



**LIFE**  
**EXTENSION**<sup>®</sup>

The Science of a Healthier Life<sup>®</sup>

Life Extension.com

Winter 2020-2021 Edition

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# Remarkable Increases in **BONE DENSITY**



ANNUAL  
**SuperSale**  
BEGINS!

**PLUS: Enhanced Fish Oil Benefits**



Life Extension®

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**Bone Restore Elite with Super Potent K2 120 capsules • Item #02416**

**\$28.35**

Helps maintain optimal **bone density** by combining **45,000 mcg vitamin K2 (MK-4)** with proven skeletal-strengthening nutrients in one highly absorbable formula.

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Highly purified **EPA (1,400 mg)** and **DHA (1,000 mg)**, sesame lignans, plus **olive extract**, provide essential components of the Mediterranean diet in four softgels.

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Superior **ubiquinol** form of CoQ10 (**100 mg**) plus shilajit shown to **double** mitochondrial CoQ10 levels.

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The Science of a Healthier Life®



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\*Ratings based on results of the 2020 ConsumerLab.com survey of supplement users. More information at [www.ConsumerLab.com/survey](http://www.ConsumerLab.com/survey).



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REPORTS

20 ON THE COVER

HIGH-DOSE VITAMIN K2  
BUILDS NEW BONE

Physicians in Japan have prescribed **high-dose vitamin K2** to treat **osteoporosis** for decades.

Human trials show that **45,000 micrograms (45 mg) of vitamin K2** daily *increases* bone density and *reduces* fracture risk.

High-dose vitamin K2 is now available without a prescription.



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3 "I WAS NOT SURPRISED TO HAVE OSTEOPENIA"

(William Faloon 2019)

Aging is almost always accompanied by **bone** loss. **Fractures** caused by **osteoporosis** are a leading cause of disability and mortality. Bill Faloon reports on his diagnosis.

12 THWART POST-MEAL BLOATING AND INDIGESTION

Up to **30%** of people complain of after-meal **bloating** and related discomforts. Researchers have identified **plant compounds** that target the underlying causes. Clinical studies show they can help prevent **gastrointestinal** distress.

32 Fisetin: A LONGEVITY SENOLYTIC

The plant extract **fisetin** increased **lifespan** by **10%** even when fed to rodents the equivalent of 75 human years. Fisetin counteracts aging via several mechanisms including functioning as a potent **senolytic**. A new **patented** green technology increases the **bioavailability** of fisetin **25 times higher**.

46 PROTECT RESPIRATORY FUNCTION

**NAC (N-acetyl-L-cysteine)** helps prevent **viruses** and **bacteria** from adhering to the lining of the lungs. Data show that **NAC** reduces excess airway mucus, lowers inflammation, supports pulmonary function, and inhibits infectious colonization.

56 ENHANCING THE BENEFITS OF FISH OIL

Followers of the Mediterranean diet have **lower** rates of cardiovascular disease, neurological disorders, cancer, bone loss, and overall mortality. Scientists combined key components of this healthy diet into a **fish oil concentrate** with **olive extract** and **sesame lignans**.





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WILLIAM FALOON

## "I was not surprised to have **OSTEOPENIA**"

**Osteopenia** is diagnosed when your **bones** are **weaker** than normal, but not so much that they easily fracture.

As I neared age **65**, I knew it was time to check my **bone density**, since **aging** is almost always accompanied by significant **bone loss**.

When my results came back as **mild osteopenia** I was not surprised.

My **low-calorie** diet contained little **calcium** and the last supplement I took each day was **calcium**, so I seldom got to it before the day ended.

I'm grateful to have found out in time to take corrective actions to rebuild **skeletal density**.



### Prevalence of Osteopenia

**Bone fractures** caused by **osteoporosis** are a leading cause of disability and mortality in the **elderly**.<sup>1</sup>

Yet a surprising number of **younger** individuals have **osteopenia**, which can lead to **osteoporosis**.

A study published in **2019** found more than **25%** of men and women between age **35-50 years** *already* had **osteopenia** (weakened bones).<sup>2</sup>

As these people age past 50, they are likely to be at risk of more severe **bone loss**, a condition called **osteoporosis**, which means **fractures** become much more likely. With advancing age, adverse outcomes resulting from **fractures** are common.

Inability to walk following a hip fracture may lead to pneumonia, deadly blood clots, and muscle loss,<sup>3</sup> ultimately increasing the risk of premature death.

### Osteoporosis Epidemic

**One** of every **five** men over age **50** will suffer an **osteoporotic fracture**.<sup>4</sup>

**One** out of every **three** women over **age 50** will suffer a **fracture** related to **osteoporosis**.<sup>4</sup>

Having osteoporosis not only increases the risk of fractures, it is also associated with accelerated aging and with an increased risk of:<sup>5-9</sup>

- 1. Cancer**
- 2. Cardiovascular disease**
- 3. Dementia**

Health-conscious individuals take steps to protect against heart disease, cancer, and Alzheimer's by taking supplements including CoQ10, fish oil, vitamin D, and others. Often overlooked are nutrients needed for comprehensive **skeletal** support, like **vitamin K**.

## Drugs That Improve Bone Density

A class of drugs called **bisphosphonates**, (that include Fosamax® and Actonel®) help rebuild **bone density**.

There are concerns, however, with short- and long-term use of these drugs in many patients.

Side effects include bone, joint, or muscle pain.<sup>13</sup>

For oral bisphosphonate tablets, side effects may include nausea, difficulty swallowing, heartburn, irritation of the esophagus, and gastric ulcer.<sup>13</sup>

These drugs reduce osteoporotic fractures involving the hips and spine in older patients, especially women ages 65 to 80 years with osteoporosis.<sup>14</sup>

The problem with bisphosphonates is that they focus on limiting additional bone loss, rather than **building** more bone.

Longer-term use of bisphosphonates beyond five years has been linked to increased risk of **atypical fractures** of the femur and **osteonecrosis** of the jaw.<sup>13</sup> Some trials, but not others, have also reported increased rates of **atrial fibrillation**.<sup>15,16</sup>

Better and safer methods of **rebuilding bone mass** are clearly needed.

## High-Dose Vitamin K2 Restores Bone Mass

The **Japanese** approved **coenzyme Q10** as a heart medication in **1974**.

Americans did not gain access to CoQ10 until **1983**.

Analogous to **CoQ10**, the **Japanese** approved a high-dose **vitamin K2** drug in the **1990s** to restore bone mass and prevent **fractures**.

**Vitamin K2** supports new bone formation and also protects against excess removal of older, but still structurally important bone.<sup>17,18</sup>

Japanese doctors took a common form of **vitamin K2** called **MK4** and studied it at the **high dose** of **45 mg** a day.<sup>19,20</sup> This is about **15 times more** than what **Life Extension®** supporters supplement with.

The results from studies dating back decades reveal **improvements** in **bone density** and reductions in **fracture rates**.<sup>19-27</sup>

**Vitamin K2** activates a protein called **osteocalcin** in **bone** that binds **calcium**. If this calcium-binding protein is not activated, then natural bone **restoration** may not be possible.

Just as important, **vitamin K2** activates a protein in **arteries** and **heart valves** that **shields** them from deadly **calcification**.



## Bone Loss Risk Factors

There are many reasons for **loss** of bone mass.

Many have a false sense of security about their ability to maintain healthy bones, because they avoided some common bone loss risks.

Some of the major controllable or acquired factors that accelerate **bone loss** include:<sup>10-12</sup>

- Smoking cigarettes
- Excess alcohol ingestion
- Hormone deficits (estrogen, progesterone, testosterone, DHEA)
- Lack of weight-bearing exercise
- Drugs (proton-pump inhibitors, corticosteroids, warfarin, and others)
- Nutrient deficiencies (magnesium, boron, vitamins D & K, calcium)

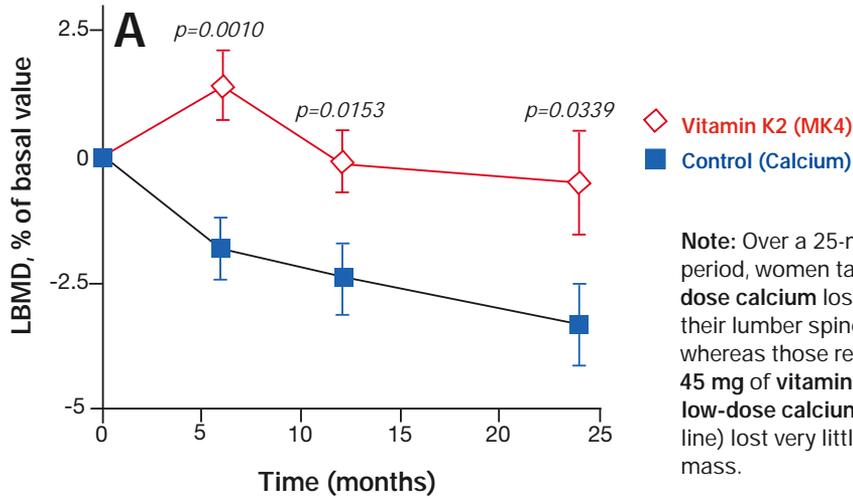
Add to the above list risk factors such as ethnicity, small body frame, family history, and certain medical conditions.<sup>10-12</sup>

With so many pathologies impairing one's ability to maintain healthy bone strength, it becomes clear why **preservation of bone density** requires aggressive measures.

I fear most people look at **osteoporosis risk factors** and think they are avoiding most of them, such as not smoking or taking bone-depleting drugs.

The reality is that virtually **all** these factors might need to be addressed to protect against **osteopenia** and **osteoporosis**.

### BONE MINERAL DENSITY COMPARING LOW-DOSE CALCIUM ALONE TO LOW-DOSE CALCIUM + 45 MG OF VITAMIN K2



Adapted from: *J Bone Miner Res.* 2000 Mar;15(3):515-21.

### Remarkable Improvement in Bone Density

**Vitamin K2** is critical for **calcium** to **bind** to **bone** to provide structural support.

Clinical trials show that a **45 mg** dose of **vitamin K2** (MK4) can prevent, or in some cases **reverse** age-associated bone density loss, and reduce **fracture** risk.<sup>19-27</sup>

In one clinical study, researchers divided women in their mid to late 60s with **osteoporosis** into one of two groups:<sup>26</sup>

**150 mg a day of elemental calcium**  
or

**150 mg of elemental calcium + 45 mg of MK4**

As seen in the graph above, **lumbar bone mineral density** decreased steadily at every time point in the **calcium-only** group. By the 24-month measurement, the low-dose-**calcium-only** group lost **3.3%** of their bone density!

Impressively, the **calcium + vitamin K2** (MK4) group lost little if *any* **bone mass** over that same period.<sup>26</sup>

This study demonstrated how **high-dose vitamin K2** added to a modest-dose (**150 mg/day**) **calcium** supplement prevented the **loss of lumbar spine mineral density** over a period of two years. And these are only two of several nutrients needed to maintain bone mass.

### Reduction in Fracture Incidence

In this same study,<sup>26</sup> the group receiving calcium + high-dose K2 saw a reduction in **fracture incidence**.

The group receiving **calcium alone** sustained **35 fractures**, compared to only **14 fractures** in the vitamin K2 + calcium treatment group (see table below.)

As it relates to percentages, patients in the **calcium + high-dose K2** group had a significantly lower fracture rate at **15.4%** compared to the calcium alone at **35.4%**.

This study corroborates the elevated **fracture rate** observed in women over age 50.

Even more robust results in the **calcium + K2** group may have been seen if *higher* dose calcium, along with **vitamin D** and other bone nutrients, had been included.

GROUP	Number of patients included in the fracture incidence analysis	NUMBER OF FRACTURES AND FRACTURE LOCATION			
		Vertebral	Forearm	Femoral Neck	Other Site
CALCIUM (150 mg)	99	30	2	2	1
CALCIUM (150 mg) + VITAMIN K2 (45 mg)	91	13	1	0	0

Adapted from: *J Bone Miner Res.* 2000 Mar;15(3):515-21.

## Combining Vitamin D + Vitamin K2

Another study evaluated the effect of **vitamin D3 + high-dose K2** in osteoporotic postmenopausal women.<sup>27</sup> All the women were encouraged to obtain **1,000 mg** of calcium a day plus **400 IU** of **vitamin D** through their food.

After two years, study participants showed the following percent changes in lumbar spine **bone mineral density (BMD)** compared to baseline:<sup>27</sup>

**Calcium group** (calcium lactate 2,000 mg/day)—  
**0.79% reduction in BMD**

**Vitamin D3 group** (30 IU/day)—  
**0.38% increase in BMD**

**Vitamin K2** (45 mg/day)—  
**0.90% increase in BMD**

**Vitamin K2 + D3 group**—  
**1.35% increase in BMD**

These data reveal the benefits of combined bone-building nutrient supplementation.

## New Recommendation to Restore Bone Structure

Most of us have lost more bone than we realize.

Nutrient formulas containing calcium, magnesium, vitamins D and K, proper hormone balance and healthy lifestyle choices are all important in slowing bone loss and partially reversing it.

Most of us over age 50 should now consider a strategy based on three decades of human studies emanating mostly from **Japan**. This has demonstrated meaningful **bone density** improvements and marked reduction in **fracture** incidence.

Consider a supplement that provides approximately:

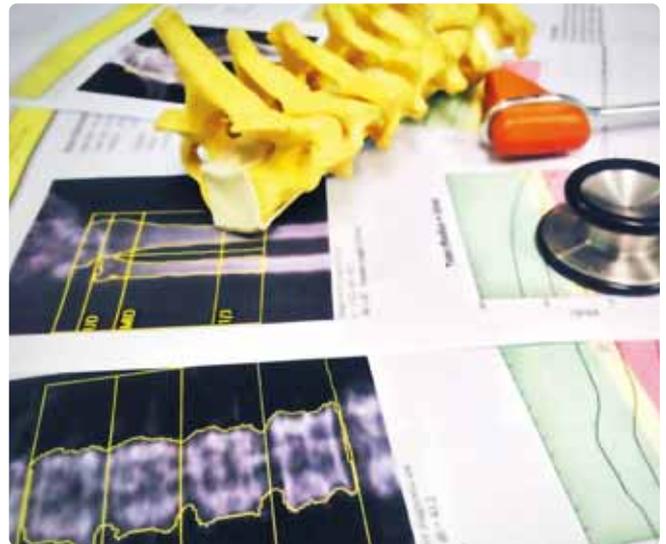
**45 mg of vitamin K2 (MK4)**

**700 mg of calcium\***

**1,000 IU of vitamin D3**

(plus nutrients like magnesium and boron)

\* This dose assumes daily calcium **dietary** intake of 300-500 milligrams. A man may require less supplemental calcium, but aging **men** need **skeletal-support** nutrients that include **calcium**.



Many readers obtain additional vitamin D3, zinc, boron, and magnesium from their nutrient formulas.

Those who take this new approach to restoring lost **bone mass** may not require any other vitamin K supplement. That is because this **45 mg** potency of **vitamin K2** is likely to provide **superior** protection against **calcification** of arteries, soft tissues, and heart valves, along with restoration of **bone mass**.

## Conclusion

The magnitude and prevalence of **age-related** bone loss is underappreciated.

**Osteopenia** and **osteoporosis** are worsened by poor lifestyle choices (like excess alcohol) and drugs like stomach-acid blocking drugs that impede **calcium absorption**.

If *high-dose* **vitamin K2** is widely adopted in the United States, it could **reverse** the surging epidemic of **bone loss** and crippling **fractures** occurring in men and women over **age 50**.

This is of even greater importance to people like myself who intentionally reduce their overall calorie intake, and thus ingest less dietary calcium.

In this special edition, you'll learn how easy it is to boost your **vitamin K2** intake.

For longer life,

William Faloon

## Note to Warfarin (Coumadin®) Users

Human studies validate the **safety** of high-dose vitamin K2 (MK4) in people not taking warfarin.<sup>20</sup>

Warfarin is a powerful anti-coagulant drug that functions as a vitamin K antagonist.

Warfarin users are told to avoid vitamin K foods and supplements. A side effect of warfarin is accelerated bone loss caused by lack of vitamin K.

If you are using warfarin, consider asking your doctor about newer anti-coagulant drugs (Pradaxa®, Eliquis®, Xarelto®) that do not function by antagonizing vitamin K.

Use of these newer anti-coagulant drugs can enable you to benefit with vitamin K and still obtain needed anti-coagulant effects.

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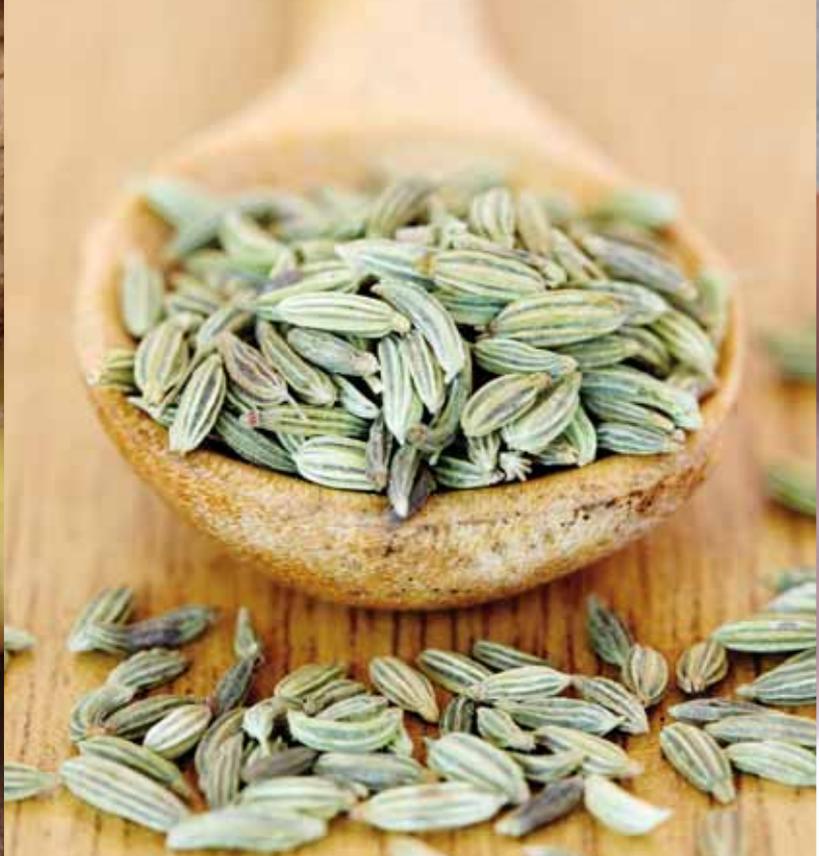
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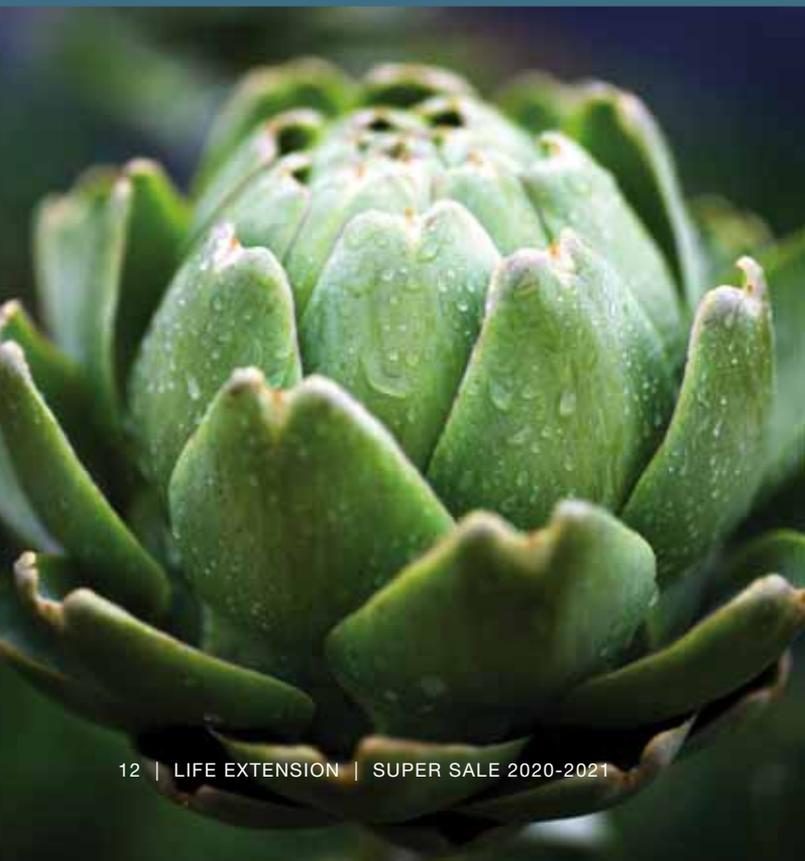
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# Thwart POST-MEAL Bloating and Indigestion

BY MICHAEL DOWNEY





As people age, they often experience bloating, gas, or nausea before they even finish a meal.

It's more common than most people realize.

Up to **30%** of people suffer from after-meal **bloating**, that uncomfortable feeling that your belly is swollen.<sup>1-3</sup>

Even when small meals are consumed, after-meal **bloating** remains a widespread problem.

Scientists have identified four **plant extracts** that target *underlying causes* of gastrointestinal discomforts.

In one human trial, more than **63%** of the subjects taking an **artichoke-ginger** blend experienced significantly reduced feelings of bloating, gassiness, nausea, and other symptoms of indigestion.<sup>4</sup>

A **fennel-curcumin combination** relieved symptoms of **irritable bowel syndrome**, including bloating and stomach pain, by more than **50%**, and *completely prevented all symptoms* in **25.9%** of users.<sup>5</sup>

Taken together, these nutrients promise to relieve post-meal distress and improve quality of life.

## The Causes of Bloating

**Bloating** is one of the most commonly reported gastrointestinal symptoms. It's characterized by a feeling of excessive fullness, trapped gas, distension, and abdominal pressure and pain.<sup>2</sup>

No treatment has proven consistently effective,<sup>2</sup> and drugs may have serious side effects.

**Propulsid®** was a drug frequently prescribed to alleviate bloating. But it *caused* abdominal pain, indigestion, gas, and nausea.<sup>6</sup> It was removed from the U.S. market after it was associated with heart rhythm abnormalities.<sup>7</sup>

Two of the **underlying causes** of after-meal bloating are slow **gastric motility** and excess **gas production**.

When **gastric motility** slows, the ability of the stomach muscles to move food through the digestive tract is impaired.

## Artichoke and Ginger

**Indigestion** in the upper abdominal region is described as bloating or gassiness, a burning sensation, nausea, or feeling too full too quickly after starting to eat.

About **40%** of patients have abnormally **delayed gastric emptying**, which means food simply sits in the stomach longer than it should.

**Prokinetic** drugs *accelerate* gastric emptying. They are often used to treat indigestion. But like Propulsid®, they have side effects.<sup>8</sup>

Fortunately, there are specific **nutrients** used for centuries that safely facilitate **gastric emptying**.



Researchers first focused on **artichoke leaf** and **ginger root**, which have long been used in traditional medicine to treat indigestion.<sup>8-10</sup>

**Ginger** has been shown in animal and human studies to promote **gastric motility**.<sup>4,8,10</sup>

**Artichoke** promotes **bile acid** secretion from the liver. Bile acid secretion is essential for *accelerating* gastrointestinal transit.

Artichoke is also an **antispasmodic**, which means it suppresses gut spasms or cramping. This also helps speed the movement of food through the digestive tract.<sup>4,8,10</sup>

Scientists decided to combine **ginger** and **artichoke extracts** to test their effects on bloating.<sup>4,11</sup>

## Human Trials

Researchers created a blend of **100 mg** of **artichoke leaf extract** and **20 mg** of **ginger root extract**.<sup>4,11</sup>

They tested it on 126 healthy men and women, aged 18-70, who had **functional dyspepsia** (indigestion).

This was defined as having had complaints of *early satiety* (fullness), *postprandial fullness* (feeling *too full* after eating), bloating, or nausea for at least three months during the last year, without a known structural or biochemical cause.<sup>4</sup>

In a randomized, double-blind, placebo-controlled study, two groups took either **120 mg** of the **artichoke-ginger blend** or a **placebo** twice daily. Patients rated the severity of each of six dyspeptic symptoms: fullness, bloating, early satiety, nausea, vomiting, and upper abdominal pain.

In 14 days, **44.6%** of participants taking the **artichoke-ginger blend** had a marked (clinically significant) **improvement** in digestive symptoms, compared to **13.1%** of the placebo users.

After **four weeks**, **63.1%** of the **artichoke-ginger** group had a **marked** symptom improvement, while only **24.6%** showed improvement in the **placebo** group. No adverse effects were reported.<sup>4</sup>

In another study, scientists used ultrasound to measure the size of the stomach area of 11 healthy men and women, aged 20-60, both before and after a standardized meal.<sup>11</sup>

When the **artichoke-ginger blend** was taken, subjects had a significantly *smaller* stomach area than when the placebo was taken. This indicates that the **artichoke-ginger** blend works by encouraging **enhanced gastric emptying**.<sup>11</sup>



## Fennel Seed and Curcumin Relieve Pain and Gas

Two other nutrients have been used to aid digestion: **fennel** and **curcumin**.

Seeds from **fennel**, a plant known for its licorice flavor, have long been consumed after meals to promote digestion and prevent flatulence.<sup>12</sup>

Studies show that fennel **reduces gas production** by inhibiting the activity of a methane-producing bacterial enzyme.<sup>13</sup>

In addition, clinical trials have shown that fennel seeds, tea, and seed oil promote **gastrointestinal stimulation**, improving gastric motility.<sup>5,14,15</sup>

Like artichoke, fennel also has an **antispasmodic** effect, reducing irregular muscle contractions that impair normal gut motility.<sup>5</sup>

Researchers combined fennel seed oil and a low-dose curcumin in a clinical trial to test their effect on bloating and abdominal pain.<sup>5</sup>

### Clinically Effective

Scientists enlisted 121 male and female volunteers, aged 18-60, who suffered from **irritable bowel syndrome** (IBS) for a randomized, double-blind, placebo-controlled trial.<sup>5</sup> IBS is a chronic disorder characterized by abdominal pain, bloating, and abnormal bowel movements in the absence of identifiable cause.

Participants took a capsule twice daily that contained either a placebo or a combination of **25 mg** of **fennel seed oil** and **42 mg** of **curcumin**.

## WHAT YOU NEED TO KNOW

### Relief for Post-Meal Problems

- **Bloating** is one of the most common gastrointestinal symptoms, marked by a feeling of excessive fullness, gas, and abdominal pressure and pain.
- Scientists have identified **four clinically effective** compounds that target the *underlying causes* of bloating before it occurs.
- A blend of **artichoke leaf** and **ginger root** extracts relieves symptoms of **dyspepsia** (indigestion), including bloating, nausea, vomiting, and upper abdominal pain.
- A mix of **fennel seed oil** and curcumin decreases bloating, abdominal pain, and other severe symptoms of **irritable bowel syndrome**.
- Taken together, **ginger root**, **artichoke leaf**, **fennel seed oil**, and **curcumin** may help prevent or significantly reduce gastrointestinal distress, and improve quality of life.

Researchers **combined** low-dose curcumin with fennel seed oil to reduce assorted symptoms of bloating. The curcumin was added to reduce inflammation in the gut. Fennel seed oil was used for its antispasmodic properties.

When these two compounds were used **together**, researchers found reduced abdominal pain and abdominal distention in study subjects.

After 30 days, those taking the **fennel-curcumin** mix reported an average **50.05%** decrease in bloating, abdominal pain, and other IBS symptoms, nearly double the **26.12%** decrease in the **placebo** group.<sup>5</sup>

All symptoms were improved by treatment. Among those taking the **fennel-curcumin** mix, **25.9%** became **completely symptom-free**, compared to **6.8%** of **placebo** users.

The treated group also reported significant improvement in quality of life, with no adverse effects.

Taken together with **ginger root** and **artichoke leaf**, this **fennel-curcumin** combination may significantly improve or even *prevent* after-meal bloating, gas, and abdominal pain, providing a solution to a problem many people thought they just had to live with.

## Summary

Up to **30%** of people complain of **bloating** after eating, which is often accompanied by gas, abdominal pressure and pain, and reduced quality of life.

Scientists have identified four compounds that target the underlying causes of this discomfort, which are slow **gastrointestinal motility** (movement) and excess **gas production**.

**Ginger root, artichoke leaf, fennel seed oil, and curcumin** have been shown to target these causes.

In clinical trials, they significantly reduce bloating, gas, feelings of excessive fullness, stomach distension, abdominal pain and discomfort. •

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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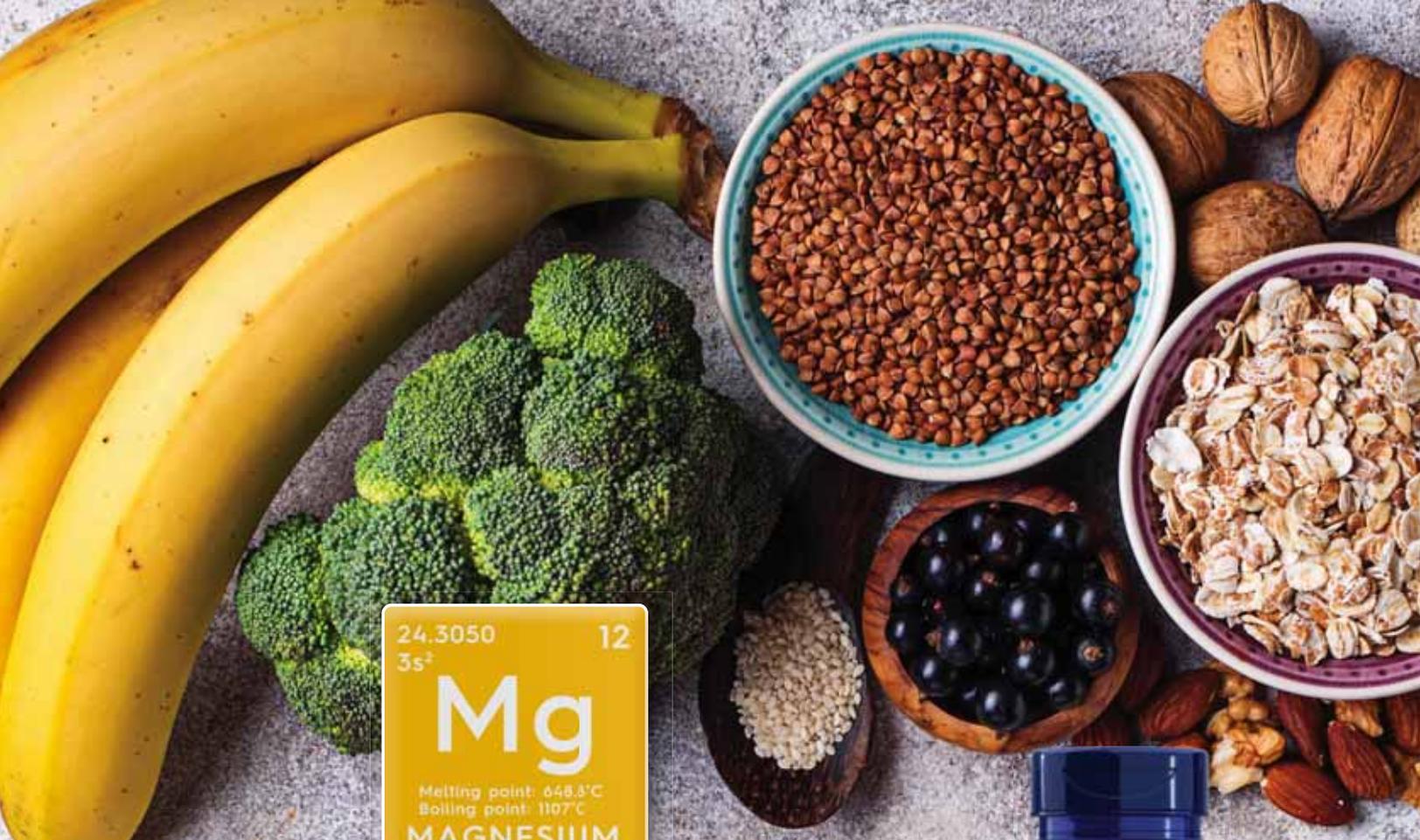


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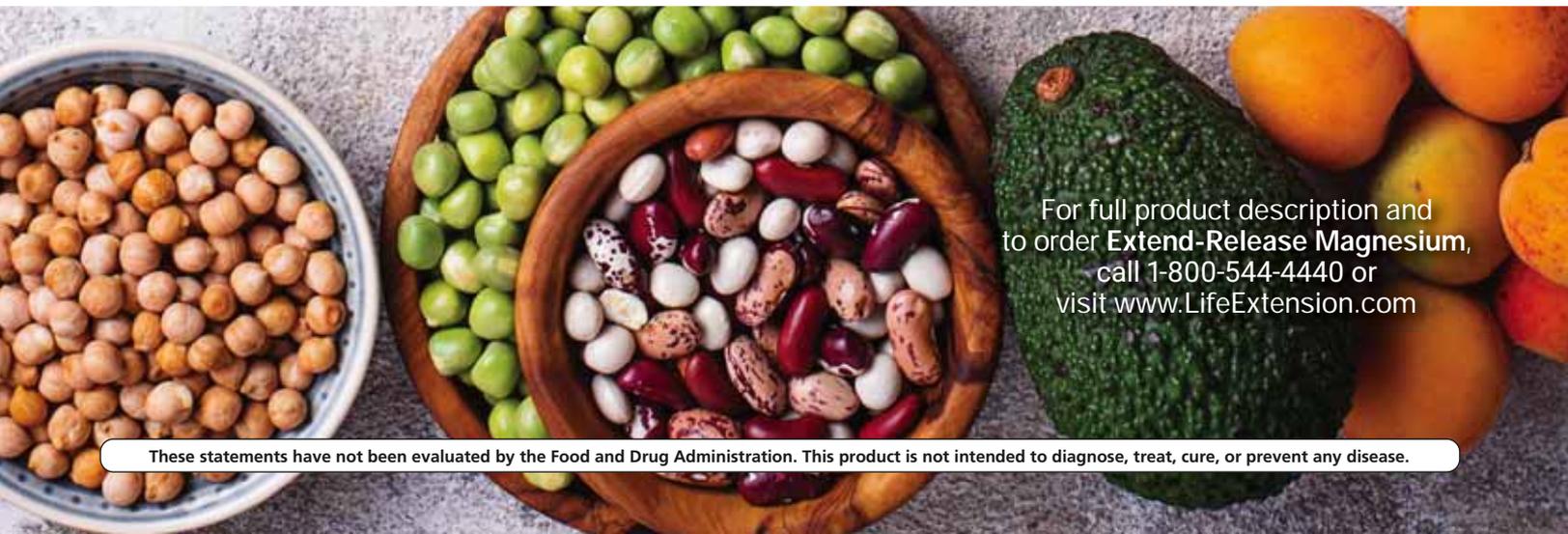
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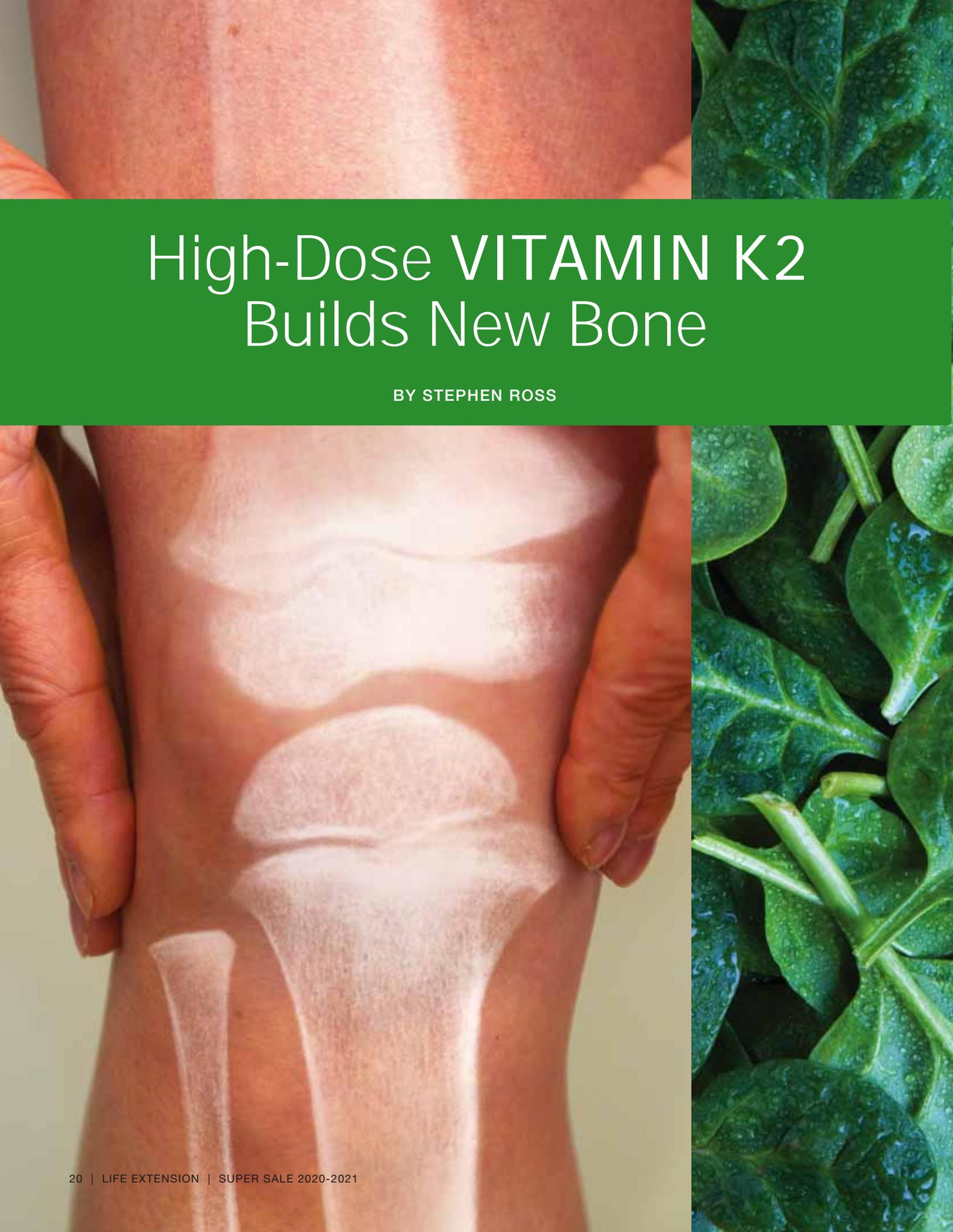


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# High-Dose VITAMIN K2 Builds New Bone

BY STEPHEN ROSS



With age, our bones get thinner and weaker.

This leads to increased **fractures** that are leading causes of disability as people age past **50 years**.<sup>1</sup>

The numbers are chilling. Within a year of suffering a hip fracture, up to **20%** of patients will die.<sup>1</sup> And almost *any* kind of broken bone increases the risk of death in older people.<sup>2</sup>

Physicians in **Japan** discovered a way to help prevent **bone loss** and protect against **fractures**.

For more than two decades they have been prescribing a **high-dose vitamin K2** in the form of **menaquinone-4** or **MK4**.<sup>3</sup>

This high-dose vitamin K, used as a **prescription drug** in Japan, is now available as a **dietary supplement**.

Vitamin K is found in small amounts in many foods and over-the-counter formulas. But at the **high dose** of **45 mg**, it has a profound impact, helping to:<sup>4-11</sup>

- Slow bone loss,
- Build *new* bone, and
- Reduce fracture risk.

In a two-year study on older people with **osteoporosis**, high-dose vitamin K2 cut the number suffering a vertebral **fracture** by **half**.<sup>11</sup>

Along with other nutrients known to support bone strength, **vitamin K2** plays an essential role in maintaining and helping to restore **bone density**.

## What Causes Bone Loss?

To maintain **structure**, old bone is constantly being broken down, and new bone is being built up.

For the first decades of life, **bone density** (how tightly bones are packed with minerals) increases. Peak bone density and bone strength then plateau for about two decades.

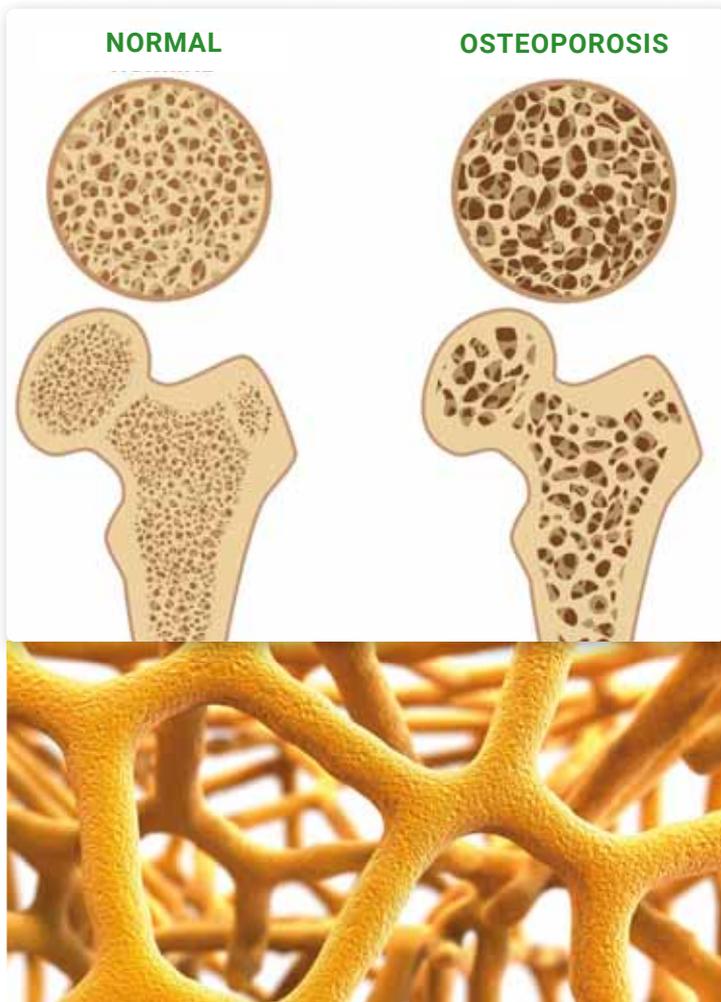
By age 40, bone density starts to fall and continues to decline into old age. In women, the speed of bone loss accelerates with the onset of **menopause**.

That *drop* in bone-mineral density leads to a *reduction* in bone strength. Bones become brittle and prone to **fractures**, even from minor injuries (or **stress fractures** that occur during normal use).

The early stage of bones weakening is called **osteopenia**.

As **bone density** continues to drop, **osteoporosis** develops, which means “*bone full of pores or holes.*”

Most people don't know they have **osteopenia** or **osteoporosis** until it's too late—when they suffer a **fracture**.



## High Doses of Vitamin K2

The encouraging news is there *is* something we can do about age-related bone loss and risk of fractures.

**Vitamin K2** has been used to treat **osteoporosis** in Japan for decades.<sup>3</sup>

Research has confirmed that this specific form of vitamin K is critical for bone health and other aspects of healthy aging.

In low doses (60 mcg), vitamin K promotes normal blood clotting. This small amount of vitamin K is normally obtained from dietary sources.

Beginning in **1999**, scientists at **Life Extension®** recognized that *higher* doses of vitamin K can better keep **calcium in bones** and help prevent **calcification** of soft tissues such as heart valves, arteries, and brain cells.

As data accumulated over the past **21 years**, the suggested daily dose of vitamin K steadily increased to over **2,000 mcg**, which is far *higher* than the tiny amount needed for normal blood coagulation.

## Vitamin K2 Safety Profile

What's interesting is how vitamin K functions to enable normal coagulation.

Once low doses activate **coagulation proteins** in the liver, then no matter how much more vitamin K is ingested, there is no excess coagulation/clotting risk. That's because when coagulation proteins are fully saturated with vitamin K, they cannot take up more vitamin K to cause greater coagulation potential.

With this understanding, the opportunity to use far **higher** vitamin K doses to build strong bones became an enticing reality.

So much so that Japanese doctors began prescribing **45,000 mcg** of **vitamin K2** and have verified profound improvements in bone health in older adults.<sup>3</sup>

## Building New Bone

**Bone density** is influenced by two types of bone cells: **osteoclasts** and **osteoblasts**.

**Osteoclasts** break down old bone. **Osteoblasts** build new bone.

Healthy bone relies on a balance of activity between these two types of cells. They constantly remodel **bone structure** while keeping **bone density** stable.

As we age, this balance is lost. **Osteoclast** activity outweighs **osteoblast** activity. As a result, bone is broken down faster than new bone can be built up. As bone density drops, **osteopenia** and **osteoporosis** manifest.



**Vitamin K2** appears to restore healthy balance. In preclinical studies, it promotes an increase in bone-building **osteoblast** activity and *reduces* **osteoclast** activity.<sup>12,13</sup> With this balance restored, more bone is built, less is destroyed, and **bone mineral density** is maintained or even *increased*.

In addition, in order to lay down new bone, osteoblasts need a protein called **osteocalcin**. This protein binds to **calcium**, helping osteoblasts turn calcium into healthy new bone.<sup>13</sup> Vitamin K2 helps convert osteocalcin into its *active* form.<sup>13,14</sup>

## WHAT YOU NEED TO KNOW

### Prevent Fractures with Vitamin K2

- Bone loss begins to occur in our 40s and progresses with advancing age.
- This weakening of bone can lead to osteoporosis and greatly increased risk of fractures, which can cause disability and dramatically increase risk of death.
- High-dose vitamin K2 has been used as a treatment for osteoporosis in Japan for decades.
- Vitamin K2 acts by several mechanisms to improve bone health in preclinical studies, including restoring balance to the process of bone breakdown and formation.
- Human trials have shown that daily intake of 45 mg (45,000 micrograms) of vitamin K2 maintains or increases bone density and reduces the risk of fractures.
- Other nutrients, including calcium and vitamin D3, also support bone health and help maximize vitamin K2's benefits.

## Keeping Bones Strong

Human trials have tested the benefits of vitamin K2 on bone health.<sup>4-11</sup>

The results show that **high-dose** vitamin K2:

- Increases **active osteocalcin** levels required for new bone formation, and
- Maintains or increases **bone mineral density**.

Many of these studies have been performed in older people with **osteoporosis**. Even those already at this advanced level of bone loss benefit from oral **vitamin K2**.

One example comes from researchers in Japan.<sup>11</sup> They enrolled older individuals in a study who all had a diagnosis of **osteoporosis**. Patients were randomized to receive either **calcium** alone or calcium plus **45 mg** of **vitamin K2** daily.

Over the course of the two-year study, subjects who received *only* **calcium** continued to lose **bone density**, dropping by about **3%**.

A **10%** drop in bone density more than **doubles** the risk for **fractures** of the vertebra (the bones making up the spine) and hip.<sup>15</sup> This means that those treated only with **calcium** in this study (who lost **3%** of bone density) increased their risk of **fracture**.

### Vitamin K2 and Bisphosphonates

The **bisphosphonates** are a group of drugs prescribed to slow bone loss in osteoporosis. They include medications such as **alendronate**, **risedronate**, and others.

Research shows that vitamin K2 does *not* interfere with bisphosphonates and can safely be used at the same time. There are even some data to suggest that they may have an **additive** effect, protecting bone density better together than either one alone.<sup>28</sup>

On the other hand, people receiving **high-dose vitamin K2** in addition to **calcium** largely maintained their bone mineral density. They also benefited from a significant *increase* in levels of **active osteocalcin**.

## Reducing Fracture Risk

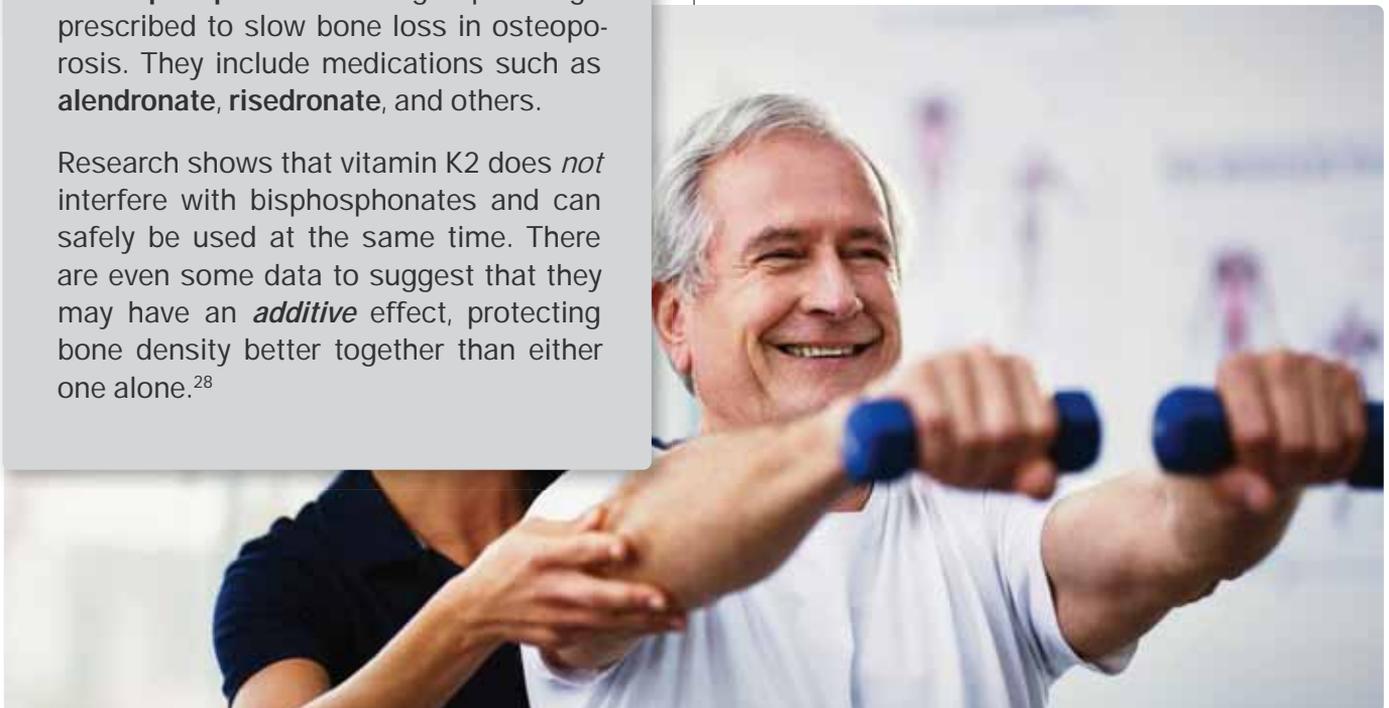
The scale of osteoporosis and related fractures is staggering.

Worldwide, as many as **one-third** of women and **one-fifth** of men over **age 50** will suffer an **osteoporotic fracture**.<sup>1</sup> And after suffering one fracture, the risk of future fractures increases by a whopping **86%**.<sup>1</sup>

Fractures of the **hip** and **vertebra** in particular are associated with pain, loss of mobility, and risk of death.<sup>1</sup> For example, people who suffer a **vertebral fracture** have an **8-fold** increase in mortality compared to other individuals their age.<sup>1</sup>

In the Japanese study on older people with osteoporosis, **30%** of those receiving only calcium suffered vertebral fractures during the two years of the study. But only **14%** of those also receiving high-dose **vitamin K2 + calcium** had a vertebral fracture.<sup>11</sup> (These study subjects did not receive supplements like **vitamin D** and **magnesium**, also needed to protect aging bones.)

Another Japanese clinical trial found that **45 mg** of vitamin K2 daily maintained bone mineral density and reduced the risk of fractures.<sup>6</sup>



## Nutrients That Work *with* Vitamin K2

As in all aspects of health, no one nutrient is enough on its own. Vitamin K works with other **nutrients** to form healthy bone.

The following nutrients have been shown to keep **bone-density** levels up and to maximize the benefits of vitamin K2:

- **Calcium** is the major mineral that forms the hard, strong matrix of bone. Adequate calcium is needed so that osteoblasts have it readily available to build bone tissue.
- **Vitamin D** helps absorb calcium from the gut after a meal and stimulate the production of the protein osteocalcin, needed to form new bone.<sup>14</sup>
- **Magnesium**, like calcium, makes up the mineral matrix of bone. Adequate levels are needed to maintain healthy bone density.<sup>16</sup>
- **Zinc, Manganese, Silicon, and Boron.** These minerals have been shown to be important for optimal bone formation and health. *Low* intake of each of these minerals is associated with bone *loss*, and increased intake improves bone health in animal models and in humans.<sup>17-27</sup>

Taken together with high doses of vitamin K2, these nutrients protect against bone loss and fractures.

## Summary

As our bones become thinner and weaker with age, the risk of dangerous and life-threatening **fractures** increases.

**High-dose vitamin K2** has been used to treat the bone disease **osteoporosis** for decades in Japan.

Clinical trials demonstrate that daily intake of **45 mg** of vitamin K2 maintains or increases bone-mineral density and reduces the **risk of fractures**.

Along with other vitamins and minerals crucial for bone health, vitamin K2 is a powerful tool to help build stronger, healthier bones well into old age. •

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



## Cardiovascular Disease Benefits

Vitamin K2 promotes new bone growth in part by increasing **calcification**, the buildup of calcium deposits, in the bone.

However, in soft tissues, calcification can be extremely dangerous. In blood vessels, it leads to the buildup of atherosclerotic plaques associated with **cardiovascular disease**.

Remarkably, research has shown that while vitamin K2 causes beneficial calcification in bones, it *prevents* harmful calcification in soft tissues, including blood vessels.<sup>29,30</sup> This occurs because it activates matrix Gla protein, which *inhibits* **calcification** of blood vessels.

For this reason, vitamin K2 may be protective against cardiovascular disease.<sup>31</sup>

In addition, while **vitamin K1** is used to help blood clot in response to blood vessel injury, vitamin K2 has not shown any impact on clotting or **coagulation**.<sup>32</sup> Still, anyone taking warfarin, a powerful anticoagulant, should consult a physician before deciding to take any form of vitamin K.

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3. Cyanidin-3-glucoside to assist with night vision.<sup>6-8</sup>
4. Astaxanthin for comprehensive eye health support and to fight eye fatigue.<sup>9</sup>
5. Saffron to help support vision, based on study subjects seeing an average of two additional lines on eye chart used by doctors to test vision.<sup>1</sup>



**SUPER SALE PRICE**

**Item #01993 • 60 softgels**

1 bottle **\$29.70** • 4 bottles \$27 each

Each bottle lasts for two months.

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

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- **1,000 IU** of **vitamin D3**
- Key minerals: **magnesium, boron, zinc, silicon, and manganese**

*High potency for  
strong bones.*



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## SUPER SALE PRICE

**Item #02416 • 120 capsules**

1 bottle **\$31.05** • 4 bottles \$28.35 each

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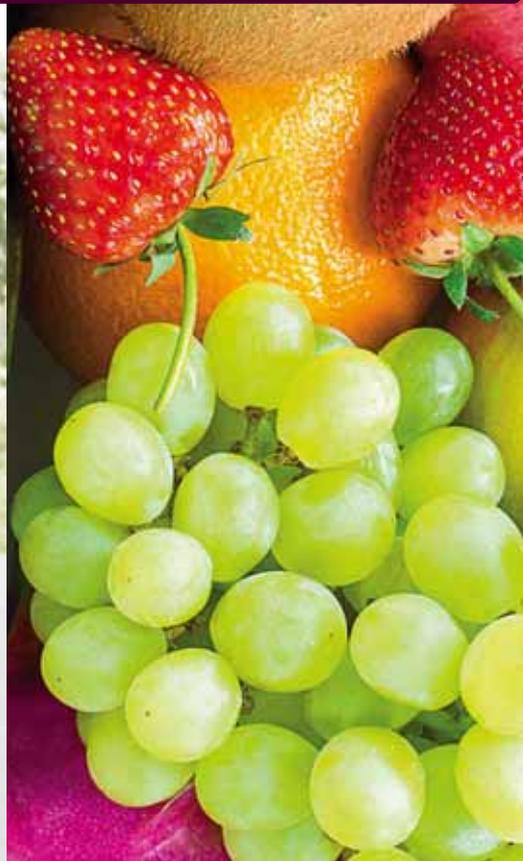


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# FISETIN: A Longevity Senolytic

BY ZACH WHITE





For decades, scientists have searched for compounds that can slow degenerative aging processes.

A recent focus is a plant extract called **fisetin**.

Found in strawberries, apples, and other plants, **fisetin** has a range of benefits that may increase **longevity**.<sup>1,2</sup>

Fisetin has been shown to:

- Function as a **senolytic**, clearing away dysfunctional senescent cells and allowing healthy cells to thrive,<sup>3</sup>
- Protect the **brain** in various models of neurodegenerative disorders,<sup>2,4-9</sup>
- Improve outcomes in people who have suffered **strokes**,<sup>10</sup>
- Help prevent **malignant** changes in cells,<sup>11-14</sup> and
- Help fight **obesity** and **type II diabetes**.<sup>15-17</sup>

Several human trials are currently underway.

The challenge up until now was that **fisetin** is converted to an *inactive* form in the digestive tract. This means very little is **absorbed** into the blood stream.

For the first time, scientists have developed a low-cost method to increase **absorption** up to **25 times higher**,<sup>18</sup> thus enabling **fisetin** to be distributed throughout the body.

## What Is Fisetin?

**Fisetin**, a flavonoid, is found in various fruits and vegetables including strawberries, apples, persimmons, grapes, and onions.

Its benefits overlap with some other flavonoids, including green tea catechins and quercetin. But it has its own unique set of biological properties.

Most notably, a recent study found **fisetin** to be the **most potent senolytic** compound among a group of flavonoids that were tested.<sup>3</sup> Senolytics are at the center of today’s anti-aging research.

## Fisetin Extends Lifespan

When cells become old or dysfunctional, they’re supposed to die off to make room for new cells. But as we age, many cells become **senescent** instead.

What this means is that these cells lose their ability to divide or perform basic functions and refuse to die. Some scientists refer to senescent cells as “zombie cells.”

Senescent cells don’t just linger around. They pump out toxic compounds that degrade nearby cells and incite **chronic inflammation** that causes systemic damage.<sup>19</sup>

**Cellular senescence** has become a major target for anti-aging research. Preclinical studies indicate that compounds called **senolytics** remove senescent cells and can slow or even reverse aging processes.<sup>3,20-22</sup>

Recent research has found that fisetin is an exceptionally powerful **senolytic**. When compared to other plant compounds, including quercetin, **fisetin** was **the most effective** at removing senescent cells, both in cell culture and in mice.<sup>3</sup>



The effects are dramatic. Mice given fisetin lived an average of about 2.5 months longer, an almost **10% extension of lifespan**—even when treatment was started at the **human equivalent of 75 years of age**.<sup>3</sup>

The **Mayo Clinic** has begun clinical trials to study the ability of fisetin to reduce senescent cell burden in aging humans.<sup>23</sup>

## Anti-Aging Properties

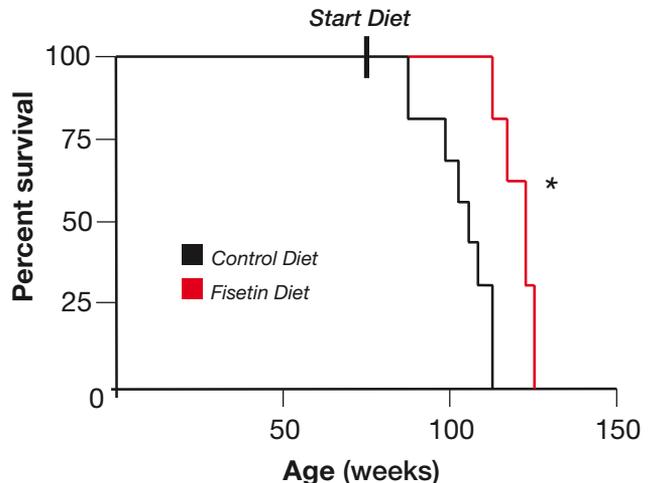
**Sirtuin** proteins are another anti-aging target.<sup>24,25</sup> These cellular protectors are found in all cells in the body, and are vital for keeping cells performing at peak level.

Sirtuin function tends to **diminish** with age. But fisetin **activates sirtuin** function in cells, countering this decline.<sup>26-30</sup> In various animal models, sirtuin activation has been shown to **extend lifespan** significantly.<sup>24,25,31,32</sup>

Fisetin may protect against aging in other ways:

- It reduces **inflammation**, a driver of many chronic illnesses and even of aging itself.<sup>2</sup>
- It mimics some of the effects of a **calorie-restricted diet**, which has been shown to boost resistance to disease and increase lifespan.<sup>1,2,29,34</sup>
- It helps prevent **oxidative damage** that leads to accelerated aging and degenerative disease.<sup>33</sup>

**Longer lifespan in old mice with fisetin supplementation.**



Mice given **fisetin** by itself lived an average of **10% longer** even when treatment was started at the human equivalent of 75 years of age.<sup>3</sup>



## Preventing Obesity and Diabetes

**Obesity** leads to a skyrocketing risk of metabolic disorders such as **type II diabetes**. It also increases the risk for cardiovascular disease, cancer, dementia, and many other disorders.

Preclinical studies show that fisetin appears to act as a kind of “**metabolism control switch**,” reducing **fat cell** accumulation and suppressing activation of the protein **mTOR**, which is linked to weight gain. In mice fed a high-fat diet, fisetin *prevented* increase in body weight and accumulation of harmful white fat tissue.<sup>15</sup>

Fisetin also helped fight fat accumulation in the livers of animals fed a high-fat diet, a common occurrence with metabolic disease that can compromise liver function and lead to **fatty liver disease**.<sup>35-38</sup>

## WHAT YOU NEED TO KNOW

### Fisetin Promotes Healthy Longevity

- Fisetin is a compound found in several fruits and vegetables, including strawberries, apples, grapes, and onions.
- Fisetin is the *most potent senolytic compound* found among a panel of flavonoids, selectively removing **senescent cells** and **extending longevity** in animal studies.
- This flavonoid has also been shown in preclinical studies to help protect against cancer, type II diabetes, and obesity, and in a human study to improve outcomes in stroke victims.
- Taken orally, pure fisetin is converted to an inactive form in the body. But scientists have discovered that combining it with **galactomannans** from fenugreek prevents that from happening.
- A new formulation boosts the bioavailability of fisetin by **25 times**, allowing more of it to circulate throughout the body, promoting health and supporting longevity.

Fisetin may provide benefits for those already suffering from **type II diabetes**.

In rodent models of diabetes, fisetin lowers body weight and leads to improved **glucose control** with lower hemoglobin **A1c** levels, a marker of blood sugar regulation over time.<sup>16,17</sup>

Poorly controlled **diabetes** often causes disabling or life-threatening complications throughout the body. In mice, fisetin significantly **reduces the severity of diabetic complications**, including slowing the progression of cataracts, preventing kidney damage, and improving kidney function.<sup>16,39</sup>

A human trial of fisetin's ability to protect **kidney** function, particularly in diabetes patients, is currently underway.<sup>40</sup>

### Brain Benefits

People who suffer from a **stroke** are often treated with medication to dissolve the clot blocking blood flow to the brain. This can save a patient's life, prevent damage to the brain, and even reverse the symptoms of stroke in some patients.

But ER doctors are working against the clock when treating acute (ischemic) stroke. The best chances of success occur when treatment begins within **three**

**hours** of the onset of symptoms.<sup>41</sup> Many people suffering a stroke are treated too late and suffer permanent neurological injury (and paralysis).

A recent study shows that *combining* clot-dissolving medication with **fisetin** significantly extends the treatment window.<sup>10</sup>

Patients receiving fisetin in addition to usual treatment up to **five hours** after a stroke had neurological outcomes as good as those treated within **three hours**. This extension of the therapeutic window means that many stroke victims who would otherwise suffer permanent loss of brain function have a better chance of recovery.

Fisetin has also shown **neuroprotective** benefits in animal models of Alzheimer's disease, Parkinson's disease, ALS (amyotrophic lateral sclerosis), and other brain pathologies, reducing the severity of disease and improving cognitive function.<sup>2,4-9</sup>

### Fighting Cancer

Fisetin has shown potential in preventing cancer and limiting the growth and spread of existing tumors in preclinical studies. Among its **anti-cancer** properties:

- Fisetin induces **apoptosis**, or programmed cell death, in cancer, which can facilitate removal of tumor cells.<sup>47-50</sup>
- As an **anti-inflammatory**, fisetin reduces compounds that contribute to chronic inflammation and cancer progression.<sup>42-45</sup> In a study of patients with colorectal cancer, fisetin reduced levels of pro-inflammatory mediators.<sup>46</sup>
- Fisetin enhances **autophagy**,<sup>51</sup> cellular housekeeping that keeps cells functioning normally. Enhanced autophagy can *inhibit* cancer cell survival.
- Fisetin helps prevent **angiogenesis**, the formation of new blood vessels, in cancer, starving tumor cells of oxygen and glucose.<sup>52,53</sup>
- Fisetin helps prevent **oxidative** damage which can contribute to DNA mutations and cancer development.<sup>42,43</sup>
- Fisetin may inhibit cancer cell migration and **metastasis**, the spread of cancer to a different part of the body.<sup>54</sup>





### Improved Bioavailability

In its pure form taken orally, there's a problem with fisetin: Once it reaches the gut, *enzymes* in the body rapidly modify it into a form which is **inactive** and all but useless.

Scientists have discovered a way around this problem. By combining it with natural compounds called **galactomannans** isolated from the herb **fenugreek**, fisetin is protected from being modified in the intestinal tract. It remains active and can be readily **absorbed** into the bloodstream.

In a recently conducted study, researchers found that the newly formulated **fisetin-galactomannan** combination, using a patented green technology, increases bioavailability (how much is absorbed and circulates) in people by **25 times**.<sup>18</sup>

This opens a brand-new door in enabling aging people to derive meaningful benefits by supplementing with a low-cost nutrient.

### Summary

**Fisetin** is a compound found in many plants, including strawberries and apples.

It is the **most effective senolytic** compared to a panel of flavonoids, removing aged, dysfunctional **senescent cells** in preclinical studies. This may help improve function in older age, shield against chronic disease, and increase healthy longevity.

In mice, fisetin alone extended lifespan by approximately **10%**.

Extensive research also demonstrates the potential of fisetin to help protect against cancer, stroke, obesity, type II diabetes, and other metabolic disorders.

A new fisetin formula compounds it with **fenugreek**, which protects it from inactivation in the gut. This allows more fisetin to be **absorbed** and distributed throughout the body for systemic benefits. •

*(Turn page to review options for using fisetin as a senolytic and to view references.)*



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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(Additional references on page 40.)

## OPTIONS TO REMOVE SENESCENT CELLS

Most of you are reducing your senescent cell burden by:

- Two-day-a-week fasting (not eating 2 days each week) or time-restricted eating (fasting 16-18 hours most days) and/or some other form of dietary restriction,
- Several times a year dosing using dasatinib + quercetin and/or,
- Weekly dosing using black tea theaflavins + quercetin + apigenin.

Fisetin is arguably one of the most focused, targeted senolytic agents, based upon current science. For the first time, people can obtain it in **bioavailable form** as opposed to taking over 1,400 mg a day of fisetin by itself and hoping enough is **absorbed** into your bloodstream.

For those who want to continue with a **weekly** senolytic program, taking seven capsules once-a-week of **bioavailable fisetin** along with a **black tea theaflavins + quercetin + apigenin** formula is an option.

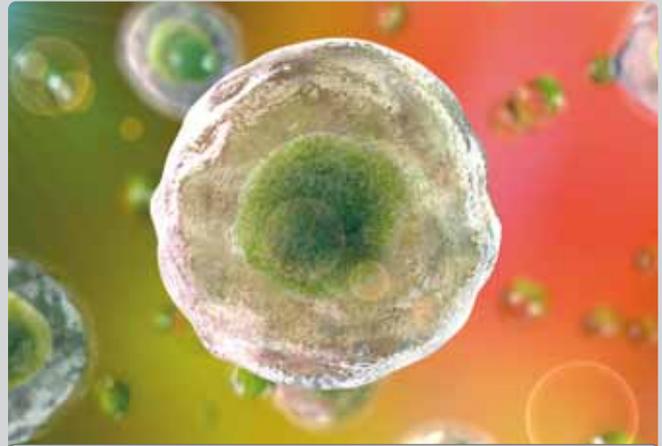
Alternatively, you may also take the bioavailable **fisetin** dose **daily** for its other benefits and continue with weekly **black tea theaflavins + quercetin + apigenin**.

There is potential benefit to daily senolytic as this is how it happens in younger people with strong immune systems that constantly remove senescent cells.<sup>55</sup>

Studies are planned for using bioavailable fisetin on differing dosing schedules to ascertain the ideal protocol to removing senescent cells and reducing the “senescent associated secretory phenotype” (SASPs).

While the longevity data on **dasatinib** are compelling, some people experience mild flu symptoms or GI upsets, whereas **fisetin** does not cause these unpleasant side effects.

We look forward to results from human trials to identify the optimal senolytic protocol for aging persons to follow. This may involve several senolytic compounds based on individual response rates as measured by the “senescent associated secretory phenotype,” skin punch measures of senescent fibroblast cells, or other senolytic measuring methods being explored.



### Highlights from Recent Study

- **Senescent cell production rate increases with age** due to accumulation of mutations, telomere damage, other factors triggering cell senescence.
- **Senescent cells catalyze their own production** by paracrine and bystander effects.
- **Senescent cell removal decreases with age** due to decline in immune surveillance functions.
- **Senescent cells reduce their own removal rate.**

Karin O, Agrawal A, Porat Z, et al. Senescent cell turnover slows with age providing an explanation for the Gompertz law. Nat Commun. 2019 Dec 2;10(1):5495.

### Senescent Cell Removal Declines with Aging

Senescent cells turn over in **five days** in 3-month-old mice but take **25 days** in 22-month-old mice. This model predicts a vicious cycle where senescent cells accumulate faster and are degraded slower.

At the point of **30% senescent cell load** animals often appear to reach tipping point **resulting in death**.

*“Our results suggest that treatments that remove senescent cells can therefore have a double benefit: an immediate benefit from a reduced senescent cell load, and a longer term benefit from increased senescent cells removal.”*

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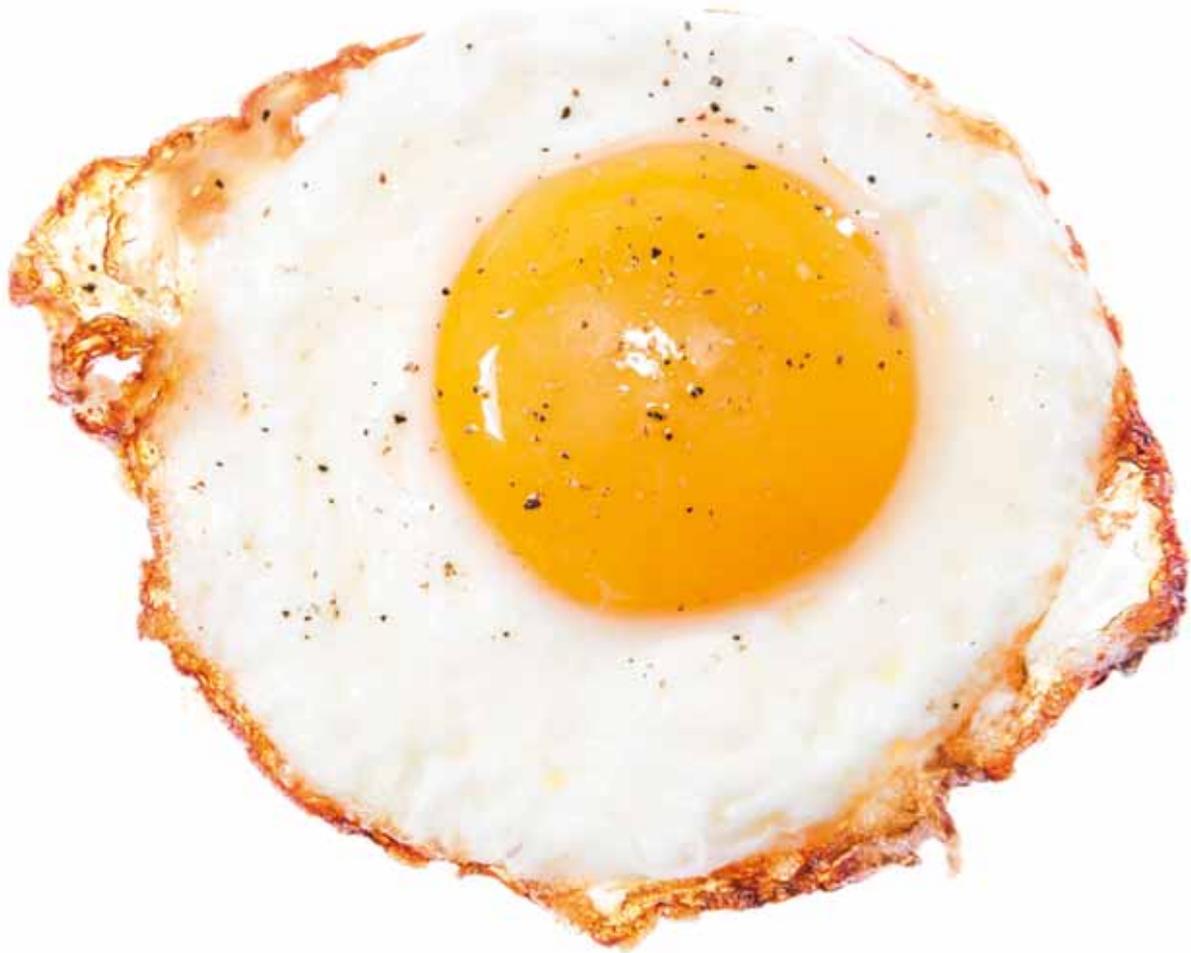
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# FISETIN

## The Longevity Flavonoid



**Fisetin**, a flavonoid found in strawberries and apples, is currently being studied for its effectiveness as a **senolytic** in humans.<sup>1</sup>

In preclinical studies, fisetin:

- Mimics effects of **calorie reduction**<sup>2</sup>
- Targets longevity pathways<sup>2-6</sup>
- Extends lifespan of mice by about **10%**<sup>7</sup>
- Removes **senescent** cells through **senolytic** action<sup>7</sup>
- Suppresses excess **mTOR** activation<sup>8</sup>

**Fisetin** is poorly *absorbed* due to its breakdown in the small intestines.

**Bio-Fisetin** solves this problem by enclosing **fisetin** with a compound from the fenugreek herb.

A **human** trial showed **bioavailability** of this **new fisetin** compound increased up to **25 times** compared to fisetin by itself.<sup>9</sup>

Just **one** capsule daily of **Bio-Fisetin** helps manage **senescent cells** and may support overall longevity.

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<p><b>MacuGuard® Ocular Support</b> • 60 softgels, Item #01992 Lutein, <i>trans</i>-zeaxanthin, meso-zeaxanthin, and saffron help maintain structural integrity of the macula and retina. Just <u>one</u> softgel per day.</p>	<p><b>\$16.88</b></p>	<p><b>\$15.75</b></p>
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<p><b>Super Ubiquinol CoQ10</b> • 100 mg, 60 softgels, Item #01426 Superior <b>ubiquinol</b> form of CoQ10 (<b>100 mg</b>) plus shilajit shown to <u>double</u> mitochondrial CoQ10 levels.</p>	<p><b>\$41.85</b></p>	<p><b>\$35.10</b> <b>\$32.40</b> (ten-unit per-bottle price)</p>
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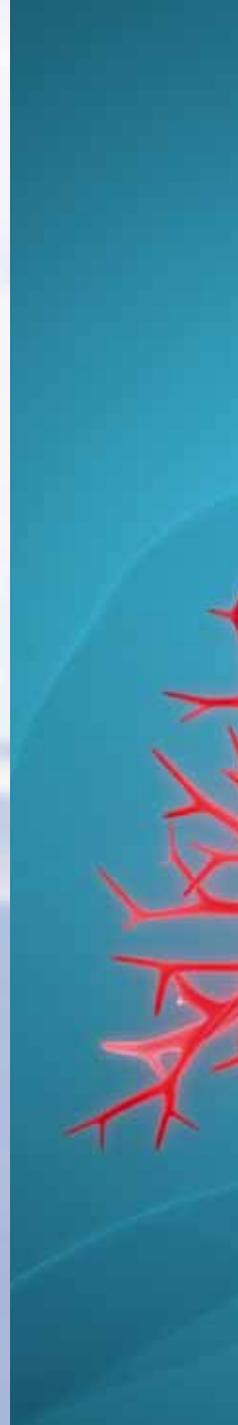
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<p><b>Memory Protect</b> • 36-day supply, Item #02101 <b>Lithium (1,000 mcg)</b> and <b>proline-rich polypeptide</b> to support cognitive health.</p>	<b>\$16.20</b>	<b>\$14.40</b>
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<p><b>NAD+ Cell Regenerator™ and Resveratrol</b> • 30 vegetarian capsules, Item #02348 NIAGEN® <b>nicotinamide riboside, trans-resveratrol, quercetin,</b> and more to support healthy cellular metabolism. NIAGEN® is a registered trademark of ChromaDex, Inc., Patents see: <a href="http://www.ChromaDexPatents.com">www.ChromaDexPatents.com</a>.</p>	<b>**</b>	<b>***</b>

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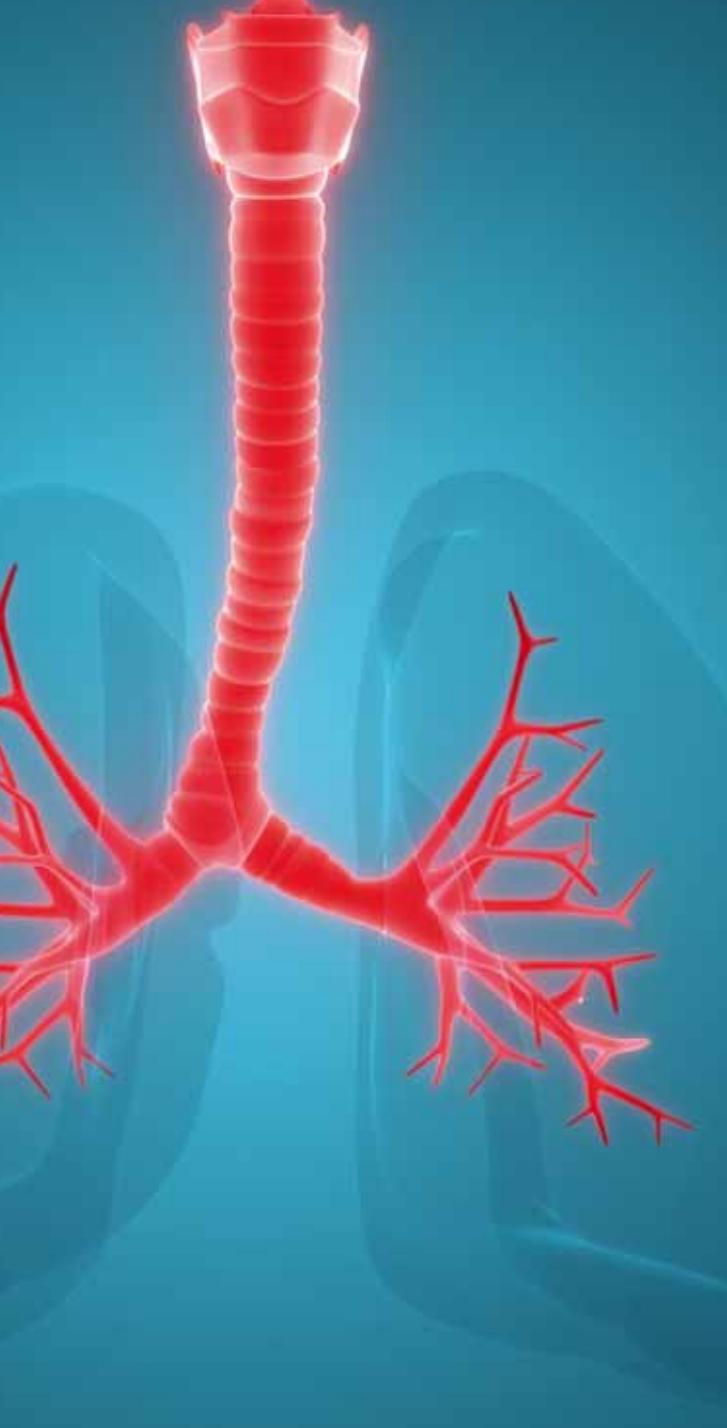
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# Protect Your Respiratory Tract During Winter Season

BY ROBERTA STANTON





**N-acetyl-L-cysteine** is an amino acid derivative that breaks down excess mucus in air passages.

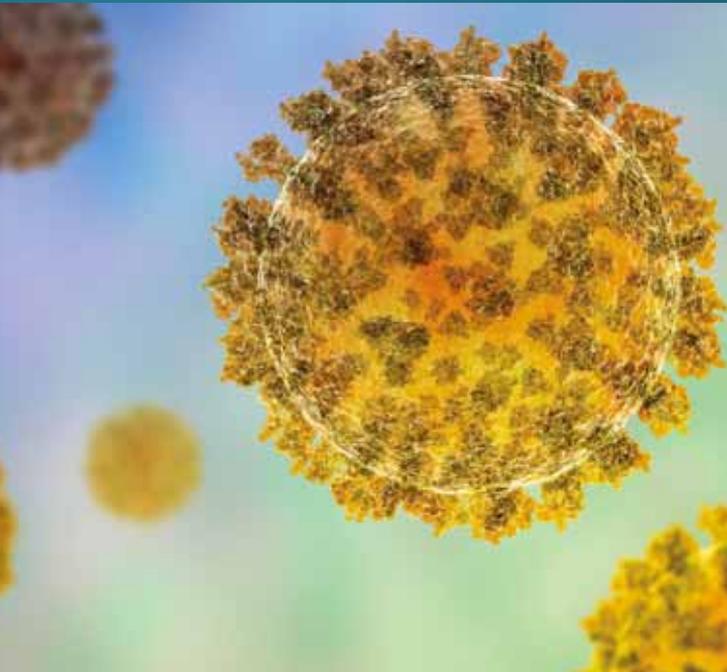
Used by physicians for decades, **N-acetyl-L-cysteine** has a wide variety of benefits, especially helping to protect the lungs and airways of the **respiratory tract**.

Known by many as **NAC**, N-acetyl-L-cysteine has been shown to reduce the number of harmful **pathogens**, including bacteria *and* viruses.<sup>1-6</sup>

Clinical studies have shown that **NAC** can help treat or prevent worsening of **chronic bronchitis** and **acute respiratory distress syndrome**, an often fatal complication in patients with pneumonia or other severe lung infections.<sup>7-12</sup>

In patients with **chronic obstructive pulmonary disease (COPD)**, N-acetyl-L-cysteine has been associated with lower rates of exacerbations (periods of worsening of symptoms) and fewer days spent in the hospital.<sup>4,13-18</sup>

Most individuals gain benefits from using **600 mg** to **1,800 mg/day** in divided dosages.



## What Is N-Acetyl-L-Cysteine?

**N-acetyl-L-cysteine (NAC)** is a precursor of **L-cysteine**, the amino acid cells need to produce one of the most powerful antioxidants in the body, **glutathione**.<sup>19,20</sup>

Found in every cell in the body, glutathione fights the **oxidative stress** that is closely associated with many age-related chronic diseases.<sup>21</sup>

But scientists have found that N-acetyl-L-cysteine does much more than this. It also protects the **respiratory system** from a number of different pathogens and diseases.

## Controlling Excess Mucus

Healthy lungs have a built-in cleaning and protection system.

A small amount of **mucus** is secreted to coat the walls of the airways. This mucus traps inhaled particles, many of which can be irritants, infectious, or worse. Then, tiny projections called **cilia** on the surface of cells lining the airways sweep away the mucus and trapped particles, keeping airways clear and protecting the lungs from potential pathogens.

Many conditions, from allergies to infection to lung disease, can cause this system to become dysfunctional, leading to the secretion of large amounts of mucus.<sup>22</sup>

When **excess mucus** accumulates, it becomes sticky and hard to remove, leading to difficulty breathing. This complicates many lung conditions, including

bronchitis, emphysema, asthma, cystic fibrosis, and lung infections.<sup>22</sup>

Doctors have been using inhaled **N-acetyl-L-cysteine** to reduce mucus since the 1960s.<sup>23</sup> It breaks down mucus secretions, making them less dense and sticky.

N-acetyl-L-cysteine also reduces the *thickness* of the mucus.<sup>3</sup> It does this by reacting with bonds within the mucus proteins and thinning the mucus.<sup>4,24</sup>

This helps clear the airways *and* makes it easier for the cilia to sweep away mucus and trapped particles.<sup>3</sup>

## Reducing Oxidative Stress

N-acetyl-L-cysteine is a highly effective precursor to the antioxidant **glutathione**, which reduces oxidative stress and free-radical tissue damage.<sup>3,4,24</sup>

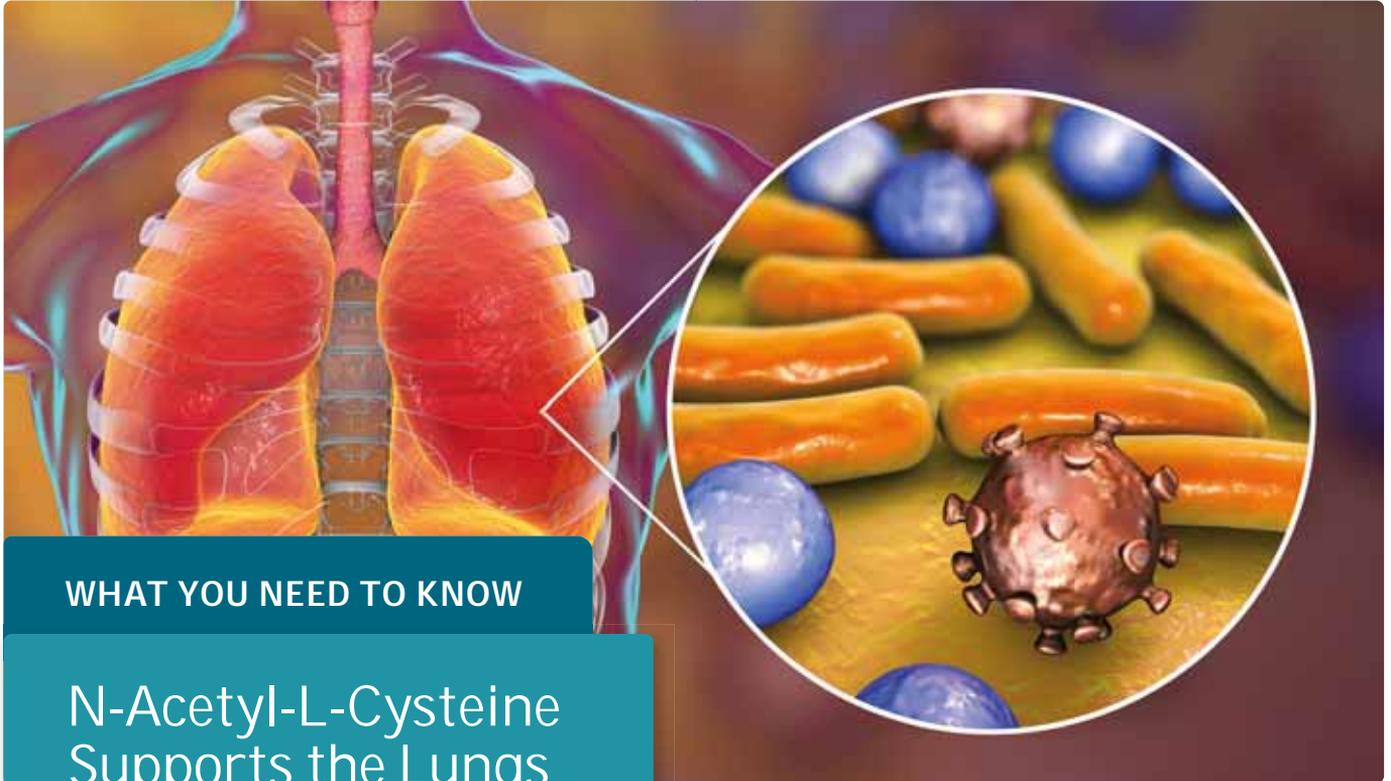
Taken orally, NAC is rapidly absorbed and distributed throughout the body, where it provides the building blocks for cells to produce their own glutathione.

N-acetyl-L-cysteine is also a **direct antioxidant** itself. Even before conversion into glutathione, it scavenges free radicals that could otherwise cause damage.<sup>4</sup>

Oxidative stress is a common contributor to many disorders of the respiratory system, from **infection** to **chronic obstructive pulmonary disease (COPD)**, disorders of the lungs that cause difficulty breathing.<sup>4</sup>

By bolstering antioxidant reserves, and thus reducing oxidative stress, N-acetyl-L-cysteine offers powerful protection to the lungs.





## WHAT YOU NEED TO KNOW

### N-Acetyl-L-Cysteine Supports the Lungs and Airways

- N-acetyl-L-cysteine is a precursor to **glutathione**.
- It reduces and thins excess **mucus** production in the airways, which can be a major contributor to lung problems in infection and other conditions.
- N-acetyl-L-cysteine also reduces harmful inflammation and could help prevent colonization by **viruses** and **bacteria** in the lungs.
- Through all these mechanisms, N-acetyl-L-cysteine supports healthy **respiratory tract** function and may prevent or treat bronchitis, chronic obstructive pulmonary disease, acute respiratory distress syndrome, and respiratory tract infections.
- Typical daily doses of N-acetyl-L-cysteine range from **600 mg** to **1,800 mg** in divided doses.

For example, in COPD such as **emphysema**, oxidative stress in the lungs contributes to inflammation, abnormal constriction of the airways, fluid in the lungs, excess mucus secretion, and other tissue damage.<sup>4</sup> N-acetyl-L-cysteine reduces oxidative stress and the damage it does while also reducing mucus volume and thickness.

### Stopping Infectious Pathogens

N-acetyl-L-cysteine has been shown to reduce the number of harmful **pathogens**, including bacteria and viruses.

In the case of harmful **bacteria**, N-acetyl-L-cysteine makes it hard for them to gain a foothold and cause infection.

In vitro experiments show that N-acetyl-L-cysteine prevents bacteria from adhering to cells lining the airways.<sup>5,6</sup>

One of the ways it accomplishes this is by disrupting **biofilms**, slimy coverings that many disease-causing bacteria form around themselves. These films prevent immune cells from recognizing and gaining access to the bacteria. They also make it difficult for antibiotics, antibodies, and other helpful compounds to get to the bacteria.



N-acetyl-L-cysteine blocks the formation of biofilms and destroys existing ones, impeding the ability of bacteria to survive in the airways.<sup>2,3</sup>

The protection from pathogens also extends to **viruses**.

One cell study evaluated **respiratory syncytial virus**. Normally, this virus invades the cells lining the airways, growing rapidly and causing damage to the structure of the airways.

But treatment with N-acetyl-L-cysteine **blocks the reproduction of the virus** while restoring the normal structure and function of the cells lining the airways.<sup>1</sup>

### Reducing Harmful Inflammation

By preventing free-radical damage, reducing pathogen colonization, and other mechanisms, N-acetyl-L-cysteine decreases harmful **inflammation**, which contributes to the symptoms of most respiratory disorders.

Preclinical studies show that N-acetyl-L-cysteine reduces the production of pro-inflammatory compounds and decreases the production of compounds that initiate **fibrosis** in the lung tissue, scarring that makes it difficult for the lungs to work properly.<sup>25-27</sup>

### Respiratory Tract Disorders

N-acetyl-L-cysteine has shown success in treating a number of different respiratory conditions.

**Chronic bronchitis** is longstanding inflammation in the airways of the lungs caused by irritation and tissue damage. It's common in smokers but can also be caused by secondhand smoke, air pollution, and other inhaled irritants.

Several human studies have shown that oral intake of N-acetyl-L-cysteine reduces **exacerbations** (worsening or flare-ups) of chronic bronchitis *and* significantly improves symptoms.<sup>11,12</sup>

**Chronic obstructive pulmonary disease (COPD)** refers to disorders of the lungs that restrict airflow in the lungs, making it hard to breathe. It includes chronic bronchitis, emphysema, and severe asthma.<sup>28,29</sup>

Oxidative stress, inflammation, and excessive secretion of airway-clogging mucus play major roles in these conditions. Knowing that N-acetyl-L-cysteine helps prevent or treat *all three* of these problems, scientists have tested it to treat COPD.

In COPD patients, N-acetyl-L-cysteine use has been associated with clinical improvements. These include lower rates and decreased severity of exacerbations, and fewer days spent in the hospital for COPD exacerbations.<sup>4,13-18</sup>

**Acute respiratory distress syndrome (ARDS)** is a form of severe lung inflammation that causes fluid to leak into the lungs, preventing oxygen from getting into the body.

It occurs in critical illness, particularly in patients suffering from **pneumonia** or other serious lung infections. It often requires mechanical ventilation and typically results in a high mortality rate.

Animal studies show that N-acetyl-L-cysteine protects the lungs from injury and leads to significant improvements.<sup>30,31</sup> In clinical studies, patients with acute respiratory distress syndrome who were given N-acetyl-L-cysteine had shorter intensive-care-unit stays, and clinical improvements.<sup>7-10</sup>

## Summary

**N-acetyl-L-cysteine (NAC)** is a precursor to the antioxidant **glutathione**. It helps prevent harmful oxidative damage and reduces inflammation.

In the lungs and airways of the **respiratory tract**, it reduces and thins excess **mucus** secretion and could help prevent colonization by harmful **bacteria** and **viruses**.

Through these mechanisms and more, N-acetyl-L-cysteine supports healthy respiratory function and provides protection against lung diseases, including **acute respiratory distress syndrome**, infections, and **chronic obstructive pulmonary diseases** like bronchitis and emphysema.

Most individuals gain benefits from using **600 mg** to **1,800 mg/day** of N-acetyl-L-cysteine in divided dosages. •

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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\* *Aging Cell*. 2015 Aug;14(4):644-58.



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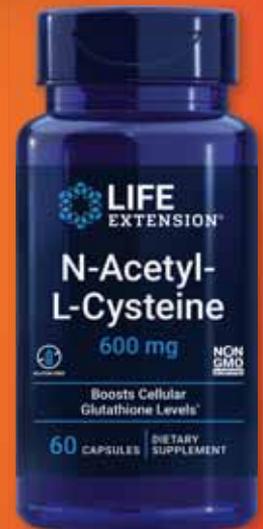
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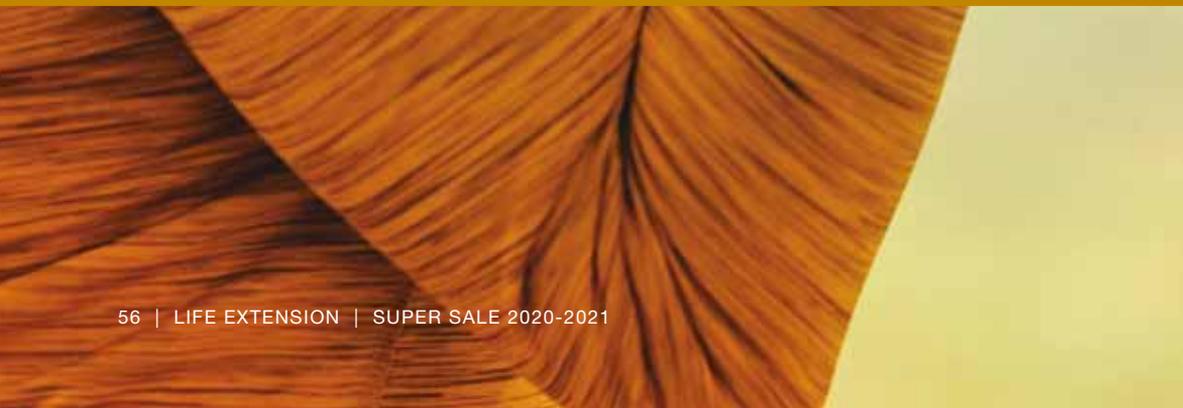


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# Enhancing the Health Benefits of **FISH OIL**

BY MICHAEL DOWNEY





The benefits of the **Mediterranean diet** are well established.

They include reduced **cardiovascular** and **neurological** risks along with lower overall **mortality**.<sup>1-7</sup>

Components of the Mediterranean diet are comprised of fish, olive oil, nuts and seeds, vegetables and fruits, and whole grains.

Science today enables people to receive many **Mediterranean diet** components using concentrated:

- **Fish oil rich in EPA/DHA**
- **Olive fruit and leaf extract**
- **Sesame seed lignan extract**

To conveniently deliver these nutrients, researchers have combined **fish oil**, **olive polyphenols**, and **sesame lignans** to enhance overall health benefits.



The **omega-3 fatty acids** found in **fish oil** have a wide range of benefits for human health and longevity.

Populations that consume large amounts of oily fish have *reduced* incidence of **cardiovascular disorders**, which include heart attacks, hypertension, strokes, atrial fibrillation, and heart failure.<sup>8-11</sup>

A meta-analysis found that the *highest* consumption of the omega-3s **EPA** and **DHA** is associated with a **14% reduction** in the risk of dying from *any* cause, compared to the lowest omega-3 consumption.<sup>12</sup>

In the analysis, each additional **200 mg of fish oil** consumed per day led to a **7% reduction** in the overall risk of death.<sup>12</sup>

Fish oil works in many different ways to achieve these benefits.

It helps lower levels of **triglycerides**, fats linked to risk of heart disease. It reduces the buildup of plaque on artery walls that restricts blood flow, and improves function of the **endothelial cells** that line blood vessels.<sup>8,9</sup>



Fish oil also combats **chronic inflammation**, which plays a key role in age-related disease.<sup>13,14</sup> That helps prevent:<sup>15-23</sup>

- Metabolic disorders, such as obesity and diabetes,
- Cancer,
- Neurological disorders, such as depression and Alzheimer's,
- Autoimmune diseases,
- Chronic kidney disease, and
- Non-alcoholic fatty liver disease (NAFLD).

## Olive Extract

**Olive oil** has long been considered a crucial contributor to the Mediterranean diet's benefits.<sup>24</sup>

Research shows that people who consume the most olive oil have a lower risk of dying from **cardiovascular** events, **strokes**, or **any cause at all**, compared to those who consume the least.<sup>25</sup>

Consuming olive oil daily may also protect against conditions ranging from Alzheimer's and osteoporosis to skin aging and cancer.<sup>26-29</sup>

**Polyphenols** are beneficial components present in olive oil that include **oleuropein**, **tyrosol**, and **hydroxytyrosol**.<sup>30-32</sup>

**Hydroxytyrosol** is one of the most common polyphenols present in **extra virgin** olive oil.<sup>31</sup> In people over age 65, those who ingest the *highest* amount of **hydroxytyrosol** have been shown to live, on average, **9.5 years longer**.<sup>33</sup>

Extracts of the **olive leaf**, concentrated and standardized to provide maximum polyphenol content, have been shown to protect cultured heart-muscle cells from destruction caused by **oxidative damage**.<sup>34</sup> In a study in aged rats, olive polyphenols decreased stress-induced tissue damage and boosted intracellular resistance systems.<sup>35</sup>

In a rat model of **metabolic syndrome**, olive extracts *improved* or normalized accumulation of **fat** in the abdomen and liver, excessive collagen deposits in the heart and liver, cardiac stiffness, poor glucose tolerance, and abnormal lipid profiles.<sup>36</sup>

WHAT YOU NEED TO KNOW

## Combining Fish Oil, Olive Polyphenols, and Sesame Lignans

- The **Mediterranean diet** is high in fish, olive oil, seeds and nuts, and other wholesome plant-derived foods.
- People with greater adherence to this dietary pattern have reduced rates of cardiovascular and neurological diseases, cancer, and overall mortality.
- Science has allowed us to combine key components of the Mediterranean diet into a **fish oil concentrate** with olive extract and **sesame lignans** to enhance its health benefits.



### Unique Power of Sesame Seeds

**Sesame seeds** have long been a component of the Mediterranean diet,<sup>37</sup> whether added to dishes or ground into tahini or hummus.

They contain high concentrations of polyphenols called **lignans**. They may reduce blood lipid levels, fight inflammation and cancer, neutralize free radicals, and enhance **vitamin E** bioavailability (absorbability).<sup>38,39</sup>

Metabolism of **sesame lignans** by intestinal microflora creates *other* compounds, enterolactone and enterodiol, both of which may have protective effects against **hormone-related diseases** such as breast cancer.<sup>40,41</sup>

**Sesame lignans** may help enhance the effects of **omega-3s** in the body, making them a complement to add to fish meals and fish oil supplements.

### Summary

People who follow a **Mediterranean diet**, typically rich in fish and olive oil, have lower risk of cardiovascular disease, neurological disorders, cancer, bone loss, and overall mortality.

Research indicates that **fish oil** rich in omega-3 fatty acids offers anti-inflammatory and disease-prevention benefits.

Based on the impressive findings about the Mediterranean diet, combining **fish oil concentrate** with **olive extract** and **sesame lignans** may enhance overall health benefits. ●

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

## Omega-3 Supplementation Reduces Cardiovascular Disease Death

The *Mayo Clinic Proceedings* recently published a meta-analysis showing that omega-3 supplementation is associated with significant reductions in the risk for cardiovascular disease death.<sup>42</sup>

The study looked at 40 clinical trials and concluded that supplementation with EPA and DHA reduced risk of coronary heart disease, including heart attack.

Specifically, the study found that EPA+DHA supplementation is associated with a **reduced risk** of:

- Fatal myocardial infarction (**35%**)
- Myocardial infarction (**13%**)
- Coronary heart disease events (**10%**)
- Coronary heart disease mortality (**9%**)

The cardiovascular protection was greater with *increases* in omega-3 dosage.

Increasing intake of EPA and DHA by **1,000 mg** per day was associated with a **reduction** of **5.8%** in the risk of cardiovascular disease events.

Robust evidence suggests benefits from daily supplementation with EPA+DHA.

Today's fish oil products deliver a higher content of EPA/DHA per serving. Aging adults should consider taking at least **1,400 mg** of EPA and **1,000 mg** of DHA daily with meals that contain some fat to facilitate **absorption**.

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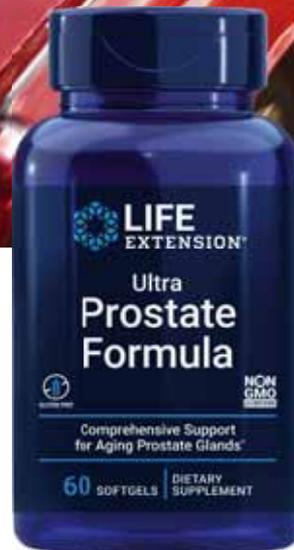
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- 00038 Arginine Ornithine Powder
- 01253 Branched Chain Amino Acids
- 01829 Carnosine
- 01671 D,L-Phenylalanine Capsules
- 01624 L-Arginine Caps
- 01532 L-Carnitine
- 00345 L-Glutamine
- 00141 L-Glutamine Powder
- 01678 L-Lysine
- 01827 Taurine
-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

**BLOOD PRESSURE & VASCULAR SUPPORT**

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

**BONE HEALTH**

- 01726 Bone Restore
- 02123 Bone Restore Chewable Tablet
- 02416 Bone Restore Elite with Super Potent K2
- 01727 Bone Restore with Vitamin K2
- 01725 Bone Strength Collagen Formula
- 00313 Bone-Up™
- 01963 Calcium Citrate with Vitamin D
- 01506 Dr. Strum's Intensive Bone Formula
- 02417 Mega Vitamin K2
- 01476 Strontium Caps

**BRAIN HEALTH**

- 01524 Acetyl-L-Carnitine
- 01974 Acetyl-L-Carnitine Arginate
- 01659 Citicoline® (CDP-Choline)
- 02321 Cognitex® Basics
- 02396 Cognitex® Elite
- 02397 Cognitex® Elite Pregnenolone
- 01540 DMAE Bitartrate (dimethylaminoethanol)
- 02006 Dopa-Mind™
- 02212 Focus Tea™
- 01658 Ginkgo Biloba Certified Extract™
- 01527 Huperzine A
- 00020 Lecithin Granules

- 02101 Memory Protect
- 00709 Migra-Eeze™
- 01603 Neuro-Mag® Magnesium L-Threonate Caps
- 02032 Neuro-Mag® Magnesium L-Threonate Powder
- 00888 Optimized Ashwagandha
- 01676 PS (Phosphatidylserine) Caps
- 02406 Quick Brain Nootropic
- 01327 Vinpocetine

**CHOLESTEROL MANAGEMENT**

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

**DIGESTION SUPPORT**

- 53348 Betaine HCl
- 54160 Black Vinegar
- 02412 Bloat Relief
- 30747 Digest RC®
- 07136 Effervescent Vitamin C - Magnesium Crystals
- 02021 Enhanced Super Digestive Enzymes
- 02022 Enhanced Super Digestive Enzymes and Probiotics
- 02033 EsophaCool™
- 01737 Esophageal Guardian
- 01706 Extraordinary Enzymes
- 02100 Gastro-Ease™
- 01122 Ginger Force™
- 00605 Regimint
- 01386 TruFiber®

**ENERGY MANAGEMENT**

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

**EYE HEALTH**

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

**FISH OIL & OMEGAS**

- 02311 Clearly EPA/DHA Fish Oil
- 00463 Flaxseed Oil
- 01937 Mega EPA/DHA
- 02218 Mega GLA Sesame Lignans
- 01983 Super Omega-3 EPA/DHA Fish Oil, Sesame Lignans & Olive Extract
- 01988 Super Omega-3 Plus EPA/DHA Fish Oil, Sesame Lignans, Olive Extract, Krill & Astaxanthin

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

**FOOD**

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

**GLUCOSE MANAGEMENT**

- 01503 CinSulin® with InSea<sup>2</sup> and Crominex® 3+
- 01620 CoffeeGenic® Green Coffee Extract
- 02122 Glycemic Guard™
- 00925 Mega Benfotiamine
- 01803 Tri Sugar Shield®

**HEART HEALTH**

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

**HORMONE BALANCE**

- 00454 DHEA (Dehydroepiandrosterone) 15 mg, 100 capsules
- 00335 DHEA (Dehydroepiandrosterone) 25 mg, 100 capsules
- 00882 DHEA (Dehydroepiandrosterone) 50 mg, 60 capsules
- 00607 DHEA (Dehydroepiandrosterone) 25 mg, 100 vegetarian dissolve in mouth tablets
- 01689 DHEA (Dehydroepiandrosterone) 100 mg, 60 veg capsules
- 02368 Optimized Broccoli and Cruciferous Blend
- 00302 Pregnenolone • 50 mg, 100 capsules
- 00700 Pregnenolone • 100 mg, 100 capsules
- 01468 Triple Action Cruciferous Vegetable Extract
- 01469 Triple Action Cruciferous Vegetable Extract with Resveratrol

**IMMUNE SUPPORT**

- 02411 5 Day Elderberry Immune
- 00681 AHCC®
- 02302 Bio-Quercetin
- 02410 Black Elderberry + Vitamin C
- 01961 Enhanced Zinc Lozenges
- 01704 Immune Modulator with Tinofend®
- 00955 Immune Protect with PARACTIN®
- 02005 Immune Senescence Protection Formula™
- 29727 Kinoko® Gold AHCC
- 24404 Kinoko® Platinum AHCC
- 00316 Kyolic® Garlic Formula 102
- 00789 Kyolic® Reserve
- 01681 Lactoferrin (Apolactoferrin) Caps
- 01903 NK Cell Activator™
- 01394 Optimized Garlic
- 01309 Optimized Quercetin
- 01811 Peony Immune
- 00525 ProBoost Thymic Protein A
- 01708 Reishi Extract Mushroom Complex
- 01906 Standardized Cistanche
- 13685 Ten Mushroom Formula®
- 01097 Ultra Soy Extract
- 01561 Zinc Lozenges

**INFLAMMATION MANAGEMENT**

- 01639 5-LOX Inhibitor with AprèsFlex®
- 02324 Advanced Curcumin Elite™ Turmeric Extract, Ginger & Turmerones
- 01709 Black Cumin Seed Oil
- 02310 Black Cumin Seed Oil and Curcumin Elite™ Turmeric Extract
- 00202 Boswellia
- 02467 Curcumin Elite™ Turmeric Extract • 30 veg capsules
- 02407 Curcumin Elite™ Turmeric Extract • 60 veg capsules
- 01804 Cytokine Suppress® with EGCG
- 02223 Pro-Resolving Mediators
- 00318 Serrafazyme
- 01203 Specially-Coated Bromelain
- 00407 Super Bio-Curcumin® Turmeric Extract
- 01254 Zyflamend™ Whole Body

**JOINT SUPPORT**

- 02404 Arthro-Immune Joint Support
- 02238 ArthroMax® Advanced NT2 Collagen™ & AprèsFlex®
- 01617 ArthroMax® with Theaflavins & AprèsFlex®
- 02138 ArthroMax® Elite
- 00965 Fast-Acting Joint Formula
- 00522 Glucosamine/Chondroitin Capsules
- 01600 Krill Healthy Joint Formula
- 01050 Krill Oil
- 00451 MSM (Methylsulfonylmethane)
- 02231 NT2 Collagen™

**KIDNEY & BLADDER SUPPORT**

- 00862 Cran-Max® Cranberry Whole Fruit Concentrate
- 01424 Optimized Cran-Max® with Ellirose™
- 01921 Uric Acid Control
- 01209 Water-Soluble Pumpkin Seed Extract

**LIVER HEALTH & DETOXIFICATION**

- 01922 Advanced Milk Thistle • 60 softgels
- 01925 Advanced Milk Thistle • 120 softgels
- 02240 Anti-Alcohol Complex
- 01651 Calcium D-Glucarate
- 00550 Chlorella
- 01571 Chlorophyllin
- 01522 Milk Thistle • 60 veg capsules
- 02402 FLORASSIST® Liver Restore™
- 01541 Glutathione, Cysteine & C

- 01393 HepatoPro
- 01608 Liver Efficiency Formula
- 01534 N-Acetyl-L-Cysteine
- 00342 PectaSol-C® Modified Citrus Pectin Powder
- 01080 PectaSol-C® Modified Citrus Pectin Capsules
- 01884 Silymarin
- 02361 SOD Booster

**LONGEVITY & WELLNESS**

- 00457 Alpha-Lipoic Acid
- 01625 AppleWise Polyphenol Extract
- 02414 Bio-Fisetin
- 01214 Blueberry Extract
- 01438 Blueberry Extract and Pomegranate
- 02270 DNA Protection Formula
- 02405 Endocannabinoid System Booster
- 02119 GEROPROTECT® Ageless Cell™
- 02415 GEROPROTECT® Autophagy Renew
- 02133 GEROPROTECT® Longevity A.I.™
- 02401 GEROPROTECT® Stem Cell
- 02211 Grapeseed Extract
- 00954 Mega Green Tea Extract (decaffeinated)
- 00953 Mega Green Tea Extract (lightly caffeinated)
- 01513 Optimized Fucoidan with Maritech® 926
- 02230 Optimized Resveratrol
- 01637 Pycnogenol® French Maritime Pine Bark Extract
- 02210 Resveratrol
- 00070 RNA (Ribonucleic Acid)
- 02301 Senolytic Activator
- 01208 Super R-Lipoic Acid
- 01919 X-R Shield

**MEN'S HEALTH**

- 02209 Male Vascular Sexual Support
- 00455 Mega Lycopene Extract
- 02306 Men's Bladder Control
- 01789 PalmettoGuard® Saw Palmetto with Beta-Sitosterol
- 01790 PalmettoGuard® Saw Palmetto/Nettle Root Formula with Beta-Sitosterol
- 01837 Pomi-T®
- 01373 Prelox® Enhanced Sex for Men
- 01940 Super MiraForte with Standardized Lignans
- 01909 Triple Strength ProstaPollen™
- 02029 Ultra Prostate Formula

**MINERALS**

- 01661 Boron
- 02107 Extend-Release Magnesium
- 30731 Ionic Selenium
- 01677 Iron Protein Plus
- 02403 Lithium
- 01459 Magnesium Caps
- 01682 Magnesium (Citrate)
- 01328 Only Trace Minerals
- 01504 Optimized Chromium with Crominex® 3+
- 02309 Potassium with Extend-Release Magnesium
- 01740 Sea-Iodine™
- 01879 Se-Methyl L-Selenocysteine
- 01778 Super Selenium Complex
- 00213 Vanadyl Sulfate
- 01813 Zinc Caps

**MISCELLANEOUS**

- 00577 Potassium Iodide
- 00657 Solarshield® Sunglasses

**MOOD & STRESS MANAGEMENT**

- 02312 Cortisol-Stress Balance
- 00987 Enhanced Stress Relief
- 01074 5 HTP
- 01683 L-Theanine

- 02175 SAME (S-Adenosyl-Methionine)  
200 mg, 30 enteric coated vegetarian tablets
- 02176 SAME (S-Adenosyl-Methionine)  
400 mg, 30 enteric coated vegetarian tablets
- 02174 SAME (S-Adenosyl-Methionine)  
400 mg, 60 enteric coated vegetarian tablets

**MULTIVITAMINS**

- 02199 Children's Formula Life Extension Mix™
- 02498 Comprehensive Nutrient Packs ADVANCED
- 02354 Life Extension Mix™ Capsules
- 02364 Life Extension Mix™ Capsules without Copper
- 02356 Life Extension Mix™ Powder
- 02355 Life Extension Mix™ Tablets
- 02357 Life Extension Mix™ Tablets with Extra Niacin
- 02365 Life Extension Mix™ Tablets without Copper
- 02292 Once-Daily Health Booster • 30 softgels
- 02291 Once-Daily Health Booster • 60 softgels
- 02313 One-Per-Day Tablets
- 02317 Two-Per-Day Capsules • 60 capsules
- 02314 Two-Per-Day Capsules • 120 capsules
- 02316 Two-Per-Day Tablets • 60 tablets
- 02315 Two-Per-Day Tablets • 120 tablets

**NERVE & COMFORT SUPPORT**

- 02202 ComfortMAX™
- 02303 PEA Discomfort Relief

**PERSONAL CARE**

- 01006 Biosil™ • 5 mg, 30 veg capsules
- 01007 Biosil™ • 1 fl oz
- 00321 Dr. Proctor's Advanced Hair Formula
- 00320 Dr. Proctor's Shampoo
- 02322 Hair, Skin & Nails Collagen Plus Formula
- 01278 Life Extension Toothpaste
- 00408 Venotone
- 00409 Xyliwhite Mouthwash
- 02304 Youthful Collagen
- 02252 Youthful Legs

**PET CARE**

- 01932 Cat Mix
- 01931 Dog Mix

**PROBIOTICS**

- 01622 Bifido GI Balance
- 01825 FLORASSIST® Balance
- 02125 FLORASSIST® GI with Phage Technology
- 01821 FLORASSIST® Heart Health
- 02250 FLORASSIST® Mood Improve
- 02208 FLORASSIST® Immune & Nasal Defense
- 02120 FLORASSIST® Oral Hygiene
- 02203 FLORASSIST® Prebiotic
- 01920 FLORASSIST® Throat Health
- 02400 FLORASSIST® Winter Immune Support
- 52142 Jarro-Dophilus® for Women
- 00056 Jarro-Dophilus EPS® • 60 veg capsules
- 21201 Jarro-Dophilus EPS® • 120 veg capsules
- 01038 Theralac® Probiotics
- 01389 TruFlora® Probiotics

**SKIN CARE**

- 80157 Advanced Anti-Glycation Peptide Serum
- 80165 Advanced Growth Factor Serum
- 80170 Advanced Hyaluronic Acid Serum
- 80154 Advanced Lightening Cream
- 80155 Advanced Peptide Hand Therapy
- 80175 Advanced Probiotic-Fermented Eye Serum
- 80177 Advanced Retinol Serum
- 80152 Advanced Triple Peptide Serum
- 80140 Advanced Under Eye Serum with Stem Cells

- 80137 All-Purpose Soothing Relief Cream
- 80139 Amber Self MicroDermAbrasion
- 80118 Anti-Aging Mask
- 80151 Anti-Aging Rejuvenating Face Cream
- 80153 Anti-Aging Rejuvenating Scalp Serum
- 80176 Collagen Boosting Peptide Cream
- 80156 Collagen Boosting Peptide Serum
- 02408 Collagen Peptides for Skin & Joints
- 80169 Cucumber Hydra Peptide Eye Cream
- 80141 DNA Support Cream
- 80163 Eye Lift Cream
- 80123 Face Rejuvenating Anti-Oxidant Cream
- 80109 Hyaluronic Facial Moisturizer
- 80110 Hyaluronic Oil-Free Facial Moisturizer
- 80138 Hydrating Anti-Oxidant Facial Mist
- 00661 Hydroderm
- 80103 Lifting & Tightening Complex
- 80168 Melatonin Advanced Peptide Cream
- 80114 Mild Facial Cleanser
- 80172 Multi Stem Cell Hydration Cream
- 80159 Multi Stem Cell Skin Tightening Complex
- 80122 Neck Rejuvenating Anti-Oxidant Cream
- 80174 Purifying Facial Mask
- 80150 Renewing Eye Cream
- 80142 Resveratrol Anti-Oxidant Serum
- 01938 Shade Factor™
- 02129 Skin Care Collection Anti-Aging Serum
- 02130 Skin Care Collection Day Cream
- 02131 Skin Care Collection Night Cream
- 80166 Skin Firming Complex
- 02096 Skin Restoring Ceramides
- 80130 Skin Stem Cell Serum
- 80164 Skin Tone Equalizer
- 80143 Stem Cell Cream with Alpine Rose
- 80148 Tightening & Firming Neck Cream
- 80161 Triple-Action Vitamin C Cream
- 80162 Ultimate MicroDermabrasion
- 80173 Ultimate Peptide Serum
- 80160 Ultra Eyelash Booster
- 80101 Ultra Wrinkle Relaxer
- 80113 Under Eye Refining Serum
- 80104 Under Eye Rescue Cream
- 80171 Vitamin C Lip Rejuvenator
- 80129 Vitamin C Serum
- 80136 Vitamin D Lotion
- 80102 Vitamin K Cream

**SLEEP**

- 01512 Bioactive Milk Peptides
- 02300 Circadian Sleep
- 01551 Enhanced Sleep with Melatonin
- 01511 Enhanced Sleep without Melatonin
- 02234 Fast-Acting Liquid Melatonin
- 01669 Glycine
- 02308 Herbal Sleep PM
- 01722 L-Tryptophan
- 01668 Melatonin • 300 mcg, 100 veg capsules
- 01083 Melatonin • 500 mcg, 200 veg capsules
- 00329 Melatonin • 1 mg, 60 capsules
- 00330 Melatonin • 3 mg, 60 veg capsules
- 00331 Melatonin • 10 mg, 60 veg capsules
- 00332 Melatonin • 3 mg, 60 veg lozenges
- 02201 Melatonin IR/XR
- 01787 Melatonin 6 Hour Timed Release  
300 mcg, 100 veg tablets
- 01788 Melatonin 6 Hour Timed Release  
750 mcg, 60 veg tablets
- 01786 Melatonin 6 Hour Timed Release  
3 mg, 60 veg tablets

- 01721 Optimized Tryptophan Plus
- 01444 Quiet Sleep
- 01445 Quiet Sleep Melatonin

**VITAMINS**

- 01533 Ascorbyl Palmitate
- 00920 Benfotiamine with Thiamine
- 00664 Beta-Carotene
- 01945 BioActive Complete B-Complex
- 00102 Biotin
- 00084 Buffered Vitamin C Powder
- 02229 Fast-C® and Bio-Quercetin Phytosome
- 02075 Gamma E Mixed Tocopherol Enhanced with  
Sesame Lignans
- 02070 Gamma E Mixed Tocopherol/Tocotrienols
- 01913 High Potency Optimized Folate
- 01674 Inositol Caps Liquid Emulsified
- 02244 Liquid Vitamin D3 • 2,000 IU, 1 fl oz
- 02232 Liquid Vitamin D3 • 2,000 IU, 1 fl oz, mint
- 01936 Low-Dose Vitamin K2
- 00065 MK-7
- 00373 No Flush Niacin
- 01939 Optimized Folate (L-Methylfolate)
- 01217 Pyridoxal 5'-Phosphate Caps
- 01400 Super Absorbable Tocotrienols
- 02334 Super K
- 02335 Super K Elite
- 01863 Super Vitamin E
- 02028 Vitamin B5 (Pantothenic Acid)
- 01535 Vitamin B6
- 00361 Vitamin B12 Methylcobalamin
- 01536 Vitamin B12 Methylcobalamin • 1 mg, 60 veg lozenges
- 01537 Vitamin B12 Methylcobalamin • 5 mg, 60 veg lozenges
- 02228 Vitamin C and Bio-Quercetin Phytosome  
1,000 mg, 60 veg tablets
- 02227 Vitamin C and Bio-Quercetin Phytosome  
1,000 mg, 250 veg tablets
- 01753 Vitamin D3 • 25 mcg (1,000 IU), 90 softgels
- 01751 Vitamin D3 • 25 mcg (1,000 IU), 250 softgels
- 01713 Vitamin D3 • 125 mcg (5,000 IU), 60 softgels
- 01718 Vitamin D3 • 175 mcg (7,000 IU), 60 softgels
- 01758 Vitamin D3 with Sea-Iodine™
- 02040 Vitamins D and K with Sea-Iodine™

**WEIGHT MANAGEMENT & BODY COMPOSITION**

- 00658 7-Keto® DHEA Metabolite • 25 mg, 100 capsules
- 02479 7-Keto® DHEA Metabolite • 100 mg, 60 veg capsules
- 01509 Advanced Anti-Adipocyte Formula
- 01807 Advanced Appetite Suppress
- 02207 AMPK Metabolic Activator
- 02478 DHEA Complete
- 01738 Garcinia HCA
- 01292 Integra-Lean®
- 01908 Mediterranean Trim with Sinetrol™ -XPur
- 01492 Optimized Irvingia with Phase 3™ Calorie Control Complex
- 01432 Optimized Saffron with Satiereal®
- 00818 Super CLA Blend with Sesame Lignans
- 01902 Waist-Line Control™
- 02151 Wellness Code® Appetite Control

**WOMEN'S HEALTH**

- 01942 Breast Health Formula
- 01626 Enhanced Sex for Women 50+
- 01894 Estrogen for Women
- 01064 Femmenessence MacaPause®
- 02204 Menopause 731™
- 02319 Prenatal Advantage
- 01441 Progesta-Care®
- 01649 Super-Absorbable Soy Isoflavones

# “C”

## TO THE MAX

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

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

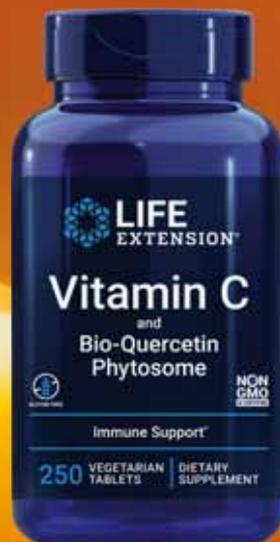
A highly *absorbable* form of **quercetin** complements vitamin C's activity in the body.

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

### SUPER SALE PRICE

Item #02227 • 250 vegetarian tablets

1 bottle \$20.25 • 4 bottles \$18 each



For full product description and to order **Vitamin C and Bio-Quercetin Phytosome**, call 1-800-544-4440 or visit [www.LifeExtension.com](http://www.LifeExtension.com)

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



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

# Multi-Action Support for **AGING JOINTS!**

Clinically validated ingredients help maintain cartilage and inhibit inflammatory factors to support joint health.

## JUST TWO CAPSULES A DAY PROVIDE:

<b>Glucosamine sulfate 2KCl</b> (derived from non-GMO corn)	<b>1,500 mg</b>
<b>AprèsFlex® Indian frankincense</b> ( <i>Boswellia serrata</i> ) extract (gum resin) [std. to 20% AKBA <sup>‡</sup> ]	<b>100 mg</b>
<b>NT2 Collagen™</b> standardized cartilage	<b>40 mg</b>
Total Collagen	<b>10 mg</b>
<b>Boron</b> (calcium fructoborate as patented FruiteX-B® OsteoBoron®)	<b>1.5 mg</b>

NT2 Collagen™ is manufactured by Bioibérica. AprèsFlex® is a registered trademark of Laila Nutraceuticals exclusively licensed to PL Thomas - Laila NUTRA LLC. U.S. Patent No. 8,551,496 and other patents pending. FruiteX-B® and OsteoBoron® are registered trademarks of VDF FutureCeuticals, Inc. U.S. Patent No. 5,962,049.

<sup>‡</sup> 3-O-acetyl-II-ketoB-boswellic acid.

## SUPER SALE PRICE

Item #02238 • 60 capsules

1 bottle **\$22.95**

4 bottles \$19.80 each



For full product description and to order **ArthroMax® Advanced with NT2 Collagen™ & AprèsFlex®** call 1-800-544-4440 or visit [www.LifeExtension.com](http://www.LifeExtension.com)

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

# Restore Youthful Cellular Energy with PQQ

**PQQ** (*pyrroloquinoline quinone*) activates genes involved in the production of cellular energy.<sup>1-5</sup>

Studies show **PQQ** supports heart health and cognitive function, complementing CoQ10.<sup>6,7</sup>

In fact, just **20 mg** per day of **PQQ** plus **CoQ10** promotes memory and attention in aging individuals.<sup>8</sup>

This formulation contains **20 mg** of **PQQ** per capsule, which is the recommended daily dose.

For full product description and to order **PQQ** or any other **PQQ-containing formulas**, call 1-800-544-4440 or visit [www.LifeExtension.com](http://www.LifeExtension.com)

Also available are **10 mg PQQ caps** (Item #01500) and **100 mg Super Ubiquinol CoQ10 with PQQ** (Item #01733).



## SUPER SALE PRICE

Item #01647 • 30 vegetarian capsules  
1 bottle **\$21.60** • 4 bottles \$16.20 each



### References

1. *Alt Med Rev.* 2009; 14(3):268-77.  
2. *J Nutr.* 2006 Feb;136(2):390-6.

3. *Exp Biol Med (Maywood).* 2003 Feb;228(2):160-6.  
4. *Biochim Biophys Acta.* 2006 Nov;1760(11):1741-8.

5. *J Biol Chem.* 2010 Jan 1;285:142-52.  
6. *Cardiovasc Drugs Ther.* 2004 Nov;18(6):421-31.

7. *J Cardiovasc Pharmacol Ther.* 2006 Jun;11 (2):119-28.  
8. *FOOD Style.* 2009;21:13(7)50-3.

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

# Go with your Gut

Ultimate  
PROBIOTIC + PHAGE  
Dual-Encapsulated Formula

Want to feel your best?  
Digestive health is key.

The 7-strain blend in FLORASSIST® GI with Phage Technology helps maintain healthy digestion, microbiome balance, and nutrient absorption.

Plus, the phage blend targets bad bacteria, leaving you with more beneficial probiotics.



Trust your gut:  
FLORASSIST® GI with  
Phage Technology.

**SUPER SALE PRICE**  
Item #02125  
30 liquid vegetarian capsules

1 bottle **\$22.28**  
4 bottles **\$20.25 each**



For full product description and to order **FLORASSIST® GI with Phage Technology**, call 1-800-544-4440 or visit [www.LifeExtension.com](http://www.LifeExtension.com)

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



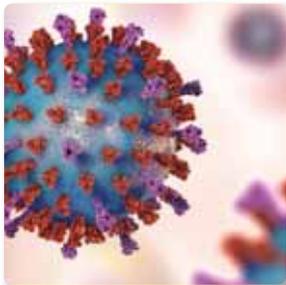
**LIFE  
EXTENSION®**

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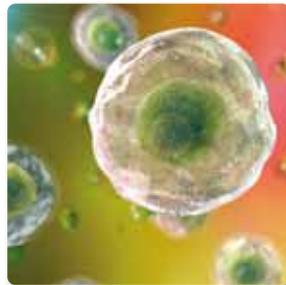
WHAT'S INSIDE

# Super\$Sale



**PROTECT RESPIRATORY  
FUNCTION**

**NAC (N-acetyl-L-cysteine)** helps prevent **viruses** and **bacteria** from adhering to the lining of the lungs, while reducing excess airway mucus.



**FISETIN: A LONGEVITY  
SENOLYTIC**

In an animal study, **fisetin** increased lifespan. It also functions as a powerful **senolytic**. A new **fisetin** formula provides **25 times greater bioavailability**.



**HIGH-DOSE VITAMIN K2  
BUILDS NEW BONE**

Japanese physicians prescribe **high-dose vitamin K2** to treat **osteoporosis**. Now available without a prescription, **45 mg of vitamin K2** increases bone density and *reduces* fracture risk.



**THWART POST-MEAL  
BLOATING**

Up to **30%** of people complain about after-meal **bloating**. Researchers have identified **plant compounds** that relieve gastrointestinal distress.



**"I WAS NOT SURPRISED  
TO HAVE OSTEOPENIA"**

Aging is almost always accompanied by **bone** loss. Bill Faloon reports on his diagnosis.



**ENHANCING THE BENEFITS  
OF FISH OIL**

Scientists combined key components of the healthy Mediterranean diet into a **fish oil concentrate** with **olive extract** and **sesame lignans**.

Annual **SUPER SALE** begins November 9, 2020