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Senescent Cells

PLUS: Page 7
Urgent Need to Accelerate Clinical Trials
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At 95 years old, Marion Ferdinand Hess, Sr., attributes his healthy longevity to the extensive list of supplements that he and his wife started taking for prevention—over 25 years ago.

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30 DR. JAMES KIRKLAND: THE SENOLYTICS REVOLUTION

Research by Dr. James Kirkland and his Mayo Clinic team on senolytics aims to reverse age-related diseases and increase human lifespans.

38 CANCER-FIGHTING IMPACT OF BLACK TEA

Preclinical data show that black tea theaflavins block cancer development and progression. Human studies are urgently needed to evaluate these findings in the clinical setting.

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Using an extended-release formulation allows L-theanine to stay in the body for up to six hours to reduce stress without drowsiness.

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To boost the immune benefits of echinacea, researchers recommend using multiple species and parts of the plant, which are rarely found in commercial supplements.
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Jonathan V. Wright, MD, is medical director of the Tahoma Clinic in Tukwila, WA. He received his MD from the University of Michigan and has taught natural biochemical medical treatments since 1983. Dr. Wright pioneered the use of bioidentical estrogens and DHEA in daily medical practice. He has authored or co-authored 14 books, selling more than 1.5 million copies.

Xiaoxi Wei, PhD, is a chemist, expert in supramolecular assembly and development of synthetic transmembrane nanopores with distinguished selectivity via biomimetic nanoscience. She has expertise in ion channel function and characterization. She founded X-Thera Inc., a company developing a radical new highway towards non-toxic, hyper-effective antifreeze agents to fight unwanted ice formation in regenerative medicine and reduce mechanical icing.
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When we wrote about the dangers of senescent cells in 2015, few had ever heard about this aspect of pathologic aging.

Move forward to 2022 and there are hundreds of published papers in the National Library of Medicine describing compounds that remove these worn-out cells.

Agents that delete senescent cells are called “senolytics.”¹,²

In coming years, senolytics will likely become standard care for all individuals over age 40.

The reason is that senescent cells release toxic factors that accelerate degenerative processes throughout our bodies.¹,³–⁸

When senolytics were administered to old mice (the human equivalent of 75-90 years), lifespans increased roughly 36% along with better physical function.⁹

In 2018 and 2019, mainstream medical journals described the potential of senolytics to “transform medical care.”¹⁰,¹¹

A huge review article published in August 2022 described many promising animal and human studies. The authors advocated for large, randomized, placebo-controlled clinical trials using senolytics to combat age-related disorders.¹²

We concur about more extensive research, but this begs the question, what are people over age 40 supposed to do now to reduce their senescent cell burden?

This editorial describes what’s holding back rapid clinical research and what people are practicing today to selectively remove senescent cells.
A major factor in old-age decline is the accumulation of senescent cells that:

- Impede Organ Function
- Ignite Chronic inflammation
- Emit Protein-Destroying Enzymes
- Shorten Healthy Lifespan

Diabetes, obesity, stroke, vision loss, neurodegenerative disorders, osteoarthritis, and cancer can be connected to the presence of senescent cells. Senolytic compounds selectively destroy senescent cells.

Numerous studies about senolytics have been published in recent years. This research provides evidence that senolytics could contribute to better clinical outcomes against age-associated disorders. They show promise in combating heart failure, type II diabetes, Alzheimer’s, vascular insufficiency, and lung impairment.

Senolytic Properties of Fisetin

Fisetin is a flavonoid found in various plants including strawberries, apples, grapes, and onions. Researchers have found that fisetin is an exceptionally powerful senolytic.

When compared to other plant compounds, fisetin was the most effective at removing senescent cells, both in cell culture and in mice. The impact is 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.

The Mayo Clinic has been at the forefront in initiating clinical trials to ascertain the ability of fisetin to reduce the senescent cell burden in aging humans. Mayo Clinic researchers, however, ran into an obstacle.

Government Impedes Human Research

Professor James Kirkland at the Mayo Clinic is spearheading multiple senolytic studies.

On December 9, 2021, Dr. Kirkland described a clinical trial where he had to complete a 450-page detailed Investigational New Drug application. He submitted this to the FDA for approval to do a human study using fisetin.

The FDA then mandated that Dr. Kirkland do preclinical (animal and pharmacology) studies before “allowing” a senolytic clinical trial to commence. It took 2 1/2 years to gather this information, and only then could they begin the human study.
Congress Needs to Amend Regulations

In this instance, I am not criticizing the FDA for intentionally committing wrongdoing. The problem is an antiquated system that erects so many bureaucratic hurdles that many promising clinical trials never commence. Congress needs to amend requirements for studying compounds (like repurposed medications) so that clinical trials can be initiated without the strict regulatory requirements for testing a brand-new drug.

Senolytic Drug and Nutrient Options

The first clinically tested senolytic approach combined a cancer drug called dasatinib with high-dose quercetin on an intermittent basis (several dosing periods within a year).

Quercetin and dasatinib each have unique senolytic-targeting properties. Taking dasatinib + quercetin together is a validated approach to removing senescent cells.9,23

Obtaining a prescription for dasatinib is challenging, the cost per pill is high, and some people don’t want to take a cancer drug, even though it is only being used several times a year in many cases.

Fortunately, an extract from black tea called theaflavins has been shown to have a similar senolytic mechanism (decrease activity of tyrosine kinase receptors) as dasatinib in preclinical research.24

Theaflavins have also been shown to inhibit the BCL-2 family of proteins.25 Compounds that inhibit BCL-2 might help prevent some malignancies in addition to removing certain types of senescent cells.

Fisetin is a broad-spectrum bioactive plant flavonoid with potent senolytic activity.

Fisetin has been shown to:

- Function as a targeted senolytic agent;21
- Protect the brain in various models of neurodegenerative disorders;26-32
- Improve outcomes in people who suffered strokes;33
- Help prevent malignant changes in cells;34-37
- Help fight obesity and type II diabetes in animal and experimental models.38-40

The initial challenge was that fisetin is mostly, and rapidly, converted to different metabolites in the liver.

Two years ago, scientists developed a method to increase fisetin bioavailability up to 25 times higher,21 thus enabling it to reach higher concentrations in the blood, and then to stay there longer, compared to ordinary fisetin.

A current nutritional senolytic strategy is to take, just once per week, the following:

Theaflavins + Quercetin + Fisetin

Many readers of this publication already do this, using a formula that combines all three of the above nutrients.

What’s irrational about this delay is that fisetin has long been ingested by people in various fruits and vegetables (albeit at lower potencies). It’s also been used for years as a dietary supplement.

Bureaucratic barriers like this impede rapid testing of senolytic and other compounds that may slow or reverse certain aging processes.

It’s a major reason why most practicing physicians remain in the dark about senolytics, despite favorable reviews published in the New England Journal of Medicine, JAMA, and other respected medical journals.
Mainstream Recognizes Potential of Senolytics

Here are a few quotes from research published in the *Journal of the American Medical Association*:

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

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

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

### In this month’s issue...

In a recent interview, Dr. James Kirkland at the Mayo Clinic elaborated on the multiple ways that senolytics can potentially combat a host of degenerative disorders.

The article on page 30 of this month’s issue provides an update on Dr. Kirkland’s research at the Mayo Clinic.

People with higher intake of black tea have lower incidences of cancer. This may be due to a senolytic compound in black tea called theaflavins.

The article on page 38 describes how theaflavins activate a beneficial cancer-suppressing gene named p53.

Theaflavins may play a dual role by removing senescent cells and protecting normal cells.

We at Life Extension continue to advocate for rapid-fire clinical testing of compounds that may delay and reverse toxic mechanisms that underlie biological aging.

### References

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References

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Ever heard of cell senescence?
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Vitamin D Levels Linked to Better Cognitive Function in Parkinson’s Disease

Higher levels of vitamin D are associated with better cognitive function in Parkinson’s disease, according to a study published in the *Journal of Clinical Neuroscience.*

Compared to healthy controls, levels of vitamin D were significantly lower in patients with Parkinson’s disease.

Differences were also noted in the levels of cognitive function within Parkinson’s disease patients.

For example, the highest levels of vitamin D were seen in those with normal cognition. Those with Parkinson’s dementia had the lowest vitamin D levels.

*Editor’s note:* The researchers concluded that, “These findings support the relationship between cognitive impairment and vitamin D in Parkinson’s disease patients.”

* Journal of Clinical Neuroscience 100 (2022) 192-195.
Calcium Intake May Protect Against Kidney Stones’ Recurrence

A study reported in *Mayo Clinic Proceedings* revealed a lower risk of recurrent kidney stone symptoms in people who had higher dietary intake of calcium.*

The study enrolled 411 individuals who were symptomatic kidney stone formers and 384 control patients who did not have the condition, following them for a median of 4.1 years. Responses to questionnaires about diet at the beginning of the study were analyzed for the intake of various nutrients.

A recurrence of kidney stone symptoms was experienced by 73 of the stone formers. After adjustment for various factors, lower dietary calcium intake remained a significant predictor of recurrent symptoms.

**Editor’s Note: Life Extension** considers an optimal calcium intake of 1,200 mg from both diet and supplements together. Many women supplement with 700 mg of calcium daily.†

† This dose assumes daily calcium dietary intake of 300-500 mg.

A man may require less supplemental calcium, but aging men need skeletal-support nutrients, like calcium.

Cranberry Supplement Boosts Memory

*Frontiers in Nutrition* reported the finding of a brain benefit among a group of older men and women who consumed a supplement containing powdered cranberries.*

Sixty participants between the ages of 50 to 80 were given a supplement that contained the equivalent of one cup of fresh cranberries (providing 281 mg of proanthocyanidins) or a placebo daily for 12 weeks. Blood chemistry and cognitive function were assessed, and magnetic resonance imaging (MRI) scans of the brain were conducted before and after the treatment period.

Participants who received the supplement showed improved episodic memory performance and neural functioning compared to placebo.

**Editor’s Note:** Additionally, researchers reported the observation that there was a decrease in low-density lipoprotein (LDL) cholesterol during the course of the study. Cranberry juice or concentrated cranberry anthocyanin capsules have long been used to prevent urinary tract infections.

* Front Nutr. 2022 May 19;9:849902.
Colorectal Cancer Risk Reduced with Higher Folate Intake

Higher intake of folate and its synthetic form, folic acid, is associated with a lower risk of colorectal cancer (CRC), *The American Journal of Clinical Nutrition* reported.*

Based on data collected from more than 85,000 individuals who participated in the Nurses' Health Study, folate intake was assessed using dietary questionnaires, with follow-up lasting from 1980-2016.

Greater folate intake 12-24 years before diagnosis was associated with a 7%-17% lower risk of colorectal cancer, and greater intake of folic acid 16-20 years before diagnosis was associated with a 9% reduced risk.

**Editor's Note:** “Folate intake, both total and from synthetic forms, was associated with a lower risk of overall CRC after long latency periods. There was no evidence that high folate intake in the post-fortification period [the 1998 institution of mandatory folic acid fortification in the U.S.] was related to increased CRC risk in this U.S.... population,” the authors concluded.

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

In preclinical studies, fisetin:

- Mimics effects of calorie reduction²
- Targets longevity pathways²⁻⁶
- Extends lifespan of mice by about 10⁷
- Removes senescent cells through senolytic action⁷
- Suppresses excess mTOR activation⁸

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 fisetin compound increased up to 25 times compared to fisetin by itself.⁹

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

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References
Echinacea is an immune enhancing plant. Clinical studies have shown that compared to placebo, echinacea use can lead to an improvement in cold symptoms, fewer days with severe symptoms, and reduction in cold incidence and severity.¹³

But not all echinacea is the same. Different active components are found in different species of echinacea and in different parts of the plant.

Many echinacea supplements contain only one species, with 80% of products relying solely on Echinacea purpurea.

Not all contain standardized ingredients. This results in inconsistent potency.⁴

To maximize echinacea’s full immune supportive potential, look for supplements containing extracts from various parts of the plant, as well as more than one plant species.

This can deliver echinacea’s spectrum of immune-boosting benefits.
What is Echinacea?

Echinacea is a plant native to central and eastern North America. It was used as folk medicine by Native Americans to reduce cold symptoms and treat coughs, sore throat, and headaches.

When explorers Lewis and Clark learned about the uses of this medicinal plant in 1805, they considered it one of their most important finds, mailing its seeds and roots back to President Thomas Jefferson.5

Today, echinacea extracts are used to boost immune function and treat flu, colds, and other upper respiratory tract infections. It is also an anti-inflammatory.

Echinacea’s effects derive from its bioactive compounds, including phenolics, polysaccharides, alkamides, caffeic acid derivatives, and others.

These active components are found in different parts of the plant (the roots, flowers, leaves, and others) and in different echinacea species. Research suggests that the clinical effects are likely due to these multiple bioactive compounds which may have a synergistic effect.6,7

How Echinacea Works

The compounds in echinacea work in different ways to enhance immune function and deliver other benefits. For example:7

- **Phenolic** compounds provide antiviral, antitumor, and antioxidant activity.

- **Polysaccharides** provide immunomodulating and anti-inflammatory effects. They stimulate macrophages (immune cells that destroy harmful microorganisms), which in turn secrete signaling proteins that enhance virus-killing natural killer (NK) cells.

- **Alkamides** provide immunomodulating, anti-inflammatory, and antifungal effects, and protect NK cells against compounds that can inhibit their activity.

Boosting Immunity

Preclinical studies support echinacea’s use for immune support:

- One study found that echinacea produced a two-fold increase in natural killer cell activity in a type of human immune cell known as peripheral blood mononuclear cells (PBMCs).8

- In another study on human PBMCs, compared to baseline, echinacea resulted in a reduction in pro-inflammatory compounds of up to 24% and a 13% increase in interleukin 10 (IL-10), an anti-inflammatory factor.9

- A study on aging mice showed that echinacea increased NK cell numbers by 30% and activity by 20%.10

- Studies on mice found that echinacea boosted NK cell activity11 and that lifelong echinacea use significantly increased lifespan.12

- A systemic review of preclinical and clinical studies found that echinacea may decrease pro-inflammatory cytokines and increase levels of anti-inflammatory cytokines.13

This immune support explains how echinacea may defend against illnesses like the common cold and flu.
Fighting Upper Respiratory Tract Infections

To evaluate the ability of echinacea to help prevent upper respiratory tract infections, researchers conducted a meta-analysis of 24 controlled trials, involving a total of 4,631 participants. These clinical trials had used various echinacea preparations from different species, with dosages ranging anywhere from 40 mg to 4,000 mg per day.

The meta-analysis found that echinacea use was associated with an absolute reduction of 10% in the risk of contracting a cold, compared to placebo. When the clinical trials included in the study are examined individually, the effects of echinacea on the common cold are more dramatic. These individual studies document an array of improvements with echinacea use compared to placebo, including:

- 58.7% improvement in symptoms compared to 33.6% with placebo,
- 33.3% fewer days with severe symptoms,
- 36% relative reduction in cold incidence and severity following travel, and
- 3.4 days duration of upper respiratory tract infection, versus 8.6 days with placebo.

These human studies used different echinacea species and different echinacea plant parts, and each trial demonstrated a different type or level of protection against upper respiratory tract infections. This suggests that using more than one echinacea species and multiple parts of the plant is the best way to maximize echinacea defense.

Getting the Most from Echinacea

- The immune supportive effects of echinacea help it defend against upper respiratory tract infections. Clinical studies have shown that compared to placebo, echinacea use can lead to an improvement in cold symptoms, fewer days with severe symptoms, and reduction in cold incidence and severity.

- Different active components are found in different species of echinacea and in different parts of the plant. Many echinacea products contain only one species and one plant part.

- Studies suggest that to receive echinacea’s complete spectrum of immune-boosting and antiviral benefits, it is critical to select a product that contains extracts from various parts of the plant, as well as more than one plant species.
**Summary**

Echinacea delivers immune support and varying degrees of protection against colds, flu, and other upper respiratory tract infections. Different bioactive compounds behind this immune support are found in different echinacea species and different parts of the plant.

Many echinacea supplements contain only one species and provide only one part of the plant. This diminishes the wide range of biologically active components and their immune-supporting effects.

The best way to obtain echinacea's full immune support and anti-viral power is by taking extracts from various parts of the plant, as well as more than one plant species.

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

**References**

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Not All ECHINACEA Is the Same

Echinacea has been used for centuries to support immune function.

Most echinacea products contain one part of the plant, extracted from one plant species, limiting the amount of available beneficial compounds.

Echinacea Elite contains standardized extracts from various parts of the plant, as well as from more than one plant species. This provides a broad spectrum of echinacea actives for maximum benefits.

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Dr. James Kirkland: The Senolytics Revolution
James Kirkland, MD, PhD, and his Mayo Clinic team are spearheading research that aims to prevent or reverse multiple diseases of aging.

Compounds known as senolytics are being tested in 16 clinical (human) trials.¹

Early evidence suggests they may do more than target chronic diseases. They may also counteract certain aging processes.

Dr. Kirkland, along with a growing number of scientists, believes the body’s accumulation of senescent cells is a critical factor in disease, frailty, and aging.

His research is focused on identifying and testing agents that safely remove these toxic, old cells.

In the August 2022 issue of Nature Medicine, Dr. Kirkland and two Mayo Clinic colleagues note that senescent cells are a target for “disorders across the lifespan.”²
Senescent Cells

Ideally, old cells begin a programmed sequence of self-destruction, known as apoptosis, and are cleared away by the immune system.

But senescent cells behave differently. They don’t self-destruct.

Instead, they linger and emit a toxic mix of protein-degrading enzymes that damage healthy cells. They also secrete pro-inflammatory factors that contribute to chronic low-grade inflammation.3

Dr. Kirkland attributes the accumulation of senescent cells to be causative factors of degenerative aging and chronic diseases.

These senescent cells are what Dr. Kirkland and others seek to safely eliminate.

Dangers of Senescence

The idea that removing senescent cells could boost longevity was based partly on the observation that mice with mutations that increase lifespan have fewer senescent cells than normal mice. Similarly, very short-lived mice have more senescent cells.4

In studies in some human cell and animal models, removing senescent cells from the body improves markers of aging and prolongs lifespan.5-9

Senescent cells also increase in a number of chronic diseases.6

Dr. Kirkland and his collaborators are investigating the effects of eliminating senescent cells in models of Alzheimer’s disease, arthritis, osteoporosis, frailty, and other disorders.

Senolytics

Compounds called senolytics have the capacity to safely sweep away senescent cells.9,10

They work by reactivating the apoptosis switch in senescent cells, causing these toxic cells to die off, and provide room for healthy, functioning cells.

Dr. Kirkland has worked intensively on the potential for senolytics to reverse a range of chronic diseases and increase human longevity.

Senolytics being tested include the anticancer drug dasatinib, the plant-based nutrients quercetin, theaflavins, and fisetin, and a growing list of related compounds.

The senolytic effects of these compounds have been documented in rodents and human cultured cells.
Compared to untreated mice, those that started a dasatinib-quercetin mix at an age equivalent to 75 to 90 years in humans ended up living about 36% longer, with better physical function.\(^\text{11}\)

Senolytics have effectively prevented, delayed, or alleviated a variety of conditions and diseases in mice. Clinical trials currently underway for senescence-related diseases have shown early but clear signs of promise.

In humans, a brief course of senolytics enhanced several measures of physical activity in patients with idiopathic pulmonary fibrosis, a progressive lung disease.\(^\text{12}\)

**Daunting Roadblocks**

Human trials of senolytics could change medicine forever. They could allow us to switch from treating symptoms to circumventing root causes of aging and age-related disease.

Of course, these trials can take many years, given the timeframe needed to observe a significant change in longevity.

Lack of funding delayed getting senolytic trials started. As Dr. Kirkland noted in the review of which he was a co-author, companies and entrepreneurs are generally uninterested in funding studies of nutrients or existing drugs because they’re unable to patent them.\(^\text{2}\)

Even more daunting, bureaucratic mandates and regulatory red tape are proving to be the greatest roadblock.

In a recent interview, Dr. Kirkland described the voluminous paperwork and endless regulatory hoops holding his team back.

Dr. Kirkland and his team wanted to study the plant compound fisetin, known to be a promising senolytic. Before getting approval, however, the U.S. Food and Drug Administration (FDA) forced them to compile a highly technical, 450-page Independent New Drug report on fisetin.

Preparing this one document for FDA submission required 2.5 years.

These roadblocks were erected despite over 5,000 Americans a day perishing from an age-related pathology.
Summary

Senescent cells are a major cause of accelerated aging and the development of chronic age-related disorders.

The research into senolytics by Dr. Kirkland and his colleagues at the Mayo Clinic seeks to delay the onset of multiple degenerative illnesses and increase healthy human lifespans.

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

References


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With age, our body accumulates senescent cells that affect the day-to-day function of the healthy cells around them.

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The suggested dose of the Senolytic Activator® is 3 capsules once a week. Each bottle lasts 3 months and costs very little.
CANCER-FIGHTING EFFECTS OF THEAFLAVINS
It has been observed that people with higher intake of black tea have reduced rates of cancers.¹

That may be due to a compound found in black tea called theaflavins.

In cell culture and animal models, theaflavins have demonstrated anti-cancer effects, working in multiple ways to slow the spread and progression of many types of cancer.¹⁻⁵

One group of scientists has dubbed black tea “the future panacea for cancer.”²

BY BRUCE EDWARDS
Systemic Effects of Theaflavins

When green tea leaves are fermented to make black tea, compounds called theaflavins are formed.6 These black tea polyphenols (theaflavins) have shown body-wide health benefits.

In particular, research has uncovered specific ways that theaflavins play a role in fighting cancer. By interacting with cellular pathways and processes critical to cancer development and progression, theaflavins beat back cancer cells and make it hard for them to survive and spread.

One review paper noted that an ideal cancer therapy would:2

- Shrink tumors by inducing cancer cell death, blocking the growth of new blood vessels in tumors, and slowing or stopping the spread of cancer in the body,
- Boost immune system function to aid in the fight against cancer, and
- Reduce the systemic toxic effects that cancer creates.

These scientists believe that black tea theaflavins accomplish all these actions. Several reviews of the anti-cancer actions of theaflavins provide evidence to support this belief.1-5

A “Guardian Angel” Against Cancer

A gene is critically involved in halting the progress of a wide range of human cancers.

Known as p53, this gene has long been recognized as a tumor suppressor, inhibiting both the formation and progression of tumors. In fact, p53 has earned the nickname “the guardian of the genome.”7,8 Tumor suppressor genes are parts of the genetic code that prevent and interrupt malignant changes in cells.

In approximately half of all human malignancies, the p53 gene is mutated, thus impairing the cell protective role of p53.9

When p53 is functional, it defends the health of cells by repairing damage to DNA that can cause mutations that contribute to cancer.6

The p53 gene also acts as a master regulator of cell pathways that are involved in cancer development. Active p53 helps starve cancer cells of fuel, prevent new blood vessel formation, halt spread and metastasis, block cancer cell proliferation, and induce cancer cell death.3

It even helps improve the success of chemotherapy and radiation in attacking existing cancer cells.

In many tumors, however, p53 is mutated. This is a driver of cancer risk and progression.3

Research on theaflavins suggests the activation of p53 as an important mechanism in inducing many of its anti-cancer actions.3
Additional Anti-Cancer Action

Theaflavins regulate a protein called mTOR, which can cause cells to excessively propagate. Theaflavins also inhibit an inflammation-inducing complex called NF-kB that is involved in cancer development and progression.\(^1,4,7,10\)

In cell cultures and animal models, theaflavins have demonstrated the ability to impair cancer by:\(^1-5\)

- Reducing the initial development of cancers,
- Arresting the cancer cell cycle, halting cancer cells’ ability to grow and proliferate,
- Reducing cancer cell viability, making them less robust and resilient,
- Inducing the death of cancer cells,
- Inhibiting the formation of new blood vessels in the tumor, starving the cancer of oxygen and nutrients,
- Impairing the ability of cancer cells to spread and metastasize, and
- Boosting the immune system to join the fight against cancer.

Anti-Cancer Activity of Theaflavins

- Theaflavins are nutrients found in black tea. These compounds work in different ways to prevent cancer development, block its ability to grow and spread, and directly kill cancer cells.
- These anti-cancer effects of theaflavins have been demonstrated for many forms of cancer in both cell cultures and animal models.

A wealth of pre-clinical data has found that theaflavins offer protection against mechanisms involved in cancer development and progression.\(^11-15\)

These beneficial actions have been seen in cancers of the breast, prostate, lung, ovaries, cervix, skin, colon, liver, esophagus, stomach, and hematological malignancies like leukemia.\(^1-5\)

Human Studies

There are human data to support this. One study recruited men with prostate cancer who were scheduled for surgery.\(^16\) Some consumed black tea for five days prior to surgery while others received a placebo drink.

After surgery, levels of tea polyphenols were significantly higher in the removed tumor tissues of men who received black tea.

Scientists then attempted to grow the prostate cancer cells in a cell culture containing blood serum from the patients. In these cultures, cancer cell growth was significantly reduced in those who drank black tea five days prior to surgery.
Summary

Preclinical studies have found that theaflavins from black tea exert anti-cancer effects. Cell culture and animal models have demonstrated multiple ways that theaflavins block cancer development and progression, and epidemiological studies show that people with higher intake of black tea theaflavins have reduced rates of cancers. We hope the data presented in this article will motivate oncology researchers to initiate clinical trials to assess whether adding theaflavins to conventional cancer treatments improves patient outcomes.

Theaflavins Fight Cancer by Some of the Same Mechanisms as Statin Drugs

Recent research has found that some common medications possess anti-cancer activity. For example, the statin drugs used to treat abnormal cholesterol levels have been found in some studies to reduce risk for cancer. This effect is believed to be attributable to various mechanisms including modulation of mTOR and associated PI3K/Akt.

These cellular signaling pathways are intertwined with many other mechanisms of cancer development and progression. Theaflavins have been found to share many of these mechanistic targets.1,4,5,17

Theaflavins are not a substitute for conventional cancer treatment. They may later demonstrate efficacy as an adjuvant nutrient analogous to doctors who recommend vitamin D to patients with diseases like type II diabetes and cancers today.

References

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Black Tea

Theaflavins

A UNIQUE PLANT EXTRACT

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Black tea extracts have been found to:

• Promote normal cell division
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Theaflavins, found in black tea, work on multiple pathways to protect the integrity of cells throughout your body.

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A Single Dose of L-THEANINE Safely Lowers Stress
Stress makes us feel miserable. It can have a devastating impact on emotional and physical health.

**Chronic stress** increases cardiovascular risk, diminishes immune function, impairs cognition, induces gastrointestinal problems, contributes to depression, and more.¹

A compound found in **green tea** can help. This amino acid, named **L-theanine**, promotes **stress relief**, calm, and relaxation—**without** causing drowsiness.²

L-theanine is rapidly absorbed and cleared from the body. This causes some people to take multiple doses throughout the day to achieve sustained levels.

Using an *immediate- and extended-release technology*, scientists have found a way to allow L-theanine to stay in the body for **up to six hours**.

One study in **moderately stressed** adults found that a **single dose** of this form of L-theanine led to a greater *increase* in indicators of **relaxation** compared to placebo.³
Deadly Effects of Chronic Stress

Repeated or unrelenting stress leads to a higher risk for cardiovascular disease, diminished immune function, and damaging inflammation.\(^1\).\(^4\)

One of the most widely recognized health effects of chronic stress is an increased risk of heart disease.\(^5\)

Chronic stress has been shown to impair cardiac function and can cause high blood pressure, arrhythmia, and vascular inflammation leading to atherosclerosis and stroke.\(^6\)

Most anti-stress or anti-anxiety drugs cause sedation and other side effects and can be addictive.\(^7\)
So, scientists have been investigating plant extracts that may safely reduce stress and anxiety without side effects.

L-Theanine Lowers Stress

Researchers have long been investigating an amino acid called L-theanine that is found primarily in the leaves of green tea. Studies show it is able to cross the blood-brain barrier.\(^2\)

L-theanine has demonstrated anti-stress effects, including reductions in perceived stress and markers of stress response like blood pressure, heart rate, cortisol, and patterns of brain activity.\(^8\)

This confirms earlier work that showed subjects taking L-theanine reported significantly less subjective stress than those taking placebo.\(^9\)

Research has revealed that L-theanine generates a sense of relaxation, with alertness, through at least two mechanisms:\(^10\)-\(^18\)

1. Enhances production of the inhibitory (relaxing) neurotransmitter GABA, or gamma amino butyric acid.

(GABA then influences levels of dopamine and serotonin that also produce relaxing effects.)

2. L-theanine increases the brain’s production of alpha brain waves. This creates a state of deep relaxation with mental alertness.

Results of Human Studies

Human trials confirm that L-theanine has relaxing properties that relieve stress.\(^3\),\(^19\)

In one study, pharmacy students undergoing high-stress clinical training who took 200 mg of L-theanine twice daily reported feeling significantly less stress than those who took a placebo.\(^9\)

Another clinical trial was done with healthy men and women, aged 21 to 47, who were not considered to be particularly stressed before the study.\(^19\)

Each volunteer was subjected to alpha brain wave testing, which measures wakeful relaxation, and heart rate measurements. Then, a stress test was given and measurements were retaken.
Next, half the group was given 200 mg of \textbf{L-theanine}, and half was given a \textbf{placebo}. The stress test was conducted twice more over the following 90 minutes. The alpha brain wave and heart rate tests were also repeated. Results showed that:\textsuperscript{19}

- \textbf{Relaxed wakefulness} (measured by alpha brain wave activity) increased with L-theanine but not with the placebo,

- \textbf{Tension} and \textbf{anxiety} were reduced to a greater degree in the L-theanine group, and

- \textbf{Heart rates} were lowered by L-theanine, compared to placebo, a further sign of stress reduction.

A randomized, triple-blind, placebo-controlled, crossover study was done on healthy but \textbf{moderately stressed} adults aged 19 to 60 years.\textsuperscript{3}

Study subjects took a \textbf{single dose} of 200 mg of an \textbf{extended-release} form of \textbf{L-theanine}, or placebo.

\begin{itemize}
  \item All these volunteers took a mental arithmetic test in order to induce mental \textbf{stress}. There was a seven-day washout period between the L-theanine test and the placebo test.
  \item \textbf{Alpha brain wave} activity, salivary \textbf{cortisol} levels, and vital signs were recorded before and after participants took the arithmetic test.
  \item Increases in heart rate, blood pressure, and self-reported stress and anxiety confirmed that subjects experienced stress during the \textbf{stressful} mental test. However, compared to the placebo, 200 mg of \textbf{L-theanine} led to \textbf{greater} alpha wave activity, indicating a \textbf{higher} level of relaxation without drowsiness, just \textbf{three hours} later.\textsuperscript{3}
  \item The “calming response” in brain activity was further supported by greater \textbf{decreases} in salivary \textbf{cortisol} levels, compared to placebo.
  \item In other words, \textbf{L-theanine} reduced feelings of stress and physical markers of stress in the body.
\end{itemize}
Summary

Stress reduces quality of life and boosts the risk of chronic disorders and premature death.

L-theanine, an amino acid found in green tea, lowers stress and promotes relaxation while maintaining alertness.

Unlike anti-anxiety drugs, L-theanine safely relieves stress without causing drowsiness.

L-theanine is rapidly absorbed, but then rapidly cleared from the body. Using an immediate- and extended-release technology, scientists have found a solution to this, allowing L-theanine to stay in the body for up to six hours.

Human trials have shown that L-theanine reduces signs of stress after just a single 200 mg dose.

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

References

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What Is LACTOFERRIN?

BY LAURIE MATHENA

Lactoferrin is a protein found in milk that provides antimicrobial activity and has immunomodulatory properties. It is present in many tissues and required for effective protection against external threats. While some lactoferrin is produced in the body, it can also be absorbed from oral intake, bolstering the body’s defenses.

Laboratory, animal, and clinical research demonstrates lactoferrin’s activity against a wide range of viruses, including those that cause the common cold and flu.

Lactoferrin Fights Common Viral Illnesses

Lactoferrin is an important component of the body’s defense against infections. It works by helping to block viral invasion of cells and by amplifying the immune system’s power to eliminate viral infection from the body. Found in mucous, saliva, and other secretions, lactoferrin helps prevent pathogens from gaining entry through the linings of the oral cavity, nasal cavity, airways, and digestive system.
One unusual feature of lactoferrin is the diversity of viruses it can shield against. It possesses robust antiviral activity against viruses that cause the common cold and flu, gastroenteritis (stomach flu), hepatitis B and C, herpes simplex, Epstein-Barr virus, and more.¹

In one study, healthy women taking oral lactoferrin experienced a reduced onset of symptoms of both the common cold and gastroenteritis.⁵

In another, oral lactoferrin was shown to reduce the incidence and severity of the symptoms of viral gastroenteritis.⁴

How Lactoferrin Works

Lactoferrin works several ways to defend against viral infections.

First, it disrupts viruses from binding to cells.⁵ This can stop the virus in its tracks, before it has a chance to enter cells and cause illness.

Second, it activates specific immune functions, such as natural killer (NK) cells and increases NK cell numbers. This can help prevent the spread of a virus in the body.

Lactoferrin may also help block the ability of viruses to reproduce even if they’re already inside cells.¹ This helps limit the spread of the virus, potentially reducing the severity of the resulting illness.

Added Benefits

Lactoferrin has shown great promise in fighting against age-related bone loss.⁸ It can also help prevent “dry eyes” after cataract surgery. This loss of tear film and quality can produce symptoms such as pain, irritation, and poor vision.

When patients were given lactoferrin one day after surgery, they showed a 95% improvement in tear quality and quantity after 60 days of supplementation compared to controls.⁹

Supplementing with Lactoferrin

Lactoferrin is a versatile substance with a wide range of benefits. A typical dose of lactoferrin is 300 mg once or twice daily.

Taken orally, lactoferrin is readily absorbed and can play an important role in bolstering defenses against viral illnesses.

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

References

B12 Elite provides both:

**ADENOSYLCOBALAMIN**
- Active in brain cell mitochondria.
- Preclinical evidence suggests that it may support already healthy levels of dopamine.
- Supports cellular energy production.

**METHYLCOBALAMIN**
- Supports cognition within brain cells.
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- Helps maintain healthy homocysteine levels.

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Selenium promotes the body’s production of glutathione, a potent cellular antioxidant. It also encourages healthy cell division, thyroid health, and immune function.

To ensure you get enough, we’ve combined three complementary forms of this mineral with vitamin E for additional antioxidant protection. **Super Selenium. Share a longer life.**

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

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

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Lloyd

*VERIFIED CUSTOMER REVIEW*
Lactoferrin is a component of whey protein best known for its immune benefits. An array of published studies describes how lactoferrin up-regulates innate and adaptive immune responses to a variety of antigens.

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Contains milk.

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Everything you need for daily immune support in one easy-to-grab, travel-ready packet.

- **Vitamin C 1,000 mg with Bio-Quercetin Phytosome**: promotes antibody-producing cells.¹
- **Vitamin D3 5,000 IU (125 mcg)**: plays a critical role in healthy immune function.
- **Zinc 50 mg**: promotes normal development of NK cells.²
- **Probiotic *L rhamnosus* CRL1505 and *S. cerevisiae* fermentate**: promotes secretory IgA antibodies.³-⁵

Take one pack daily to help promote a healthy, balanced, year-round immune response.

References
1. Available at: https://lpi.oregonstate.edu/mic/vitamins/vitamin-C. Accessed June 24, 2021.

For full product description and to order **IMMUNE PACKS WITH VITAMIN C & D, ZINC, AND PROBIOTIC**, call 1-800-544-4440 or visit www.LifeExtension.com

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- Support a healthy response to everyday stress
- Promote emotional well-being
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Optimized Ashwagandha provides standardized leaf and root extracts at a low cost.

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It’s not just diabetics who have to worry about their blood glucose levels.

According to the National Diabetes Statistics Report, an estimated 38% of Americans aged 18 years or older have blood glucose levels that are higher than normal…but not high enough to meet the threshold for type II diabetes.¹

Our longstanding position is that anyone with less-than-optimal glucose, insulin and hemoglobin A1c (HbA1c) should aggressively intervene to optimize these glycemic markers.

Scientists have identified two plant extracts that can help maintain normal blood sugar levels, particularly after meals when spikes typically occur.

In human trials, a clove extract and a maqui berry extract²-⁵ each helped prevent harmful after-meal leaps in blood sugar.

These extracts can aid in maintaining healthy after-meal blood glucose levels.
The Danger of Elevated Blood Sugar

More than 48% of all U.S. adults aged 65 and over have prediabetes. About 25% have a formal diagnosis of type II diabetes.¹

Those with prediabetes may have normal resting levels of glucose, but their levels can get out of control after a meal. These cases often go unnoticed because they’re not apparent on standard fasting blood tests.

That’s a huge problem. After-meal elevated glucose levels alone are associated with higher rates of cardiovascular disease, impaired cognitive function, and death.⁵⁻¹⁴ Almost a third of those with prediabetes could go on to develop diabetes within five years if no corrective actions are taken.¹⁵

Benefits of Plant Extracts

Higher intake of polyphenols, health-promoting compounds found in plants, is associated with protection from disease. Low polyphenol intake is associated with increased risk of chronic disease, including type II diabetes.⁴

Two specific polyphenol-rich plant extracts have been found to have beneficial effects on the control of glucose levels, particularly following a meal: maqui berry extract and clove extract.

Maqui Berry Extract

Maqui berry is a fruit native to South America. Extracts of these berries are high in polyphenols known as delphinidins.¹⁶

These nutrients have been shown to lower after-meal glucose levels. They do this by stimulating a peptide produced in the intestines that improves glucose metabolism.¹⁶,¹⁷

A study published in 2022 in the medical journal Frontiers in Nutrition found that a single dose of maqui berry extract before intake of sugars was associated with a decreased risk of high blood glucose levels in people with prediabetes.⁵

Patients showed reductions of the risk of dysglycemia (abnormal blood sugar levels) at the different doses tested, with the greatest impact seen with the highest dose of 180 mg.

In another human study, 200 mg of maqui berry extract taken before a meal helped lower after-meal glucose by more than 15% while also reducing after-meal insulin levels.³ (Excess secretion of insulin is associated with insulin resistance and future diabetic risks.)

Another study of subjects with a new diagnosis of prediabetes² found that 180 mg of maqui berry extract significantly reduced levels of HbA1c (hemoglobin A1c) over 90 days.
HbA1c is a commonly used blood marker of long-term blood glucose control. Lower levels indicate better long-term glucose control and less risk of diseases related to elevated glucose levels.

Overall, these studies suggest that an early intervention with maqui berry extract might help prevent prediabetes from progressing into full-blown diabetes.

The most compelling evidence of blood sugar control using clove extract was seen in a clinical trial published in 2019.4 This pilot study enrolled healthy young adults with normal fasting glucose levels and prediabetics with elevated fasting glucose.

All subjects were given 250 mg of clove extract daily, following a meal, for 30 days. On various days during this month, subjects had their blood glucose levels tested before and after a meal.

The extract led to improvements in both groups as follows:

- Reduced after-meal blood glucose levels by 22% in those with normal fasting glucose, and
- Reduced after-meal blood glucose levels by 27% in prediabetics with elevated fasting glucose.

In the group with prediabetes, the clove extract also helped maintain healthy levels of glucose throughout the day. That means their fasting glucose levels were also significantly reduced.

**Clove Extract**

Cloves are dried flower buds of the *Syzygium aromaticum* tree. They have been widely used as a spice for centuries.

A clove extract has been produced that is standardized to at least 30% total polyphenols, a powerful mixture of bioactive compounds.18-20
Cell culture experiments reveal three ways that clove extract helps maintain normal blood glucose and prevent after-meal spikes:

- It enhances uptake of glucose into muscle cells by 63%.
- It inhibits excess production of glucose by liver cells, and
- It reduces the activity of two digestive enzymes that break down more complex sugars such as starch, preventing a spike in glucose.

Taking clove and maqui berry extracts together may reduce after-meal glucose spikes and help with overall glucose control.

Summary

Typical aging people have higher than ideal levels of glucose, insulin, and A1C.

Clove extract and maqui berry extract have been shown to reduce after-meal blood glucose levels in individuals with prediabetes.

Even in adults with normal fasting glucose, clove extract reduces after-meal glucose levels.

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

References

Buffered ascorbate encased in two plant extracts (liposomes plus hydrogel fenugreek) increases blood (plasma) exposure nearly seven times more compared to an equivalent dose of regular vitamin C.

It also maintains higher vitamin levels throughout the day.¹

Just one vegetarian tablet daily provides around-the-clock vitamin C support.

Item #02501 • 60 vegetarian tablets
1 bottle $25.50 • 4 bottles $23 each

GEROPROTECT® Autophagy Renew stimulates the body's natural “cellular cleanup” process essential to youthful cellular function and overall health.

Artificial Intelligence was one of the tools utilized by researchers to help identify the best nutrients in this advanced formulation.

This new longevity formula contains luteolin and piperlongumine to:

- Promote ongoing cellular housekeeping
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- Inhibit mTOR signaling

Activating autophagy supports healthy cellular function and longevity.

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

†Developed in collaboration with Insilico Medicine, Inc.

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If you want to feel great after you eat, you need to keep your already-healthy glucose levels in check. Glycemic Guard™ helps the body maintain already-healthy blood sugar levels—especially post-meal, when glucose spikes can occur.

Suggested dose is one capsule a day or as recommended by a healthcare practitioner.

If you are taking blood glucose lowering medication, consult your healthcare provider before taking this product.

"This product has been useful along with diet in keeping better blood sugar control."  
Myra  
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This formula combines proprietary cinnamon and seaweed extracts with a unique chromium stabilized with standardized amla and shilajit to promote healthy blood-sugar levels already in normal range.

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The Secret to Longevity in Life and Love

BY LAURIE MATHENA

At 95 years old, Marion Ferdinand Hess, Sr., has lived a life that has defied the odds. He survived a premature birth, fighting in World War II, and two deadly hurricanes in his hometown of New Orleans.

He has been married to his wife, Jean, for 75 years. And he is in the 10% of men over 90 years old who do not have prostate cancer.

Now, Marion attributes his longevity to the vitamins he and his wife started taking for prevention over 25 years ago.

The Early Years

At age 17, Marion enlisted in the army to fight in World War II. He was immediately deployed to Germany, where he landed under fire, and he served under General Patton until the end of the war.

Soon after returning home from the war, Hess met his future wife, Jean Catherine Meliet.

On September 20, 1947, Marion and Jean tied the knot just one day after one of the deadliest hurricanes to hit the gulf coast slammed into New Orleans, a category 2 hurricane with sustained winds of 110 mph.
Fifty-eight years before the infamous Hurricane Katrina, Hurricane George breached the 17th Street Canal, flooding buildings, causing massive power outages, and leaving standing water for weeks. But Marion and Jean refused to cancel their wedding, and they were married the following night.

“There was no electricity,” recalled Jean, “so my mother placed lanterns around the church for lighting. She also hired a band for dancing and entertainment, and she placed lanterns all around the reception hall. From that day on, my mother treated Marion like her son.”

### Overcoming Family Medical History

Marion and Jean did not have an encouraging family medical history. Many of their family members had passed away at a young age from conditions like cancer, heart attack, and stroke. It appeared as if Jean might follow in their footsteps.

In 2005, at the age of 76, Jean was diagnosed with type II diabetes. She was overweight, and her hemoglobin A1C level was over 6.6. That’s when their daughter, Melissa Hess, stepped in and took Jean to see Dr. Samuel Andrews, an endocrinologist in New Orleans and author of the well-known diet book, *Sugar Busters*.

Dr. Andrews told Jean that the only way to control her diabetes was to lose weight. Melissa took it a step further and told Dr. Andrews that her mother would not only lose the weight but would reverse her diabetes.

Jean lost 40 pounds in one year, changed her diet, and at her daughter’s recommendation, she started taking targeted supplements for diabetes and glucose control from Life Extension.

Before long, her Hemoglobin A1c level dropped down to below 6.0.

Jean said, “After taking these supplements for quite a while—and losing weight—I went back to see Dr. Andrews. He said, ‘Mrs. Hess, I’m proud to say that you’re not a diabetic anymore.’ I couldn’t believe it!”

### Their Life Extension Journey

Since 1996, Marion and Jean have taken Life Extension® supplements every day as part of their personal prevention protocol. They had learned that in order to maintain their cognitive function and prevent conditions like cancer and heart disease, they had to take action long before those conditions arose.

They now believe their efforts have paid off.

“I attribute my longevity to my vitamins,” said Jean.

Between the two of them, Marion and Jean take over 50 supplements every day, and they get their blood tested every other month to stay on top of any health problems that might arise.

The blood tests continue to show that Marion’s bloodwork looks more like a 30-year-old than a 95-year-old. Marion has very little gray hair and looks younger than his age, which he attributes to his daily supplements.

In addition, a recent biopsy revealed that Marion is free of prostate cancer, a claim only 10% of men in their 90s can make.

Even their dog, Lucki, a Hurricane Katrina survivor that was rescued from a rooftop in a flooded area of New Orleans, is given supplements and remains spry at 18 years old.

Every day, Lucki is given a multivitamin, vitamin C, carnitine, taurine, ubiquinol, ginkgo biloba, collagen, calcium, vitamin D, probiotics, lutein, and many more.

“It’s all about prevention,” said daughter Melissa. “You have to start many years ahead of time to prevent dementia, heart diseases, autoimmune conditions, and cancers.”
Marion and Jean’s Daily Supplements

- Advanced Milk Thistle
- AppleWise
- Arterial Protect
- Arthro-Immune Joint Support with PARACTIN®
- ArthroMax® Advanced with NT2 Collagen™ & AprèsFlex®
- Bifido GI Balance
- Bone Restore with Vitamin K2
- Calcium Citrate with Vitamin D
- Cognitex® Basics
- Cognitex® Elite
- Daily Skin Defense
- DMAE Bitartrate
- Endothelial Defense™ Pomegranate Plus
- Enhanced Stress Relief
- EsophaCool™ Berry Flavor
- Eye Pressure Support with Mirtogenol®
- Fast-Acting Joint Formula
- FLORASSIST® Daily Bowel Regularity
- FLORASSIST® GI with Phage Technology
- FLORASSIST® Heart Health
- FLORASSIST® Mood Improve
- Gamma E Mixed Tocopherols & Tocotrienols
- Ginkgo Biloba Certified Extract™ 120 mg
- Glycemic Guard™
- Homocysteine Resist
- MacuGuard® Ocular Support with Saffron & Astaxanthin
- Magnesium Caps 500 mg
- Melatonin 6 Hour Timed Release 300 mcg
- Mitochondrial Energy Optimizer with PQQ
- N-Acetyl-L-Cysteine (NAC)
- NAD+ Cell Regenerator™ and Resveratrol
- Neuro-Mag®
- Optimized Carnitine
- Optimized Cran-Max® with Ellirose™
- Optimized Folate L-Methylfolate 1700 mcg
- Optimized Resveratrol
- PalmettoGuard®
- Potassium with Extend-Release Magnesium
- Pro-Resolving Mediators
- Pyridoxal 5’-Phosphate Caps 100 mg
- Quick Brain Nootropic
- Shade Factor™
- Super Carnosine 500 mg
- Super K Elite
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- Taurine 1,000 mg
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- Two-Per-Day Multivitamin
- Ultra Prostate Formula
- Vanadyl Sulfate
- Vitamin D3 - 7000 IU
- VenoFlow™
- Venotone Standardized Horse Chestnut

**Words of Wisdom**

Through decades and wars, natural disasters and pandemics, Marion and Jean have defied the odds in life, in health, and also in their relationship.

In September of 2022, they celebrated 75 years of marriage, and together they have three children, three grandchildren, and four great grandchildren.

Jean says that their secret to staying together is that “You have to agree with each other, enjoy each other, and never go to bed mad at night. Always keep a smile on your face.”

No doubt Marion has been instrumental in keeping everyone smiling. When his doctors ask him why he’s taking so many vitamins and supplements, he gets a twinkle in his eyes and responds, “My daughter wants me to die healthy.”

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

**PHOTO 1:** Wedding photo on September 20, 1947. Marion was 20 and Jean was 18.

**PHOTO 2:** Marion and Jean with daughter, Melissa Hess, at a wedding in New Orleans on May 20, 2006. Marion was 79 and Jean was 77.

**PHOTO 3:** 60th Wedding Anniversary dinner party in New Orleans on September 20, 2007. Marion was 80 and Jean was 78.

**PHOTO 4:** 72nd Wedding Anniversary dinner in New Orleans on September 20, 2019. Marion was 92 and Jean was 90.
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1 bottle $33

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PRODUCTS

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 2® 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™
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 • 15 mg, 100 capsules
00335 DHEA • 25 mg, 100 capsules
00882 DHEA • 50 mg, 60 capsules
00607 DHEA • 25 mg, 100 vegetarian dissolve in mouth tablets
01689 DHEA • 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 and Resveratrol

IMMUNE SUPPORT
02411 5 Day Elderberry Immune
00681 AHCC®
02302 Bio-Quercetin
02410 Black Elderberry + Vitamin C
02433 Echinacea Elite
01961 Enhanced Zinc Lozenges
01704 Immune Modulator with Tinofend®
02425 Immune Packs with Vitamin C & D, Zinc and Probiotic
02005 Immune Senescence Protection Formula™
00316 Kyolic® Garlic Formula 102
00789 Kyolic® Reserve
01681 Lactoferrin (Apolactoferrin) Caps
02426 Mushroom Immune with Beta Glucans
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™
01709 Black Cumin Seed Oil
02310 Black Cumin Seed Oil and Curcumin Elite™
00202 Boswellia
02467 Curcumin Elite™ Turmeric Extract • 30 veg capsules
02407 Curcumin Elite™ Turmeric Extract • 60 veg capsules
01804 Cytokine Suppressor* with EGCG
02223 Pro-Resolving Mediators
00318 Serraflazyme
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
02430 Fast Acting Relief
00522 Glucosamine/Chondroitin Capsules
02420 Glucosamine Sulfate
02424 Joint Mobility
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
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
- 02414 Bio-Fisetin
- 01214 Blueberry Extract
- 01438 Blueberry Extract and Pomegranate
- 02270 DNA Protection Formula
- 02431 Essential Youth - L-Ergothioneine
- 02114 GEROPROTECT® Ageless Cell™
- 02415 GEROPROTECT® Autophagy Renew
- 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 Reservatrol Elite™
- 01637 Pycnogenol® French Maritime Pine Bark Extract
- 02210 Resveratrol Elite™
- 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 and Beta-Sitosterol
- 01790 PalmettoGuard® Saw Palmetto/Nettle Root Formula and Beta-Sitosterol
- 01837 Pomi-T®
- 01373 Prelox® Enhanced Sex for Men
- 01940 Super R-Lipoic Acid
- 01919 X-R Shield

### MINERALS

- 01661 Boron
- 02107 Extend-Release Magnesium
- 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

### 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

### MULTIVITAMINS

- 02199 Children's Formula Life Extension Mix™
- 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
- 02428 Plant-Based Multivitamin
- 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 Discomfort Relief

### PERSONAL CARE

- 01006 Biosil™ • 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

### PROBIOTICS

- 01622 Bifido GI Balance
- 01825 FLORASSIST® Balance
- 02421 FLORASSIST® Daily Bowel Regularity
- 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
- 02505 FLORASSIST® Probiotic Women's Health
- 01920 FLORASSIST® Throat Health
- 52142 Jarro-Dophilus® for Women
- 00056 Jarro-Dophilus EPS® • 60 veg capsules
- 21201 Jarro-Dophilus EPS® • 120 veg capsules
- 01038 Theracal® Probiotics
- 01389 TruFlora® Probiotics

### PET CARE

- 01932 Cat Mix
- 01931 Dog Mix

### MISCELLANEOUS

- 00577 Potassium Iodide
- 00657 Solarshield® Sunglasses

### MOOD & STRESS MANAGEMENT

- 02434 Calm-Mag
- 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
- 02429 Theanine XR™ Stress Relief
PRODUCTS

VITAMINS

WEIGHT MANAGEMENT & BODY COMPOSITION

WOMEN'S HEALTH
Get Moving!

Joint Mobility is a patent-pending blend of tamarind and turmeric extracts.

A placebo-controlled clinical trial* shows these plant extracts help:

- Support you to walk farther and faster
- Promote knee flexibility and range of motion
- Reduce occasional knee discomfort
- Inhibit inflammation to support continued joint health

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

Patented turmeric and fenugreek blend (500 mg) results in 45 times greater bioavailability of free curcuminoids.

Item #02407
500 mg, 60 vegetarian capsules
1 bottle $24 • 4 bottles $22 each

Same 500 mg potency of patented turmeric and fenugreek blend with added benefits of ginger and other turmeric actives.

Item #02324
500 mg curcumin + gingerol, 30 softgels
1 bottle $20 • 4 bottles $18 each

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.

For full product description and to order Curcumin Elite™ or Advanced Curcumin Elite™, call 1-800-544-4440 or visit www.LifeExtension.com
7 WHAT IS DELAYING SENOLYTICS?
Senolytics promise to delay and reverse aging processes. Bureaucratic barriers are impeding rapid clinical trials of senolytic compounds.

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Researchers recommend using multiple species and parts of the echinacea plant to fully obtain its immune benefits.

38 CANCER-FIGHTING IMPACT OF BLACK TEA
Preclinical data show that black tea theaflavins block cancer development and progression. Human studies are urgently needed.

46 SINGLE DOSE OF L-THEANINE LOWERS STRESS
With extended-release forms, L-theanine can reduce stress for up to six hours.

55 WHAT IS LACTOFERRIN?
Lactoferrin, a protein associated with mother’s milk, disrupts viruses from binding to cells and boosts natural killer cell activity.

62 MANAGE AFTER-MEAL BLOOD SUGAR SPIKES
Studies show that extracts of clove and maqui berry can reduce dangerous after-meal blood glucose spikes.