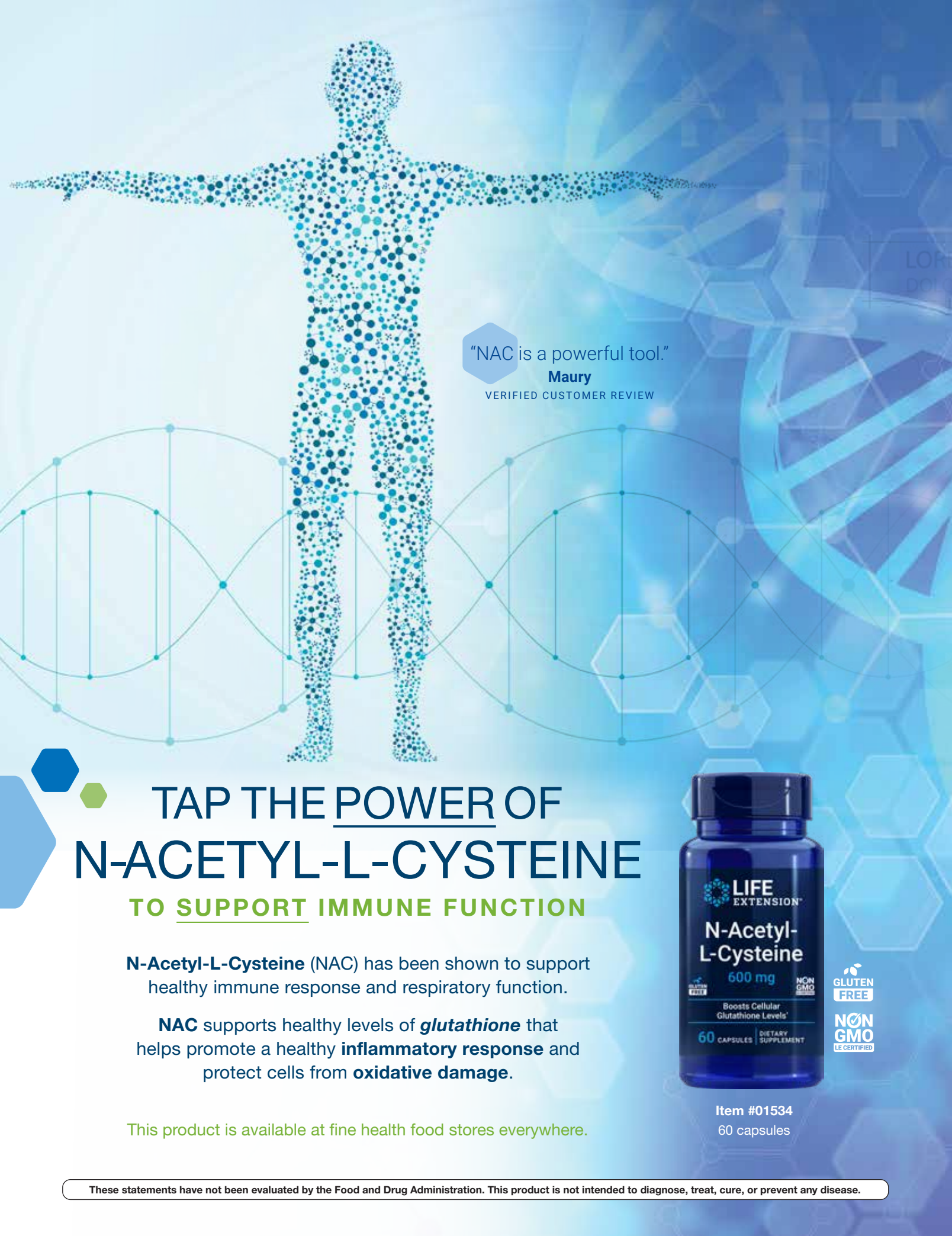
Studies have demonstrated that the carotenoid **astaxanthin** inhibits key skin-damaging factors.

These effects have been clinically validated to **reduce** and **reverse** aspects of **skin aging** caused by pollutants and sun exposure, while improving outward appearance and skin health. •

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1. Akay Internal Study. Liposomal hydrogel vitamin C pharmacokinetics. Data on file. 2021.

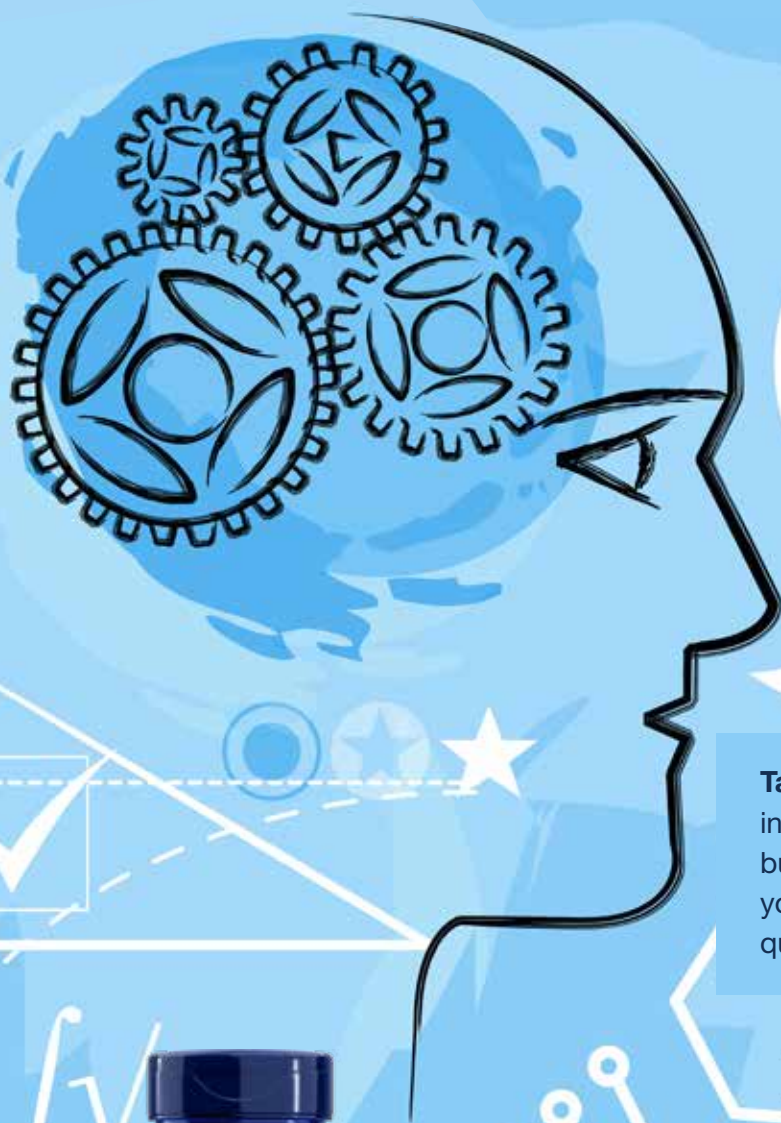
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GREEN TEA'S Effects on Brain Signaling





BY JAMES RYDER

Green tea contains compounds that have been shown in animal and cell studies to defend **brain function**.^{1,2}

A meta-analysis of 36 observational studies found that **green tea** consumption was associated with lower rates of **cognitive** issues and dementia compared to those who rarely drink it.³

Another meta-analysis found the rate of **cognitive disorders** to be **35% lower** in regular green tea drinkers.⁴

Randomized controlled trials have shown that consuming green tea powder enhanced **cognitive function** in young⁵ and elderly **humans**.⁶



Green Tea Nutrients

Diet can play a major role in susceptibility to age-related **cognitive decline** and risk for **dementia**.^{7,8}

From preclinical to clinical studies, scientists have identified beneficial effects of **green tea** and its nutrients for the nervous system.^{1,2,9}

Green tea is rapidly dried after picking, which enables it to have *high concentrations* of **polyphenols** known as **catechins**.^{10,11}

In studies that look at various types of tea consumption, the *greatest* benefits to **brain health** have been seen with **green tea**.^{4,12}

Brain and Body Health

The **catechins** in green tea function as **antioxidants** and **anti-inflammatories**.^{13,14} They help reduce major drivers of age-related chronic disease.

That may explain, in part, why the nutrients in green tea have been shown to increase **lifespan** in several animal species, including roundworms,^{15,16} fruit flies,¹⁷ and mice.¹⁸

One preclinical study demonstrated that green tea has additional properties that appear particularly beneficial for the **brain**, including boosting the creation of **new brain cells** and improving the brain's ability to adapt into old age.¹⁹

Two of the most unique ways green tea boosts brain health is through its interactions with the **gut** and its enhancement of **brain signaling**.

Improving Gut and Brain Health

The relationship between **gut health** and **brain health** is a close one. Signals sent back and forth between the gut and the brain have a profound impact on aging and risk for disease.¹

Intake of green tea helps to ensure a healthy gut by:¹

- **Improving the diversity of bacteria** in the gut. Tea polyphenols have been shown to boost the number of beneficial microorganisms while inhibiting the growth of some potentially harmful strains of bacteria.
- **Protecting the lining of the intestines.** This helps avoid “leaky gut,” which may contribute to the neuroinflammation that drives diseases like Alzheimer’s and Parkinson’s.

Boosting Brain Signaling

Neurotrophic factors are signaling compounds produced in the body that are required to support the optimal health and function of nerve cells.²⁰

Neurotrophic factor *stimulation* helps the brain ward off degenerative disease and fine-tune brain cell function.²⁰

The activity of these **neurotrophic factors** tends to dwindle with age.²¹ And that can contribute to **neurodegeneration**.²⁰⁻²²



The catechins in green tea have been shown to enhance **neurotrophic factor activity**.¹ They do this by:

- Increasing the *production* of **neurotrophic factors**, and
- Enhancing the function of the **receptors** on brain cells that receive signals from them.

Human Studies

Numerous large population studies of green tea's brain benefits have been performed, following **hundreds of thousands** of people.

They consistently find that those who consume the most green tea have **significantly better cognitive performance** and **lower rates of neurodegenerative disorders** than those who consume the least.^{4,12,23-36}

These include lower rates of mild cognitive impairment and dementia.

Summary

Green tea is a source of beneficial compounds known as **catechins**.

In studies, green tea and catechins have been shown to protect the brain into older age.

Large observational studies of green tea consumption consistently demonstrate that those who consume the *most* have the *lowest* rates of cognitive impairment and dementia.

Placebo-controlled trials show that consuming **green tea powder** boosts **cognitive function** in old and young human subjects. •

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Green Tea's Brain Benefits

- Cognitive impairment and dementia are extremely common with age.
- **Green tea** consumption has been shown in clinical trials to boost cognitive function.
- Large population studies from around the world have consistently demonstrated that those who consume the *most* green tea have better cognitive performance and lower rates of cognitive disorders, including **Alzheimer's disease**.

How Many Cups Do I Need to Drink?

Many of the epidemiological studies that have established the brain benefits of green tea find the best results in those consuming **2-5 cups daily**.^{4,6,9,37}

An alternative is concentrates of **green tea extracts** that are standardized for catechins and other compounds.³⁸



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* Gerontology. 1996;42(3):170-80.

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- ▶ **HDL**
- ▶ **Triglycerides**
- ▶ **Total cholesterol**
- ▶ **Endothelial function**
- ▶ **CRP (C-reactive protein)**

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* BMC Complement Altern Med. 2019;19:97. Capros® is patent protected and a registered trademark of Natreon, Inc.



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Relief for Dry Eyes

BY LAURIE MATHENA



Dry eye syndrome is an increasingly common condition that causes stinging, itching, and light sensitivity.^{1,2}

Left untreated, chronic dry eyes can eventually cause **permanent eye damage** in severe cases.³

While moisturizing **eye drops** provide relief to many, they do not address the long-term risks of dry eyes. Frequent use is needed to get satisfactory relief.

In addition, it is impossible to replicate the complex structure of **real tears**.

Scientists have found a way to boost the body's own production of natural tears.

An extract from **maqui berries**, a fruit native to Chile and Argentina, has been shown to *increase* natural tear production when taken orally.^{4,5}

Studies show that maqui berry extract produces:

- A **45% increase** in the production of **tear fluid** in both eyes,⁶ and
- A **72% improvement** in dry eye symptoms after 60 days (about two months).⁴

By delivering relief for dry and irritated eyes, maqui berries can help protect against potential long-term eye and vision damage.⁴

Discomfort and Eye Damage

Advancing age, along with the widespread use of smart phones, tablets, computers, and other screens, may lead to increased **dry eye symptoms**.⁷

Use of these electronic devices can result in a decreased blink rate and a fast rate of tear evaporation.⁷

Tears are essential for lubricating and protecting the **cornea**, the front central surface of the eye. They protect the eye from infection, wash away foreign matter, and deliver critical nutrients to its surface.⁸

People suffering from **dry eye syndrome** produce either too few tears or tears that are of *poor quality*.²

As a result, the **cornea** can become damaged (ulcerated or scarred), and vision can become **impaired**.⁹

Maqui berry extract does what eye drops *cannot*: They boost the body's own production of natural tears.^{4,5}

How Maqui Berry Works

Maqui berries contain bioactive pigments called **delphinidins**. Researchers found in preclinical studies that these compounds:⁵

- Protect eye structures, including the tear-producing **lacrimal gland**, by reducing levels of free radicals,⁵
- Inhibit damage from light exposure to the eye's delicate cells and tissues,¹⁰ and
- Help restore the production of high-quality tears.⁵

In these ways, delphinidins can reduce damage to the glands that produce tears and help protect the cells of our eyes critical for vision.

Impressive Results

In a pilot clinical study, 13 volunteers with moderate eye dryness took either **30 mg** or **60 mg** of **maqui berry extract** daily.

Eye dryness was tested by Schirmer's test which evaluates how much **tear fluid** is produced by the tear glands and if that amount is sufficient.⁴

- After 30 days, both dosage groups had about a **50%** improvement in tear production.
- After 60 days, the **30 mg** group's tear production declined to a **26%** improvement, while the **60 mg** group continued to have about a **45%** improvement in tear production.

Participants also completed the **Dry-Eye Related Quality-of-Life Score** test to assess symptoms and their impact on daily life. A lower score reflects **fewer problems** and improved **quality of life**.

- The **60 mg** group had a **72%** improvement in dry eye symptoms after two months, and
- A substantially improved result on the **Dry Eye-Related Quality-of-Life Score** test, dropping from a 40 down to an astoundingly low 11.

Controlled Clinical Trials

Scientists next moved on to the gold standard of human studies, a **randomized, controlled trial**.⁶

They enlisted 74 healthy participants (aged 30 to 60) who had moderate eye dryness and eye fatigue and were exposed to video display screens for at least four hours daily.

Half the volunteers took **60 mg** of **maqui berry extract** daily, while the other half took a **placebo**.



Both groups started with the same degree of eye dryness.

After **four weeks**, the maqui berry group had:

- A **45%** increase in the production of **tear fluid** in both eyes,
- Substantially improved values for **ocular symptoms** (such as grittiness or dry eyes), and
- Significant improvements in **eye fatigue** as well as **stiff shoulders**, which often can occur with eye strain.

This study confirmed that **maqui berry extract** delivers serious relief to those who suffer from dry eyes and related eye fatigue.

In a similar trial of 20 patients with complaints of dry eyes, participants were randomized to receive maqui berry extract or a placebo, for two months. Improved symptoms of dry eye and reduction in inflammatory markers of eyes were seen in the **maqui berry** group as compared to **placebo**.¹¹

By improving tear production, maqui berry may also help protect the eye from long-term damage.

Summary

Dry eye syndrome causes discomfort, reduces quality of life, and can damage eye tissue.

A sufficient amount of high-quality **natural tears** is essential for protecting the eye from infection and delivering critical nutrients.

An oral extract of the **maqui berry** helps the body produce more of its *own* tears. It has been shown to relieve symptoms of dry eyes, including eye discomfort and fatigue, and to boost quality of life. •



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AMLA

Reduce Artery-Blocking **LIPIDS and INFLAMMATION**

BY MICHAEL DOWNEY

Arterial disease often initiates in youth and rapidly worsens with **age**.¹

As **blood flow** is obstructed, people suffer diminished energy and cognition.

Progressive **arterial blockage** can manifest as coronary **heart disease**, ischemic **stroke**, and other bodily impairments.¹

Factors that contribute to **arterial occlusion** include **chronic inflammation**, **oxidative stress**, and elevated **lipids**.¹

Placebo-controlled human trials have found that a **fruit extract** can lower artery-damaging **lipids**, thus providing a **non-drug** approach to support **cardiovascular** health.^{2,3}



How Occlusive Heart Disease Develops

Coronary artery disease develops as plaque builds up in blood vessels feeding the **heart muscle**.

As coronary blood flow diminishes, the heart becomes oxygen and nutrient deprived. The *first* sign of a problem can be **angina** pain and/or **heart attack**.⁴

Many factors initiate and worsen atherosclerosis. *Prevention* before severe coronary artery obstruction (or aortic stenosis) manifests is considered the most effective strategy.¹

This includes lowering **inflammatory** markers and lipids like **triglycerides**, **apolipoprotein B**, and **LDL** when elevated.

The Lipid Link

A contributor to **cardiovascular diseases** is a person's **lipid profile**.

High blood levels of certain **lipids** (fats) promote **atherosclerotic** lesions. Over time, occlusive plaque reduces blood flow and boosts **heart attack/stroke** risk.

For example, elevated levels of oxidized **low-density lipoproteins (ox-LDL)** can damage **endothelial cells**

that line arteries. Endothelial dysfunction is a key factor in the initiation and worsening of atherosclerosis.

High **triglycerides** increase oxidative stress and the production of **pro-inflammatory** biochemicals.⁵ Elevated triglycerides also induce artery-clogging blood clots by increasing production of certain clotting factors.⁶

Excess triglyceride levels are associated with **small-dense LDL** particles, **very-low-density lipoproteins (VLDL)**, and other particles that promote **atherosclerosis**.^{7,8}

Maintaining healthy **lipid** and **inflammatory** levels is a key factor in cardiovascular risk reduction.

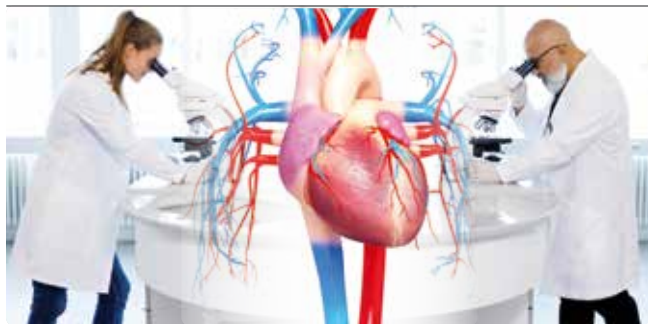
Clinical Results

Animal studies found that **amla** fruit reduces **LDL** and **triglycerides**.⁹⁻¹²

To test these findings in people, scientists developed an **amla fruit extract** standardized to a **60%** content of **tannins**.

This standardized tannin concentrate delivers an **amla extract** dose that has a *long-lasting antioxidant* effect.





In a 12-week clinical trial,³ volunteers with metabolic syndrome (a cluster of conditions that increase cardiovascular risk) were divided into three groups:

- One took a **placebo** twice daily,
- Another took **250 mg** of **amla extract** twice daily, and
- A third group took **500 mg** of **amla extract** twice daily.

Both of the **amla** doses were shown to be more effective than **placebo** at improving the measured outcomes. But the *higher* dose showed *substantially* greater reductions in cardiovascular disease risk factors.

In the group taking **500 mg** twice daily of amla extract:³

- **LDL cholesterol** *decreased 21.8%*,
- Protective **HDL** *increased 22.2%*,
- **Triglycerides** *decreased 19.2%*,
- **Total cholesterol** *decreased 11.1%*,
- **Endothelial function** was restored to normal range (indicated by improvement in Reflective Index, a validated method to evaluate endothelial function) **>6%**,
- The inflammatory marker **CRP** *decreased 53.8%*, and
- Levels of the body's antioxidant, **glutathione**, *increased 53.2%*.

Each of the above effects have been shown in other studies to reduce cardiovascular risks. There were no serious adverse effects.

Control Lipids and Reduce Heart Disease Risk

- **Cardiovascular disease** is the leading cause of death in America.
- **Amla fruit extract** has been shown in studies to improve lipid levels and other factors that drive cardiovascular disease.
- In a clinical study, taking **500 mg** of amla extract twice daily reduced **LDL** cholesterol by **21.8%**, triglycerides by **19.2%**, and total cholesterol by **11.1%**. It also led to remarkable improvements in endothelial function, inflammation, and oxidative stress.
- The reduction in total cholesterol alone translates to a roughly **30% reduction** in heart disease risk when assessed by conventional standards.

WHAT
YOU
NEED
TO
KNOW



Vascular Risks and Amla Fruit

Elevated lipids are not the only cause of **atherosclerosis**. Other cardiovascular risk factors include:

- **Endothelial dysfunction.** When endothelial cells lining the walls of blood vessels lose normal function, it promotes **atherosclerosis**.^{13,14} Cell and human studies show that **amla extract** enhances production of **nitric oxide**, a compound that signals arterial walls to relax

Optimal Cholesterol Goals

People with a family history or with *modestly* elevated LDL and other atherogenic risk factors may wish to take **amla extract** to reduce dangerous **lipid** and **inflammatory** markers.

Those with high cholesterol who *do* require statins may consult their physician to discuss the option of adding **500 mg** of amla extract twice daily.

If you currently take a prescribed lipid-lowering drug, do not stop taking it, and do not reduce its dosage *until you have consulted your physician*.

The most effective way of measuring individual responses to amla or any lipid-controlling compound is with follow-up **blood testing**.

and maintain blood flow.^{2,3,15-17} In a clinical trial of hypertensive patients on medication, amla extract has shown modest improvement in blood pressure in participants receiving amla extract as compared to placebo.²⁵

- **Oxidative Stress.** Clinical and preclinical studies have demonstrated that amla reduces oxidative stress in *three* ways: It inhibits production of free radicals that damage blood vessels, neutralizes existing free radicals, and boosts production of natural cellular antioxidants such as **glutathione**.^{3,18-23,26}
- **Chronic Inflammation.** Inflammation contributes to the formation of atherosclerotic plaque. The inflammatory marker **C-reactive protein (CRP)** is an independent predictor of coronary heart disease.³ In preclinical and clinical studies, **amla** has demonstrated **anti-inflammatory** properties.^{24,25}



CONVENTIONAL CHOLESTEROL TEST RESULT

Test Name	In Range	Out Of Range	Reference Range
CHOLESTEROL TOTAL	170 mg/dL		100-199 mg/dL
HDL CHOLESTEROL	81 mg/dL		>39 mg/dL
TRIGLYCERIDES	76 mg/dL		<150 mg/dL
LDL CHOLESTEROL	86 mg/dL		<100 mg/dL



Summary

Multiple factors contribute to **cardiovascular disease**. Studies on animals and humans show that **amla fruit extract** reduces many of these risks.

In a clinical study, taking **500 mg** of amla extract **twice daily** significantly reduced endothelial dysfunction, inflammation, and oxidative stress, along with elevated **triglycerides** and **LDL**.

Improvement in protective **HDL** levels was also observed.

The most effective way of assessing individual responses to **amla** or any lipid-controlling compound is with blood tests that include LDL, HDL, C-reactive protein, and other vascular risk markers. •

Cardio Core Essentials Panel

To review a blood panel that includes **LDL**,²⁹ **HDL**, **C-reactive protein**,²⁷ **triglycerides** and other lipid risk factors like **apolipoprotein B**,²⁸ turn to page 15.

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1. *Sleep Med Rev.* 2005 Feb;9(1):41-50. 2. *Lancet.* 1995 Aug 26;346(8974):541-4. 3. *Neurol Res.* 2017 Jun;39(6):559-65.

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remain. Marine oil contains compounds called
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"SPMs" support tissue rejuvenation, clear
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compounds that keep your body in harmony.
Pro-Resolving Mediators. Feel like you again.

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"Great product!"

Marcia

VERIFIED CUSTOMER
REVIEW

Oh My *Greenness*

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* Biomed Pharmacother. 2016(3);78:50-9.

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Brain and Whole-Body Effects of **LITHIUM**

BY STAN RICHARDS

In population studies, trace levels of **lithium** in drinking water correlate with enhanced **longevity**.¹

One study found that long-term lithium exposure from drinking water may be associated with a *lower risk* of being diagnosed with **dementia**.²

In observational studies, **lithium** use was associated with decreased dementia risk,³⁻⁵ and improved cognitive performance in people with mild cognitive impairment and Alzheimer's dementia.^{6,7}

A growing number of scientists believe that small, trace doses of lithium may have a wide-ranging impact on health and should be considered an **essential micronutrient**.⁸⁻¹⁰



What is Lithium?

Lithium is a mineral that is found in some natural water sources and in small amounts in some foods, including tomatoes, potatoes, and cabbage.⁸

People have made pilgrimages to lithium-rich mineral springs throughout history.¹¹ Drinking from these waters was considered a tonic to support mood and overall health.

While *high* doses of lithium have long been used to treat bipolar disorder and other psychiatric illnesses,¹¹⁻¹³ trace amounts of lithium in drinking water are associated with a wide range of benefits throughout the body.^{14,15}

Current literature shows that low-dose lithium may be supportive of cardiovascular, musculoskeletal, metabolic, and cognitive functions of the aging body.⁹

The evidence supporting lithium's importance is so strong that some scientists now propose that it may be an **essential micronutrient**.^{8-10,14} Essential micronutrients are required for normal and healthy—not to mention optimal—function. This would mean lithium must be consumed in the diet or through direct oral intake and is required for normal bodily function.



How It Works

Lithium serves many distinct functions throughout the body.⁹

Its greatest benefits may result from its ability to inhibit an *enzyme* known as **glycogen synthase kinase-3 (GSK-3)**.^{9,12}

GSK-3 controls several essential functions in cells, but excessive GSK-3 activity has been linked in preclinical settings to aging and metabolic disorders.¹⁶

Clinical and preclinical evidence suggests that GSK-3 activity is poorly regulated in mild cognitive impairment and neurodegenerative diseases.^{12,17} There is evidence that implicates GSK-3 in other common conditions.^{12,17}

In animal model studies, GSK-3 is involved in the production of **beta-amyloid** and **hyperphosphorylated tau** in the brain. These two abnormal protein accumulations are involved in the development and progression of **Alzheimer's disease**.¹²

By *inhibiting* GSK-3, *low*-dose lithium acts as a **neuroprotectant**, potentially shielding the brain from neurodegenerative disease.¹⁸

It also increases levels of **brain-derived neurotrophic factor (BDNF)**, a signaling compound that is required for the survival and optimal function of brain cells.^{9,19}

Implications for Chronic Diseases

Although lithium is most recognized for its effects on mental health, its actions on GSK-3 and other regulatory proteins impact health body-wide.

Epidemiological studies from around the world have evaluated the impact of varying intakes of **lithium** through drinking water.^{9,12}

Many of these studies have found that in places with *more* lithium present in the water, there are *lower* rates of several negative outcomes.

Specifically, higher lithium intake was associated with *lower* rates of:⁹

- Hospital admissions and deaths related to mental illness,
- Metabolic diseases, including obesity and diabetes,
- Death due to cardiovascular disease,
- Death due to Alzheimer's disease, and
- Death due to *any* cause.

WHAT
YOU
NEED
TO
KNOW

Experimental data demonstrate several other benefits of lithium intake, including:^{9,12}

- Improved heart and blood vessel function,
- Improved muscle and bone health,
- Reduced inflammation, and
- Antiviral effects.

Lithium may also improve general **metabolism** throughout the body.

Some epidemiologic evidence has shown that trace amounts of lithium in tap water are associated with a reduced prevalence of obesity.

Evidence from rodent models has shown that low-dose lithium may prevent diet-induced obesity. Both clinical and animal models suggest that lithium can enhance insulin function and improve **glucose control**.

However, various lines of animal models and clinical evidence are inconsistent on this topic, so more research is needed.⁹

Brain Benefits

Pre-clinical and clinical studies of low-dose lithium have evaluated its use in preventing or managing age-related brain dysfunction, including **mild cognitive impairment** and **Alzheimer's disease**.

These studies have shown a number of improvements in brain function, including:

- Improved or maintained cognitive function compared to deterioration in a placebo group,^{7,15}
- Improved or maintained cognitive function in mild cognitive impairment and Alzheimer's patients,^{6,20} and
- Reduced abnormal protein accumulations in the brain.^{7,21}

In one clinical study, taking just **300 mcg** of **lithium** daily was found to **decrease cognitive decline** in patients with Alzheimer's disease, compared to a placebo.¹⁵

A review of four clinical studies published in **2022** compared higher-dose **lithium** use to **aducanumab**, a new drug recently approved for the treatment of mild cognitive impairment and Alzheimer's disease.²²



3

Li
Lithium
6.94

A Health-Boosting Mineral

- **Lithium** is a mineral found in small amounts in natural bodies of water and some plant-based foods.
- Lithium inhibits the **GSK-3** enzyme. *Excessive GSK-3 activity has been linked to aging, metabolic disease and diabetes, and dementia.*
- Trace intake of lithium in drinking water has been tied to *reduced* rates of metabolic diseases, including obesity and diabetes, death due to Alzheimer's disease, hospital admissions, death due to mental illness, and all-cause mortality.
- In clinical studies on patients with **mild cognitive impairment** or **Alzheimer's disease**, low-dose lithium intake was *more effective* than a new drug in improving cognitive function scores.
- Growing evidence supports treating low-dose lithium as an essential nutrient that should be consumed daily for optimum health.

This review found that lithium was **significantly more effective** than the expensive drug aducanumab in improving cognitive function scores in patients with mild cognitive impairment or Alzheimer's disease.

However, this was a small, pooled analysis of four studies, none of which directly compared lithium to aducanumab (two studies compared lithium to placebo, and two studies compared aducanumab to placebo), so formal studies are needed before any firm conclusions can be reached as to direct comparative effectiveness in this context.

These studies add to the growing body of evidence that lithium intake is necessary for optimum health.

Summary

Intake of the mineral **lithium** has been linked to **lower** rates of many chronic health problems, including cognitive decline, cardiovascular disease, obesity, and diabetes, along with lower rates of **death from any cause**.

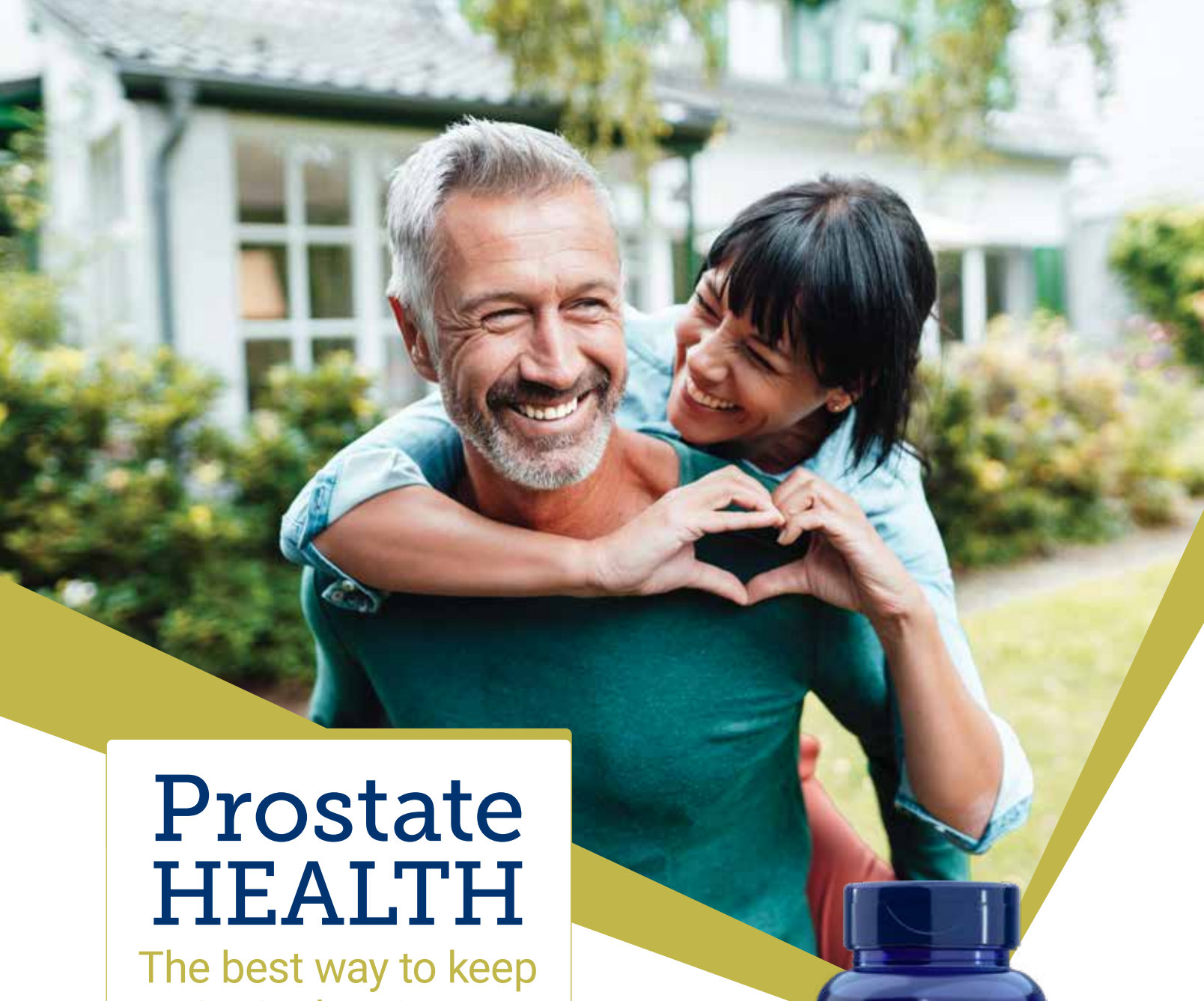
In clinical studies, low-dose lithium helps improve **cognitive function** scores in patients with mild cognitive impairment or Alzheimer's disease.

Growing numbers of scientists believe **low-dose lithium** intake can help improve health and stave off chronic disease. ●



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A male scientist wearing a white lab coat, a grey shirt, a striped tie, and safety glasses is looking through a microscope. The background is a blurred laboratory setting with various equipment and colorful containers.

Pro-Resolving Mediators: An Antidote for INFLAMMATION



BY GREGORY E. BIGFORD, PHD MSBA

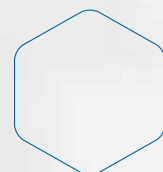
Readers of this magazine know by now that **chronic inflammation** is a major driver of nearly *all* diseases of aging.

Anti-inflammatories can help reduce existing inflammation. But that may not be enough.

To more fully undo the damage that chronic **inflammation** can cause, we need to also **resolve** the inflammation. Resolution **stops** the inflammation at the source *and* helps return inflamed tissues to their healthy, normal state.

Specialized pro-resolving mediators (PRMs) are compounds produced in the body that are *the key players* in the resolution of inflammation.

PRMs may play a vital role in helping to ward off many diseases of aging, including **atherosclerosis** and neurological disorders.



The Dangers of Inflammation

Early **inflammation** in response to an injury or infection is important in healing and protecting the body.

But when that inflammation continues and becomes **chronic** or **unresolved**, it drives the progression of numerous disorders,¹ including:^{2,3}

- Cardiovascular,
- Type II diabetes,
- Alzheimer's,
- Parkinson's,
- Osteoporosis, and
- Arthritis.

Many of these conditions are considered **age-associated diseases**. Because of the role unresolved inflammation plays, the term "**inflammaging**" is sometimes used to describe the hand-in-hand relationship between inflammation and accelerated aging.⁴⁻⁶

Many nutrients exert **anti-inflammatory** effects, which are extremely beneficial.⁷⁻⁹ But to truly counter inflammaging and restore health, the inflammation also needs to be **resolved**.

What Are Pro-Resolving Mediators?

Resolving inflammation is a coordinated and active process guided by specific signaling compounds produced in the body.¹⁰⁻¹²

The compounds that are most responsible for the resolution of inflammation are called **specialized pro-resolving mediators (PRMs)**. PRMs are derived from **EPA** and **DHA**, the omega-3 fatty acids found in fish oil, and from the omega-6 fats found in certain vegetable oils.^{13,14}

In response to inflammation, omega-3s can be converted to several classes of PRMs: **resolvins**, **protectins**, and **maresins**. Omega-6s can be converted to PRMs called **lipoxins**.¹⁵⁻¹⁸

To raise PRM levels in the body high enough to have a significant effect, direct oral intake of PRMs and precursors may be necessary.^{19,20} These include:

- **18-HEPE** (18-hydroxyeicosapentaenoic acid),
- **17-HDHA** (17-hydroxydocosahexaenoic acid), and
- **14-HDHA** (14-hydroxydocosahexaenoic acid).

How PRMs Resolve Inflammation

While each type of PRM has slightly different actions, they complement each other and collectively coordinate the processes involved in **inflammation resolution**.

PRMs resolve inflammation in several important ways. Among others, they:²¹⁻²³

- *Inhibit* the further migration of immune cells that were recruited to damaged tissue during the *acute* inflammatory phase,
- *Inhibit* the release of pro-inflammatory mediators from other immune cells,
- *Help* clear away microorganisms, tissue debris, and dead cells, and
- *Stimulate* cellular regeneration and tissue repair in damaged tissue.

Together, these actions can help counter diseases driven by inflammation.



Metabolic Diseases

Atherosclerosis, the buildup of plaque in artery walls, is driven in part by inflammation *and* by a deficiency of inflammation-resolution signals in the arteries.²⁴ It is the major cause of heart disease, heart attacks, and strokes.

In preclinical studies, specialized **pro-resolving mediators** can help prevent atherosclerosis by initiating the removal of dead cells and cholesterol-rich foam cells in a process called **efferocytosis**. If these cells are not removed, they contribute to plaque progression.^{24,25}

Obesity and **fat tissue** are tied to chronic inflammation. Genetic and dietary studies show that **obesity** is associated with low levels of PRMs in fat tissue.^{17,26}

Non-obese patients with chronic conditions such as **type II diabetes** also show signs of systemic inflammation,¹⁷ and deficiencies in the production of **PRMs** have been associated with defective resolution of inflammation that underlies chronic diabetic wounds.²⁷

In animal models of **obesity** and **diabetes**, administration of **resolvins** was able to improve glucose tolerance, reduce fasting blood sugar, and enhance the clearance of dead and damaged tissue.²⁸ This indicates that PRMs may improve metabolism and wound repair in these conditions.^{27,29}

Preclinical studies show that, in obese animals, taking **omega-3 fatty acids** can increase levels of **resolvins**.²⁶ This is an instance when taking **PRM precursors** may help raise levels more.

Brain Diseases

Prolonged and unresolved inflammation in the brain contributes to neuronal death in **Alzheimer's disease**. In patients with Alzheimer's, low levels of **lipoxins** (PRMs derived from omega-6s) have been found after death compared to patients without Alzheimer's.³⁰

In addition, animal studies found that treatment with aspirin triggered lipoxin, reduced inflammation, and facilitated the clearance of **beta-amyloid plaques** in the brain,³¹ which are seen in human patients with Alzheimer's disease.

Other preclinical studies show that PRM administration can reduce inflammation and functional deficits in models of age-associated **Parkinson's disease**.^{32,33}

PRMs have been shown in preclinical and experimental models to improve other neurological conditions as well, including postoperative **cognitive impairment**,³⁴ **stroke**,³⁵⁻⁴¹ and **depression**.⁴²



Resolve Inflammation for Better Health

- Compounds called **specialized pro-resolving mediators (PRMs)** help the body resolve inflammation, stopping it in its tracks and returning inflamed tissues to a healthy state.
- *Unresolved* inflammation is tied to many age-related chronic illnesses.
- In preclinical studies, PRMs help prevent **atherosclerosis**, reduce high blood glucose, and aid in diabetic wound healing.
- In animal models, PRMs reduce brain inflammation and help clear away beta-amyloid plaques in the brain, a hallmark of **Alzheimer's disease**. They also improve other neurological conditions, including Parkinson's disease and stroke.
- In a human study, *combining* marine oil enriched with **PRM precursors** with a highly bioavailable **curcumin** improves subjective measures of **pain** and discomfort associated with inflammation.
- The body can convert **omega-3 fatty acids** from fish oil to PRMs. Taking **PRM precursors** can raise levels even higher.

Other Disorders

There is an inflammatory component to many other chronic age-related conditions. For example, PRM production is lower in **osteoarthritis**.⁴³ In a preclinical model of obesity-associated osteoarthritis, treatment with **resolvins** slowed its progression in the knee joint.⁴⁴

Boosting pro-resolving mediators has also been effective in models of inflammatory **liver disease**,^{45,46} and there is evidence that PRMs can reduce **fibrosis** (scarring) in chronic **kidney disease**.⁴⁷

The benefits of PRMs are also being studied in conditions as far-ranging as dry eyes, periodontitis (a serious gum infection), the digestive disease colitis, lung disease, and inflammatory pain,^{16,48,49} highlighting the growing attention to the role these compounds play in resolving inflammation.

Clinical Study

An open-label pilot study published in **2022** demonstrates that taking **PRM precursors** along with bioavailable **curcumin** delivers significant relief of pain and discomfort.¹⁸ The study recruited 29 healthy males and females with mild to moderate pain. Participants received **500 mg** of marine oil enriched with PRM precursors, and **500 mg** of highly bioavailable (absorbable) curcumin. To measure pain, quality of life, and overall health, participants completed three questionnaires.



In just 30 days, the combination significantly reduced:

- **Total** pain,
- Pain **intensity**, and
- Pain **severity**.

An impressive **62%** of participants had an improved **total pain** score at **30 days**, and after 60 days, **79%** of participants had an improvement in **total pain**.

No adverse events were reported.

This suggests that taking **PRM precursors** with a bioavailable form of **curcumin** delivers significant relief of **pain** and discomfort associated with inflammation.

Summary

Without adequate levels of **specialized pro-resolving mediators (PRMs)** in the body, inflammation can persist and do great harm.

Chronic inflammation that underlies so many **age-related** diseases has been associated with lower levels of PRMs in the body.

Adequate intake of **omega-3 fatty acids** from fish oil can increase bodily production of **PRMs**.

Direct oral intake of PRM (pro-resolving mediator) **precursors** can boost levels *higher*.

Emerging evidence suggests that maintaining PRM levels may help fight a variety of inflammatory conditions, from atherosclerosis and degenerative brain diseases to osteoarthritis. •

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In clinical studies **ERr 731®** provides hormone-free relief for all **11 menopause discomforts** on the Menopause Rating Scale, including:

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30 enteric-coated
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"I feel like I will be healthy
for the long haul."

Wendy

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Clean

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Senolytic Activator® provides four ingredients, including a potent dose of **Bio-Fisetin**, to help you manage these **senescent cells**.

The suggested dose is 3 capsules just **ONE** time each week.

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SMART

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This **B12 Elite** provides both:

ADENOSYLCOBALAMIN

- Active in brain cell mitochondria.
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- Supports cellular energy production.

METHYLCOBALAMIN

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Dissolve in the mouth or chew one vegetarian **lozenge** daily.



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60 vegetarian lozenges



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Benfotiamine promotes and protects brain function while supporting healthy blood sugar metabolism.^{1,2}



Item #00925
120 vegetarian capsules

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"I take it daily because it does help."

Spencer

VERIFIED CUSTOMER REVIEW



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PROBIOTICS

Just for Women





SARAH LOBISCO, ND, IFMCP

A healthy balance of **vaginal flora** can support gynecological health.¹⁻³

Unhealthy flora, on the other hand, can increase risk of **vaginal** bacterial, yeast and sexually transmitted infections and may influence fertility outcomes.²

Approximately **29%** of U.S. girls and women aged 14–49 suffer from **bacterial vaginosis** (imbalance of good and harmful bacteria in the vagina).²

Researchers have identified two specific **strains of probiotics** that can help improve vaginal health.

One strain *helps* balance the **vaginal microbiome** by out-populating the unhealthy microorganisms that can cause **infections** and discomfort.³⁻⁶

A second strain has been found to reduce common gastrointestinal disturbances, enhance immune function, and defend against various infectious agents.⁷⁻¹⁰

Together, these two **probiotics** can help support women's vaginal, gastrointestinal, and immune health.

The Importance of Vaginal Microbe Balance

A healthy vaginal microbiome is characterized by the dominance of *Lactobacillus* species.³ These bacteria produce **lactic acid**, which *reduces* pathogen invasion, blocks the spread of harmful organisms, and assists with a well-balanced vaginal environment and microbiome.¹⁻³

When there is a *decrease* in *Lactobacillus* species in the vagina, harmful pathogens can outnumber healthy microflora. This is known as **vaginal dysbiosis**, and it can lead to **yeast infections**, **bacterial infections**, increased risk for sexually transmitted infections, and fertility problems.^{2,3}

Women of all ages can suffer from **bacterial vaginosis**. Many women will have no symptoms with this condition, but those who do could experience abnormal vaginal discharge, “fishy” odor, burning with urination, and vaginal itching and irritation.¹¹

In standard medical practice **bacterial vaginosis** is treated with antibiotics. The dysbiosis also increases risk of developing **pelvic inflammatory disease**, an infection of the upper reproductive tract that, left untreated, can cause fertility problems.

Microbial risk factors for pelvic inflammatory disease include sexually transmitted infections and bacterial vaginosis.²

Recurrences of these infections are common.¹²⁻¹⁴

Recurrent yeast infections of the vagina (candidiasis) affect about **138 million** women globally, mostly aged 25-34, every year.¹² At the current rate of recurrence, the repeated **yeast infections** are expected to affect **158 million** women worldwide by 2030.¹²

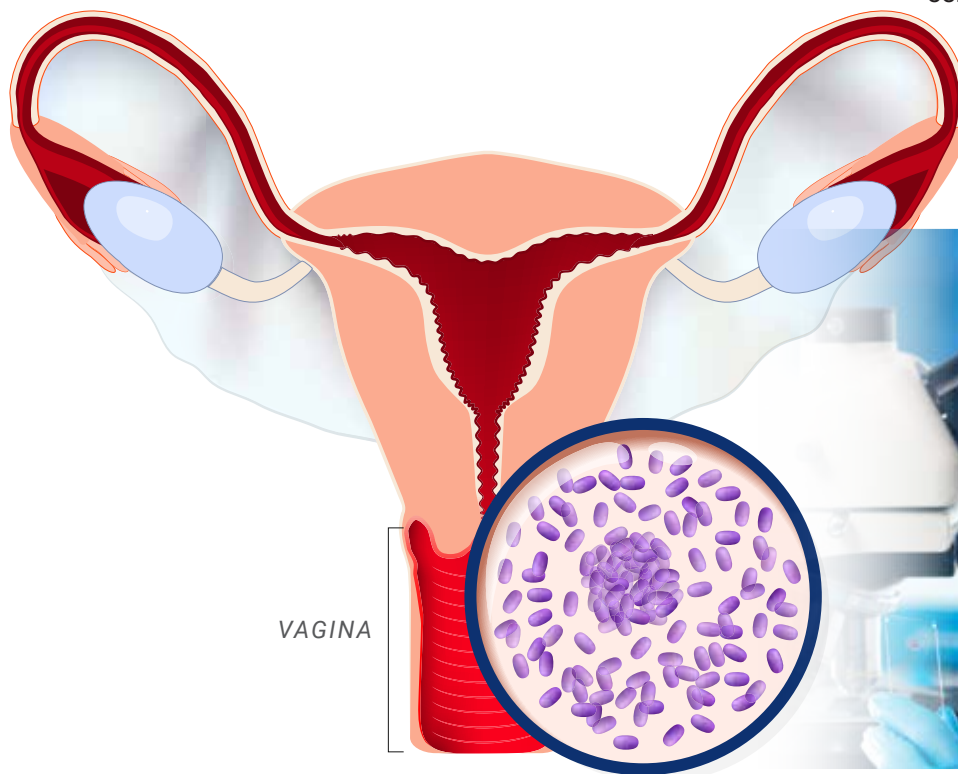
Maintaining a vaginal microbiota dominated by ***Lactobacillus*** could provide support against these common infections and reinfections.²⁻⁴

A Healthy Vaginal Microbiome

Lactobacillus plantarum is prevalent in a healthy vaginal microbiome. Research has shown that these beneficial bacteria can adhere to vaginal tissue and hinder the growth of *Candida* yeast, responsible for most **yeast infections**.^{4,15,16}

L. plantarum may provide protection by blocking the growth of other vaginal pathogens.¹⁶ In a cell study on vaginal epithelial cells, four strains of ***L. plantarum***, isolated from yogurt, were found to have antibacterial activity against *E. coli* and *Gardnerella vaginalis* (which may cause **bacterial vaginosis**).^{17,18}

Cell studies also demonstrated that a species of ***Lactobacillus plantarum* P17630** was also able to adhere to the vaginal wall.^{15,19} It was observed that ***L. plantarum* P17630** adheres to vaginal epithelial cells and significantly inhibits the adhesion of *C. albicans* in a competitive manner. This action may help support better colonization of the vagina with protective strains, thus providing protection to the vagina.¹⁹



 WHAT
YOU
NEED
TO
KNOW

Clinical studies in women also showed impressive benefits from oral *L. plantarum* P17630 intake as follows:^{4,5,15,16}

- *L. plantarum* P17630 colonization of the vagina was associated with an improvement in the vaginal **microbiome**.
- There was significant improvement in Lactobacillary grade scores, which evaluate healthy *Lactobacillus* levels in the vagina.
- Women prone to recurrent **yeast** infections experienced a significant *reduction* of symptoms, including redness and swelling.

Supporting Gut and Immune Function

Probiotics also assist with common **gastrointestinal** and **immune** issues.^{4,20,21}

According to a study, **73%** of women experience at least one gastrointestinal symptom, most commonly abdominal pain, and diarrhea, before or during **menstruation**.²²

Women also have higher rates of **irritable bowel syndrome** than men. Symptoms include diarrhea, constipation, and abdominal pain.^{23,24}

L. helveticus, another *Lactobacillus* species, has been found to inhibit pathogens that can colonize in the gastrointestinal tract and vagina.^{6,25} It can also enhance immune function by reducing inflammation.^{26,27}

Probiotic Support for Women's Health

- As in the gut, **vaginal health** is dependent on a healthy balance of bacteria to protect it from pathogens, infections, and other disorders.
- *Lactobacillus plantarum* P17630, taken orally, can adhere to the vaginal wall where it improves vaginal health and reduces the growth of organisms that cause yeast infections and bacterial vaginosis.
- Another *Lactobacillus* strain, *L. helveticus* L10, has been shown to reduce common gastrointestinal disturbances, enhance immune function, and defend against various infectious agents.
- A blend of these strains of *Lactobacillus* bacteria can help women improve their vaginal, gastrointestinal, and immune health, and enhance overall wellness.

In preclinical studies, *L. helveticus* has been shown to:

- Inhibit overgrowth of harmful *Listeria*, *Candida*, and *E. coli* bacteria,^{8,28,29}
- Reduce production of pro-inflammatory mediators, including several related to chronic inflammation, autoimmune disease, and cancer in the gut,^{30,31}
- Increase an immune-balancing and anti-inflammatory mediator (interleukin-10) believed to help prevent inflammatory bowel disease,⁹
- Promote interferon and IgA antibodies, which support immune health and fight gut infections,³¹ and
- Reduce gastrointestinal inflammation and markers of systemic inflammation and oxidative stress.³⁰



Participants in a clinical study reported the beneficial effects on health after taking the probiotic, with significant improvement in average scores of **gastrointestinal symptoms** including diarrhea, constipation, crampy abdominal pains, and flatulence.³²

L. helveticus **L10** has also been shown to improve **immune function** in human trials with regular subjects, and with fatigued, elite athletes.^{7,10,33}

Elite athletes often experience a depletion in immunity related to their intense training. But *L. helveticus* **L10** was found to promote protective **antibodies** to ward off gastrointestinal pathogens and support respiratory health.^{7,10,33}

A combination of *L. helveticus* and *L. plantarum* can help support women's vaginal, gastrointestinal, and immune health.

Summary

Maintaining a healthy balance of *Lactobacilli* species supports vaginal health and protects against bacterial and yeast infections, sexually transmitted infections, and fertility issues.

Lactobacillus plantarum **P17630** has been shown to prevent harmful bacteria and yeast from adhering to the vagina, and decrease the risk for vaginal infections.

Lactobacillus helveticus **L10** was shown to improve immune function and decrease gastrointestinal problems such as cramps, diarrhea, and constipation.

Together, these probiotic strains provide women with comprehensive gynecological, immune, and digestive support. •

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Dryness and loss of firmness are outward signs of normal aging.

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

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

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Item #01733
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* J Biol Chem. 2010;285(1):142-52.

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*European Journal of Nutrition. 2011;50(5):387-389.



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Item #02525

Hip & Joints

Glucosamine complex supports overall joint health and comfort to help maintain your dog's healthy lifestyle

Item #02523

Skin & Coat

Omega-3s from fish oil support healthy skin so your dog spends less time scratching those occasional itches

Item #02522

Chicken
flavor



Bacon
flavor



Beef
flavor



Salmon
Flavor



Life Extension® DOG: science-based nutritional support for years of mischief, adventures, and everything in between.

For use in dogs only. Not for human consumption. Keep out of the reach of children and animals. Not for dogs under 1 year old.



The Science of a Healthier Life®

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IN THIS EDITION OF LIFE EXTENSION MAGAZINE®



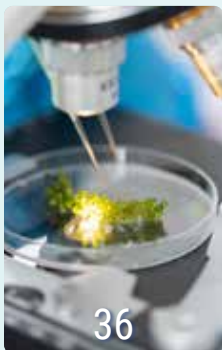
18 TAURINE SHOWN TO IMPROVE HEALTHY AGING

Taurine levels drop by as much as **80%** in older people, which may contribute to **rapid aging** and degenerative disorders. Restoring *youthful* **taurine** levels may enable healthier aging.



26 PROTECT YOUR CANINE COMPANION

Like people, **dogs** face age-related ailments, from joint pain to behavioral issues. More veterinarians today recommend specific **nutrients** to address dog health.



36 ASTAXANTHIN AND AGING SKIN

In clinical studies, **astaxanthin** *reduced* and *reversed* aspects of **skin aging**.



44 GREEN TEA BOOSTS BRAIN HEALTH

Catechins in **green tea** *enhance* brain **signaling** while reducing **neurodegenerative** risks.



58 FRUIT EXTRACT CUTS CARDIOVASCULAR RISK

A **fruit extract** was clinically shown to lower artery-clogging **lipids** and **C-reactive protein**, while improving **endothelial function**.



68 BRAIN-BODY BENEFITS OF LOW-DOSE LITHIUM

Trace levels of **lithium** in drinking water correlate with enhanced **longevity** and reduced risk of **dementia**.