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**WHAT DOCTORS MAY CONSIDER IF COVID-19 SYMPTOMS WORSEN**

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We also discuss COVID-19 tests that are not the panacea portrayed by the media and government.

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Reference
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Xiaoxi Wei, PhD, is a chemist, expert in supramolecular assembly and development of synthetic transmembrane nanopores with distinguished selectivity via biomimetic nanoscience. She has expertise in ion channel function and characterization. She founded X-Therma Inc., a company developing a radical new highway towards non-toxic, hyper-effective antifreeze agents to fight unwanted ice formation in regenerative medicine and reduce mechanical icing.
Science has shown that garlic, rich in allicin, supports immune function on multiple fronts, for example:\textsuperscript{1,2}

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- Modulates cytokine production

Easy to take Optimized Garlic is standardized to contain 10,000 ppm of allicin potential.

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References

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Avoiding Mechanical Ventilation

During the initial COVID-19 outbreak, the media focused on the shortage of hospital ventilators. It was as if intubation using mechanical ventilators would result in favorable patient outcomes or outright cures.

The reality is that large numbers of severe COVID-19 hospitalized patients did not survive the ventilator. It merely delayed death by several weeks.

Those who survived often suffered significant organ damage.

The purpose of this editorial is to convey possible strategies for a symptomatic COVID-19 patient to discuss with their physician.

These experimental tactics, if successful, might enable severe COVID-19 patients to avoid disease progression and invasive mechanical ventilation.

I also describe why COVID-19 tests are not the panacea the government and media often portray them to be.
Unreliable Testing

The lay public and medical professionals have been misled and confused by relentless reports about **testing** for the **virus** that causes COVID-19 disease.

We at Life Extension® were inundated in early March 2020 with proposals from accredited laboratories to offer **PCR** (polymerase chain reaction) **tests** to our readers, aimed at detecting acute COVID-19 infection.

Credentialed labs also proposed that we offer **blood tests** to detect **antibodies** to the SARS-CoV-2 virus.

We rejected all these **tests** because of concern that these tests might not be accurate.

Our apprehensions have been borne out.

The initial **PCR** screening tests involved sticking a swab deep into the **sinuses** and back of the **throat** (nasopharyngeal swab).

Another collection method involved testing samples of **saliva** in a cup. The objective of collecting these samples was to use **PCR** analysis to detect the presence of the SARS-CoV-2 **virus**.

Do SARS-CoV-2 Antibodies Confer Immunity?

There is lack of medical consen-
sus as to whether a positive **IgG** antibody test indicates **long-term immunity** that might protect against a future (whether new or relapsed) COVID-19 infection.4,5

What **immunity** means **after** infection with the SARS-CoV-2 virus is not clear at the time of this writing.

Questions linger, such as: Will recovered patients have **immunity**? And if so, will it last a few months? A year? Can patients infected once with COVID-19 be infected again, despite having had a **positive IgG antibody** test?

These are but some of several unknowns related to COVID-19 immunity at the time of writing this editorial.

**False-positive** test results are especially worrisome with blood **antibody** tests because this conveys a false sense of security (i.e. presence of immunity) when in fact the individual may still be at risk for infection, or re-infection, with COVID-19.

Although **PCR** is a validated technology, preliminary research by experts in lab testing suggest that up to 30% of results with **PCR** tests are **false-negative**.1,2

This is in a large degree due to inadequate **specimen collection**, but also related to reagent issues, machine testing peculiarities, and a variety of other problems.

The consequence of such a high **false-negative** rate is that many symptomatic persons were told they were not infected with the novel coronavirus when they really were.

The **antibody** blood tests were also suspect. Reasons include **false-positive** test results caused by other common cold coronaviruses (cross-reactivity with the test).3

LabCorp now offers a vastly improved **IgG** antibody test you can order yourself on their website for as low as $10-12 depending on your health insurance. As you’ll read next, we don’t know what the practical value of these **antibody** tests will be.
We were concerned about inaccurate false-negative PCR results during screening for acute infection. Even with improved SARS/Cov-2 antibody tests, we worry about misinterpreting the results when attempting to identify individuals who have developed immunity.

We await solid data as to how effective having antibodies to the SARS-CoV-2 virus is at conferring long-term immunity against COVID-19 disease.

Startling Data Published in JAMA

Severe COVID-19 patients placed on mechanical ventilators have high mortality rates. Those who survive ventilator support often encounter systemic co-morbidities along with muscle atrophy.

A study published in JAMA summarized the demographics, co-morbidities, and outcomes of 5,700 COVID-19 patients hospitalized during the first pandemic wave in New York City.6

This study found that 24.5% of patients who received mechanical ventilation died and most remained hospitalized.

When the study was released, the following data were reported about patients who needed mechanical ventilation:

- 72% remained hospitalized
- 1 out of every 4 died
- Only 3.3% were discharged from the hospital at time of publication

Those who survive prolonged ventilator support often suffer damage to their kidneys, heart, brain, and lungs.7,8

These systemic injuries are likely inflicted by a combination of:9

- The SARS-CoV-2 virus
- Pro-inflammatory cytokine storm
- Hyper-coagulation of blood
- Mechanical ventilation and long hospitalization

Better treatments are desperately needed to decrease the risk and progression of severe infection and reduce the need for invasive mechanical ventilation.

As I was finalizing this editorial, an article was published in the Wall Street Journal on May 11, 2020 titled:

“Some Doctors Pull Back on Using Ventilators to Treat Covid-19”

This article described different hospital treatment options, including having patients lie on their front side (prone position) to receive non-invasive high flow oxygen in lieu of mechanical ventilation.

Life Extension® added this suggestion to our “Respiratory Support Protocol” on April 16, 2020 that you can view at: www.LifeExtension.com/immune

Challenge to Keep You Informed

I wrote several versions of this editorial describing studies suggesting novel strategies to potentially avoid progression to severe disease with COVID-19.

My problem is that as fast as I write something of value, new data emerge. And due to the novelty of this SARS coronavirus, there is a lack of high-quality, rigorous, peer-reviewed data on which I normally insist.

But these are not “normal” times. Thousands of lives are lost daily to this global pandemic.
Advances in our understanding of how to better treat COVID-19 with experimental interventions could spare many lives—particularly if the understanding and interventions came sooner rather than later.

In lieu of printing these rapidly evolving treatment options, these insights are available on another website: age-reversal-covid.net

Some information on this website discusses what one might do if progression from “mild/moderate” to “severe/critical” COVID-19 disease occurs.

The objective of these postings is to provide updates that can be discussed with treating physicians.

Much of the information about COVID-19 is subject to radical change as new and better-quality data emerge.

Why COVID-19 is Different

Back in the 1980s-1990s, Life Extension® fought a multi-decade battle with the FDA to force the approval of an anti-viral drug called ribavirin.

When ribavirin was combined with interferon-alpha, treatment outcomes in hepatitis C patients markedly improved. Today’s hepatitis C drugs (like Sovaldi®) are curing over 95% of patients.

Yet, when these drugs were approved in 2013-2014, most still relied on co-administration of ribavirin.

More recent hepatitis C protocols are combining Sovaldi® with newer drugs (in lieu of ribavirin) to eradicate hepatitis C.

We have no financial interest in ribavirin. We identified its efficacy in the early 1980s and relayed this information to our supporters.

The FDA did not approve ribavirin until 1998. Our efforts to accelerate approval of ribavirin may have saved thousands of American lives.

The challenge with COVID-19 is there are no historic data sets to make definitive treatment suggestions like there were for ribavirin.

We are, instead, dealing with a rapidly changing series of experimental COVID-19 interventions with no tightly controlled studies to substantiate them.

New Website to Help Keep You Updated

The emergency nature of the COVID-19 pandemic mandates an open flow of information from researchers and doctors practicing on the front lines treating COVID-19 patients.

Scattered reports from these doctors are revealing potential opportunities to spare the lives of severe and critical COVID-19 patients.

Yet the media only lightly describe these data or overlook them.

This motivated me to create a new website that discusses potential COVID-19 treatment options in lay language.

The objective is to provide physicians with concise information and enlighten COVID-19 patients about potential therapies to discuss with their physicians.

Please know this is not a “news” website. It serves as a channel to disseminate biomedical data.

If something about COVID-19 is widely reported in the media, it might not get on this website right away because the data are already in the public domain.

Those interested in viewing these reports can visit: age-reversal-covid.net
LabCorp Offers Tests Direct to Consumers

LabCorp is offering SARS/Cov-2 antibody blood tests direct to the public at a very low price if you have health insurance or other forms of medical coverage. There is some bureaucracy to navigate that you can review on: www.labcorp.com/antibody-testing

Life Extension does NOT sell these antibody tests. They are available direct from LabCorp, but most of the public cannot distinguish between these validated tests and some others that may not yet be thoroughly studied.

This COVID-19 antibody test can be ordered through your doctor, either in-person or through a telemedicine program if offered by your health plan or employer, or through some employee wellness plans.

The test can also be requested using an independent telemedicine physician service accessible at LabCorp’s special website: www.labcorp.com/antibody-testing

(Article continues on next page.)

COVID-19 Symptoms

You’ve likely read about the initial symptoms of today’s novel coronavirus (COVID-19) pandemic.

The Centers for Disease Control and Prevention currently lists them as:10

- Fever
- Cough
- Shortness of breath or difficulty breathing
- Chills
- Repeated shaking with chills
- Muscle pain
- Headache
- Sore throat
- New loss of taste or smell

Some people may display no symptoms (asymptomatic) yet still be capable of infecting others.

Those who experience symptoms sometimes describe COVID-19 as the worst viral infection they have ever encountered.

The miseries of COVID-19 disease can involve fluctuating periods of fever, often worse at night, as well as shortness of breath and extreme fatigue that may last for two weeks or longer. These sufferings are being reported by people with so-called “mild to moderate” disease that does not require hospitalization.

For “severe” and “critical” COVID-19 disease, hospitalization is required.

Some reports in the medical literature at the time of this writing suggest relapses of initial infection, which implies some patients may not fully clear the viral infection for a long time, yet remain infectious.
Once the test order is placed, your antibody blood draw can be done at nearly 2,000 LabCorp patient service centers.

As I wrote earlier, however, we don’t yet know what the practical value of a positive IgG antibody test to the COVID-19 virus is as it relates to immunity.

If you choose to have this COVID-19 antibody test, consider at the same visit to LabCorp having your blood drawn for the Male or Female Blood Test Panel. We’ve extended the annual sale so you can obtain these comprehensive blood tests that cost over $2,000 at most commercial labs for only $224.

To order any test (except COVID-19 PCR and antibody tests) direct from Life Extension, call 1-800-208-3444 or log on to www.LifeExtension.com/blood

In This Month’s Issue…

Fascinating human and animal data reveal anti-aging effects in response to low-dose intake of the mineral lithium.

The first article in this month’s issue describes an array of benefits that have been discovered about lithium’s ability to slow brain aging and enhance one’s feeling of wellbeing.

Back in 1981, Life Extension® published the first of dozens of articles about the longevity-enhancing potential of DHEA. The article on page 48 expounds on an abundance of published data revealing DHEA’s systemic health benefits.

What I like about lithium and DHEA is they are low-cost and can readily be added to one’s personal health program.

On the flip side, the article on page 71 describes the enormous challenges a leukemia patient went through after undergoing brutal conventional treatments but ends on a happy note we hope you’ll appreciate.

For decades we’ve published articles about the adverse impact of immune senescence. Two articles in this month’s issue discuss non-drug approaches to help circumvent certain aspects of age-related immune decline.

Nothing in these articles is meant to imply any kind of preventative effect against SARS-CoV-2, for which there is insufficient information to make science-based recommendations, based on Life Extension’s strict evidence-based publication criteria.

For longer life,

William Faloon, Co-Founder
Life Extension®

References

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**CAUTION:** If you are taking anticoagulant or antiplatelet medications, or have a bleeding disorder, consult your healthcare provider before taking this product.

**References**
2. Biol Trace Elem Res. 2011 Sep;142(3):274-83

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The only **online** source of these NAD⁺ formulas is LifeExtension.com (or by calling 1-800-544-4440).

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4 bottles $19 each

For full product description and to order Pro-Resolving Mediators, call 1-800-544-4440 or visit 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.
Blood Pressure Medicine More Effective when Taken at Night

What time of day a patient takes blood pressure medicine can have an impact on its effectiveness, according to a study published in the *European Heart Journal*.*

In the Hygia Chronotherapy Trial, researchers looked at data from more than 19,000 patients, comparing the results of people who took blood pressure drugs in the morning to those who took them at night.

Patients were followed for an average of more than six years, during which their ambulatory blood pressure was checked over a 48-hour period at least once a year.

Compared to patients who took their medication in the morning, those who took it at bedtime had better-controlled blood pressure and showed the following benefits:

1) 56% reduced risk of dying from heart or blood vessel problems
2) 49% reduced risk for stroke
3) 34% reduced risk for myocardial infarction
4) 42% reduced risk of for heart failure
5) 40% reduced need of coronary re-stenting

*Editor’s Note:* “Routine ingestion by hypertensive patients of [one or more] prescribed blood pressure-lowering medications at bedtime, as opposed to upon waking, results in improved [ambulatory blood pressure] control…and, most importantly, markedly diminished occurrence of major cardiovascular disease events,” the study concluded.

Extra Virgin Olive Oil Benefits the Brain

Research conducted at Temple University’s Lewis Katz School of Medicine indicates a brain benefit for supplemental extra virgin olive oil in older mice. The study was published in the journal Aging Cell.*

Previously, positive effects were found for olive oil in mice that were genetically engineered to develop the amyloid deposits that characterize Alzheimer’s disease.

The new study evaluated the oil’s effects in mice engineered to develop defective tau proteins in the brain which block the communication of brain cells in Alzheimer’s disease. “Remarkably, tau pathology strictly correlates with the severity of dementia,” the authors stated.

Beginning at six months of age, until the age of one year, the mice were fed a diet either with or without extra virgin olive oil. At the end of the study, mice that received the olive oil demonstrated better memory and cognition in comparison with the control group of mice, as well as a reduction in harmful tau deposits.

Additionally, treated animals’ synapses, which are the connections between brain cells, showed increased activity.

Editor’s Note: Olive oil is known for its many health benefits, including an ability to help protect against cardiovascular disease and mild cognitive impairment.

Lactoferrin has numerous anti-cancer activities.

One key way it helps prevent the development of cancer and inhibit cancer growth is by boosting the body’s **adaptive immune response**, according to a study published in the journal *Biomolecules*.*

Adaptive immunity, also called acquired immunity, is an immune response to a specific pathogen that enhances the body’s response to future encounters with that pathogen. For example, it’s what prevents a person from contracting the measles after they’ve already had it.

In addition to boosting adaptive immunity, lactoferrin works in the following ways to help combat cancer:

- It promotes cell proliferation and migration in healthy cells, while inhibiting proliferation and migration in cancerous cells.
- It crosses the blood-brain barrier, making it an ideal carrier for chemotherapeutics designed to treat brain tumors.
- It is highly bioavailable.
- It selectively targets cells involved in tumor proliferation, survival, migration, invasion, and metastasis.

**Editor’s Note:** According to the study authors, “The use of nutraceuticals as natural compounds corroborating anti-cancer standard therapy is emerging as a promising tool for their relative abundance, bioavailability, safety, low-cost effectiveness, and immuno-compatibility with the host.”

* Biomolecules. 2020 Mar 15;10(3).
Rise in Obesity-Related Cancers Seen at Younger Ages

Cancers associated with obesity, once typically diagnosed at higher rates in people over 65, are now on the rise in younger people, according to a study published in *JAMA Network Open.*

Researchers studied more than 6 million cancer cases in the Surveillance Epidemiology and End Results (SEER) database from the years 2000 to 2016.

The results revealed a shift in obesity-associated cancers to people in both the 20-to-49-year-old age group and in the 50-to-64-year-old age group. The greatest increase occurred in the 50-to-64-year-old group.

In 50-to-64-year-olds, the increase in the number of obesity-associated cancers ranged from 25.3% in non-Hispanic white women to 197.8% in Hispanic men.

*Editor’s Note:* Obesity increases cancer risk by multiple mechanisms that include chronic inflammation, elevated glucose/fasting insulin and hormone imbalances. The authors of this study stated that “some of the greatest increases [were] observed for liver and thyroid cancers [in] all sex- and race/ethnicity- specific strata.”

* JAMA Network Open, 2019; 2 (8): e199261.
Even Light Physical Activity Increases Longevity

Increasing your amount of physical activity—regardless of intensity—can increase your lifespan, according to a study published in the *BMJ.* Even light activity—such as walking or washing dishes—can have longevity benefits.

Researchers analyzed data from 36,383 adults with a mean age of 62.6 years. The data came from studies that tracked activity using motion sensors for up to one week, and that followed individuals for a median follow-up of 5.8 years.

The researchers categorized physical activity according to light, moderate, and intense, and they divided individuals according to most active and least active.

Results showed that the 25% most active people had a 60%-70% lower risk of death compared to the 25% least active people. Moreover, sitting for 9.5 hours a day or more (not counting night-time sleep) was tied to a statistically significant increased risk of death.

* Editor’s Note: Government guidelines recommend a minimum of 150 minutes of moderate exercise or 75 minutes of vigorous exercise per week.

* BMJ. 2019;366:l4570.
Zinc helps fortify the immune system.\textsuperscript{1,2}

When needed, zinc lozenges can be important for strengthening the body’s natural defenses.\textsuperscript{3-5}

Enhanced Zinc Lozenges is an “ionic formula” that delivers 18.5 mg of zinc (acetate) in peppermint flavor lozenge.

Zinc lozenges should be taken as needed. They are not for daily use.

References

Item #01961 • 30 vegetarian lozenges
1 bottle $9

* Limited Supplies Available. One bottle will be initially shipped with the balance to follow upon our re-supply.

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

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Centrum® Can’t Compete

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Two-Per-Day Capsules
Item #02314 • 120 capsules (Two-month supply)

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<thead>
<tr>
<th>1 bottle $18</th>
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<td>4 bottles $16 each</td>
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(Just 30 cents a day or less when 4 bottles are purchased)

Two-Per-Day Tablets
Item #02315 • 120 tablets (Two-month supply)

<table>
<thead>
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<th>1 bottle $17.25</th>
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<tr>
<td>4 bottles $15.50 each</td>
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For full product description and to order Two-Per-Day Capsules or Tablets, call 1-800-544-4440 or visit LifeExtension.com

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FLORASSIST® GI with Phage Technology now provides seven strains of probiotics plus four types of phages in one daily dual encapsulated vegetarian capsule.

DUAL ENCAPSULATION DELIVERY

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Increase AMPK to Better Manage Body Weight

Most people today consume too many excess calories.

This results in mTOR constantly running at high gear, which is a factor in unwanted fat storage.

Studies show that increasing AMPK activity turns down excess mTOR.¹

Reduce Cell Fat Storage

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

AMPK Metabolic Activator was formulated based on data showing reduced belly fat in response to just one of its ingredients (Gynostemma pentaphyllum).³

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

References

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

Actiponin® is a trademark of TG Biotech Co., Ltd.
This supplement should be taken in conjunction with a healthy diet and regular exercise program. Individual results may vary and are not guaranteed.

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For decades, research has suggested that lithium has unique health benefits.

It may help prevent cognitive decline\(^1,2\) and may slow the aging process.\(^3-5\)

Much of lithium’s impact is due to its inhibition of an enzyme in the body known as glycogen synthase kinase-3 (GSK-3).

GSK-3 overactivity has been tied to rapid aging and risk for chronic diseases.

Studies suggest that GSK-3 inhibition is largely responsible for lithium’s ability to protect brain function and extend lifespan.\(^3\)

Lithium may inhibit cellular senescence, an effect that has been shown to increase longevity in preclinical studies.\(^6-8\)

Even at low doses, lithium intake has been associated with decreased all-cause mortality in humans and increased longevity in roundworms.\(^9\)

Two studies have found that individuals living in areas with even modest, low levels of lithium in the drinking water tend to live longer.\(^9,10\)

Small, daily lithium doses (around 1,000 mcg) may be an effective way to slow aging and cognitive decline.
Since lithium reduces GSK-3 overactivity at low doses, numerous age-related health problems could potentially safely be reduced without resorting to high-potency lithium drugs.3,5

Studies suggest that GSK-3 inhibition is largely responsible for lithium’s ability to protect brain function.3

**Lithium May Extend Longevity**

In addition to the well-known positive effects on mood,18 lithium has also been linked with longer overall longevity.

Two studies have found that individuals living in areas with even modest, low levels of lithium in the drinking water tend to live longer.9,10

This pattern has also been observed in people taking high-dose lithium for medical reasons. They generally have lower mortality rates, including lower rates of death due to cardiovascular disease.19,20

Studies in animals have supported these findings and have helped identify the potential biological mechanisms by which lithium extends longevity.

For example, studies in fruit flies and the roundworm C. elegans show that high doses of lithium supplementation lead to longer lifespan.3,6,9 The median survival of...
the animals in one of these studies was increased by as much as 46%.6

These effects were seen at very high doses, but even at low doses, lithium has been shown to modestly increase lifespan in C. elegans.9

Scientists believe lithium may promote longevity by protecting cellular genetic material from age-related deterioration. It may do this in three main ways:6-8

- Lithium may help maintain longer telomeres, structures associated with DNA health and longer life, as seen in long-term, high-dose treatment.
- Lithium regulates genes related to healthy DNA structure.
- Lithium may offer protection from cellular senescence, when elderly cells cease functioning properly but won’t die off. These senescent cells are major contributors to age-related ailments and faster aging.

These mechanisms pack a powerful punch against premature aging and degenerative illnesses.

Lithium and the Brain

In 2018, researchers studying lithium levels in different counties in Texas discovered that rates of death from Alzheimer’s disease were higher in areas with low levels of lithium in the water.10

This came on the heels of a Danish study that found that higher long-term lithium intake from drinking water may be associated with a lower risk of being diagnosed with dementia.21

Clinical studies of lithium in the treatment of dementia show similarly encouraging results.

In one study, a micro-dose of just 300 mcg of lithium daily significantly decreased cognitive decline in Alzheimer’s patients compared to a placebo.22

A recent review found that cognitive function of individuals with early-stage dementia remained more stable in those given lithium than in those who took a placebo.23

In addition to reducing the elevated GSK-3 activity associated with Alzheimer’s, one preclinical study showed that lithium reduces the build-up of beta-amyloid, the abnormal protein that accumulates and forms plaques in the brains of Alzheimer’s patients.24

WHAT YOU NEED TO KNOW

The Wide-Ranging Benefits of Lithium

- Lithium is a trace mineral found in the earth’s crust, and therefore in some, but not all, drinking water.
- Studies suggest that GSK-3 inhibition is also largely responsible for lithium’s ability to protect brain function and extend lifespan.
- Even at low doses, lithium intake has been associated with decreased all-cause mortality in humans and increased longevity in roundworms.
- Lithium plays a critical role, from slowing the aging process to protecting the brain and improving mental health, and more.
- Small daily doses of lithium may be an effective way to slow aging and cognitive decline and extend life.
Other Biological Effects

Research has revealed many other biological effects in those using long-term, high-dose lithium treatment for medical conditions.6

- It reduces cell death and improves cellular resilience and plasticity.
- It increases the activity of multiple beneficial neurotransmitters in the brain.
- It has balancing effects on the circadian rhythm and hormonal function.
- It increases brain-derived neurotrophic factor, an important signaling molecule in the brain that protects brain cells and augments their function.

Scientists continue to discover new benefits of lithium all the time.

Summary

Lithium, an often-overlooked trace mineral, may help slow the aging process, extend lifespan, reduce risk for chronic diseases, and slow the worsening of cognitive decline.

Research shows that low doses of lithium ranging from 300 mcg to around 1,000 mcg daily may have a beneficial impact on mental and physical health and possibly increase longevity.

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

Quercetin has demonstrated significant health benefits, but higher doses are often required to achieve optimal results. A novel phytosome delivery technology markedly increases absorption to deliver more quercetin throughout one’s body.

For daily quercetin supplementation, take just one of the highly absorbable Bio-Quercetin Phytosome capsules.

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* Supplier Internal Study. Data on File. 2017
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LITHIUM

The Brain & Body Element

In areas where lithium is naturally abundant in the drinking water, people tend to live longer, healthier lives.¹⁻³

Lithium is a low-cost mineral that supports cognition, neural function, and healthy aging.³⁻⁵

References

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

Lithium
(1,000 mcg of lithium per tiny cap)
Item # 02403 • 100 Vegetarian Capsules
1 bottle $12
4 bottles $10.50 each

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.
When IMMUNE FUNCTION “Falls off a Cliff”

BY WILLIAM FALOON

Significant dollars are being invested to develop methods to turn youthful immune function back “on.”

Yet many of us can’t wait for delays while our immune systems “fall off a cliff.”

This article explains some of the changes that occur with aging that cause our immune functions to become dysfunctional (senescent).

It also describes some of what is available today to help restore immune competence in aging humans, including suppressing the interleukin-6 cytokine.

Much of this article was published by Life Extension® in January 2016.

Human research has since moved forward on several fronts to induce systemic improvements in immune functions.
WHEN IMMUNE FUNCTION “FALLS OFF A CLIFF”

The problem is that many of us can’t wait for bureaucratic delays while our immune systems fall off a cliff. There is an urgent need today to accelerate restoration of immune competence in aging humans, including suppressing deadly interleukin-6 levels.

Leading Cause of Disability and Death in Older Persons

Immune senescence is a leading cause of disability and death in aging humans.11

By way of example, deaths from pneumonia are rare in youth, but spiral upward as humans mature.12 If you read obituaries (as I do), the number of once-vigorous individuals who perish from opportunistic illnesses caused by immune senescence is startling.

Life Extension® magazine has published in-depth reports about underlying causes of immune senescence and what stop-gap measures people should initiate to reverse this deadly trend.13-15

In people over age 65, the top 10 causes of death include influenza, pneumonia, and sepsis.16 Immune senescence is a major cause of all these maladies.12,17-22

Cancer, stroke, Alzheimer’s, and heart attack are common diseases of aging.16 These illnesses are all also related to immune senescence.

We often hear the term “immune health” as people seek to protect against winter viral infections. The public does not yet understand what causes our immune system to fail as we age.

“We conclude that CHF (chronic heart failure) patients show a higher degree of immunosenescence than age-matched healthy controls. T-lymphocyte differentiation and IL-6 levels are increased in patients with an advanced clinical status and may contribute to disease impairment through a compromised adaptive immune response due to accelerated aging of their immune system.”

Publication: International Journal of Cardiology
– July 1, 2014

Article title: Immunosenescence and inflammation characterize chronic heart failure patients with more advanced disease.

Around age 60 a startling change occurs that decimates our ability to combat infections and malignancies.

Some people encounter these immune impairments earlier in life.

This catastrophic event decreases naïve T cells needed to ward off new bacteria, viruses, and cancers.

At the same time naïve T cells are lost, we accumulate senile memory T cells that emit pro-inflammatory signals that wreak havoc in every organ system.2

One of the deadliest of these inflammatory “signals” is a cytokine called interleukin-6 (IL-6).3

Higher IL-6 levels are associated with a 2-fold greater risk of death.4 Higher levels are also involved with multiple degenerative processes, including frailty, from which so many elderly suffer.5-7

A common trait of healthy centenarians is that they have unusually low levels of IL-6.8

People associate immune senescence with weakened immune function. It turns out that impaired immunity is only half the problem. Spiraling levels of IL-6 that attack our healthy tissues are another component of immune senescence that must be addressed.9

The encouraging news is that significant dollars are being invested to develop technologies to turn youthful immune function back “on.”10 These immune-restoration therapies may add decades to our healthy lifespans.
More Naïve T Cells Urgently Needed

Immune imbalance occurs when our aging immune system fails to protect against new cancers/infections and instead generates inflammatory reactions (including increased IL-6) that attack every cell in our body.

A “naïve” immune cell is one that has not yet been activated. Since it is “naïve” (not yet exposed to an antigen), naïve immune cells are primed to effectively respond to new infectious agents and malignancies.

Once exposed, naïve immune cells become memory cells or plasma cells specific to the original antigen. As our internal reservoir of naïve immune cells is decreased, we have less ability to respond to new infections/malignancies.

A deficit of naïve immune cells combined with over-accumulation of exhausted memory cells decreases the efficacy (antibody response) of vaccinations.

Exhausted memory T cells are associated with increased risks of coronary heart disease and endothelial dysfunction, along with systemic inflammation.

If we are to guard against the ravages of immune senescence, we need to increase our numbers of naïve cells (“virgin” immune cells), while reducing numbers of senile memory cells.

WHAT YOU NEED TO KNOW

Immune Senescence

- Around age 60, physiological changes decimate our ability to combat infections and malignancies.
- Immune senescence is a leading cause of disability and death in aging humans.
- Most Life Extension® customers take nutrients that boost immune activity, including zinc, DHEA and fish oil.
- Immune imbalance occurs when our immune system fails to protect against new infections and instead generates inflammatory reactions (including increased IL-6) that attack every cell in our body.
- The herb Cistanche helps combat immune senescence, which appears to have rejuvenating effects on bone marrow.
- Supplementation with Cistanche has been shown to increase naïve T cells and natural killer (NK) cells while decreasing memory T cells and pro-inflammatory IL-6.
Protecting against Immune Senescence

Most Life Extension® customers take nutrients that exert beneficial effects on immune activity.

**Zinc** and **DHEA** partially restore thymus function, which is vital to transforming bone-marrow-derived immune cells into activated **T cells**.31-35

**DHEA** and **fish oil** help suppress deadly interleukin-6.36-41

An advance in combatting immune senescence is an herb called **Cistanche**. This medicinal plant has been used extensively in China to treat the “ailments of aging.”42

Supplementation with **Cistanche** has been shown to increase naïve T cells and natural killer (NK) cells while decreasing memory T cells and pro-inflammatory interleukin-6.43

A prime cause of the severe immune dysfunction suffered by the elderly is a marked decrease in naïve T cells44-46 and functional natural killer cells,47-49 with a concomitant increase in memory T cells.50,51

**Cistanche** counteracts these pathological trends that characterize immune senescence.43

---

How **Cistanche** Boosts T Cell Production and Healthy Longevity

**Cistanche** helps restore **progenitors** of peripheral naïve T cells, which explains the increase seen in these vital immune cells in response to **Cistanche**.43

Animals supplemented with **Cistanche** have increased lifespans, which would be expected from a compound that counteracts immune senescence.43

**Cistanche** is one of the most popular Chinese herbal medicines and is listed in the Chinese herbal pharmacopoeias as having “anti-aging” properties.

One reason Chinese physicians see such impressive therapeutic results is that **Cistanche** restores one of the most prominent bone marrow biomarkers of immune cell formation called **stem cell antigen-1**.43

Senile bone marrow loses its ability to produce fresh, naïve immune cells, which are launched into the bloodstream to differentiate into mature naïve T and natural killer cells.

Bone marrow **stem cell antigen-1** represents the body’s main source of naïve T cells in the blood.43

**Cistanche** appears to have a rejuvenating effect on the bone marrow, something that is generally available only through expensive recombinant drugs.52-54

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Age-Related Decline in Immune Function

In youth we enjoy abundant naïve T cell populations that stand ready to destroy new bacteria, viruses, and cancers. Once a naïve immune cell does its job, it converts to a memory T cell that responds only to the same bacteria, virus, etc. Aging results in excess memory cells that emit inflammatory signals, while depriving the body of vital naïve cells to fight new invaders and malignancies.
When it comes to “normal” aging, elevated IL-6 contributes to the destruction of bone, heart valves, neurons, and other tissues. The DNA damage that IL-6 inflicts accelerates aging processes and malignant transformation of healthy cells. Life Extension® has published a number of articles about the critical need for aging humans to suppress chronic inflammatory inducers like interleukin-6.

As will be described in the article on page 58, a low-cost tea extract has demonstrated the ability to reduce IL-6. When this tea extract by itself was given to 90 patients (30-65 years old) with metabolic syndrome, the following reductions in inflammatory markers were observed:

- C-reactive protein (CRP) was reduced by 26%
- Tumor necrosis factor (TNF-a) was reduced by 23%
- Interleukin-6 (IL-6) was reduced by 21%

In addition to suppressing IL-6 and other inflammatory factors, this tea extract was shown to favorably alter genes (such as mutant p53) involved in tumor cell growth.

The beneficial impact of Cistanche was demonstrated in an open-label, pilot trial of elderly people. This study combined a low dose of Cistanche (100 mg) with zinc, vitamin E, vitamin B6, fucoidan, and coenzyme Q10. Not only were markers of immune senescence reversed, but the test subjects reported improvements in quality of life, such as not “feeling tired all the time.”

This makes sense in light of the multiple adverse effects immune senescence inflicts on the body, which include increased levels of frailty. Cistanche represents an opportunity to restore vital components of our aging immune systems. Its low cost makes it readily affordable.

**Suppressing Deadly Impact of IL-6**

One way of describing “aging” is that beneficial factors (such as naïve T cell production) decrease while detrimental ones (like interleukin-6) increase.

IL-6 levels are especially high in patients with autoimmune conditions in which an out-of-control immune system attacks one’s own tissues.

High-serum IL-6, as seen in rheumatoid arthritis, for instance, is regarded as a reliable biomarker of high-grade inflammation.

When immune function “falls off a cliff”

Blood cell formation from differentiation of hematopoietic stem cells in red bone marrow.
Making Major Strides…
but Not Fast Enough

For the past five years, significant resources have been expended to initiate studies aimed at counteracting age-related disease.

Scientific studies document how certain nutrients that Life Extension® supporters have taken for decades (like DHEA and zinc) help protect against immune decline, while guarding against chronic inflammatory factors.68-73

Consumers have access to an arsenal of novel compounds to help counteract the underlying factors that characterize immune senescence.

An impressive array of clinical research is being investigated to induce systemic age reversal in elderly people, including restoration of youthful immune function.

The carnage inflicted by dysfunctional immunity in the elderly mandates that research accelerate faster, so that more lives can be saved.

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
WHEN IMMUNE FUNCTION “FALLS OFF A CLIFF”


CAUTION: Individuals consuming more than 50 mcg (2000 IU) per day of vitamin D (from diet and supplements) should periodically obtain a serum 25-hydroxy vitamin D measurement. Do not exceed 10,000 IU per day unless recommended by your doctor. Vitamin D supplementation is not recommended for individuals with high blood calcium levels.

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.
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**.


*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.*
Maintain Healthy IMMUNE FUNCTION

Cistanche: an ancient herb that has been used for thousands of years as a tonic to support health and promote longevity.¹

Scientists have identified Cistanche as rich in echinacosides which promote increased development of T cells and natural killer cells.¹,²

A 12-week human study using Cistanche extract found impressive results in immune function.²

Cistanche helps support an already healthy inflammatory response and inhibit immune senescence.³

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

Note: The same dose of standardized Cistanche can also be found in the Immune Senescence Protection Formula that also provides Reishi mushroom and Pu-erh tea extracts.


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.
DHEA Promotes Quality of Life

BY STEPHANIE MYERS

DHEA is one of the most abundant hormones in the bloodstream.

With age, DHEA levels decline.

From a high point in our 20s, DHEA levels fall by 80%-90% by the time we hit 80 years old.

This loss has been associated with loss of function and increased risk for disease. It impacts quality of life and longevity.

Back in 1981, Life Extension recommended the hormone DHEA as a strategy to slow aging. There are now hundreds of published papers substantiating DHEA’s youth-promoting properties.

DHEA has become a popular anti-aging supplement.

One landmark study that followed older men for 12 years found that an increase of 100 ug/dL of DHEA-S circulating in the blood was associated with a reduced risk of death from any cause by 36%.

A simple blood test can identify DHEA status in men and women. Taking oral DHEA capsules can restore youthful levels.
DHEA PROMOTES QUALITY OF LIFE

By increasing DHEA levels, we help provide the body with some of the raw material it requires to produce the testosterone and estrogen.

But DHEA is not always the optimal way for men to boost testosterone or women to increase estrogen.

In men, DHEA can convert to estrogen, which is good for men with low estrogen that is not in the optimal range of 20 pg/mL-30 pg/mL. Men need enough estrogen to protect against osteoporosis, but not so much that it increases cardiovascular risks.

This is why blood testing is so important for men to achieve optimal estradiol (an estrogen) levels of 20 pg/mL-30 pg/mL.

In women, DHEA more often cascades into testosterone, which can be beneficial for aging women with deficient testosterone that can diminish sexual functions. It can be challenging for menopausal women to fully restore estrogen levels with DHEA alone.

In general, as men age, DHEA tends to increase estrogen more than testosterone. The opposite happens for women, whereby DHEA tends to increase testosterone more than estrogen.

This is one reason why women often only need 15 mg a day of DHEA to achieve optimal levels, whereas aging men usually require about 25 mg of supplemental DHEA a day.

However, the direction DHEA goes is influenced by genetics, diet, lifestyle and visceral fat levels. The best way for an individual to assess if DHEA is going more toward testosterone or estrogen is through blood tests that measure levels of DHEA, testosterone and estradiol.

What Is DHEA?

Dehydroepiandrosterone (DHEA) is a hormone derived from cholesterol and pregnenolone.

It’s produced by the adrenal glands, located just above the kidneys, and in smaller amounts in the testes in males and the ovaries in females.

DHEA acts as a precursor—the starting material—for production of the sex hormones testosterone and estrogen.

It also has direct hormonal effects of its own throughout the body.

Impact on the Sex Hormones

The adrenal glands, testes, and ovaries need DHEA to produce adequate testosterone and estrogen.

As DHEA levels drop with age, less testosterone and estrogen are produced.

Low levels of these sex hormones contribute to loss of vitality and eventual frailty in older men and women.

Lower DHEA levels are tied to other health problems and a diminished quality of life.

In older men, low testosterone results in erectile dysfunction, a drop in libido, loss of muscle mass and bone density, a tendency towards depression, and slowing brain function.4,8,9

In older women, low estrogen levels are associated with a loss of libido, along with hot flashes, mood swings, fatigue, headaches, thinning of the bones, and risk for bone fractures.10,11
Systemic Effects of DHEA

Although DHEA helps produce sex hormones, it also has a widespread, direct impact on tissues throughout the body.

Low levels of DHEA have been tied to premature aging and shortened lifespan, along with an increased risk for:

- Cognitive decline and dementia,
- Cardiovascular disease,
- Osteoporosis and bone fractures,
- Depression,
- Sexual dysfunction,
- Inflammation and inflammatory disorders, and
- Frailty.

Maintaining normal, youthful levels of DHEA into older age may help fend off the problems associated with low DHEA.

Increasing DHEA Levels

DHEA levels peak between ages 20 and 30, then decline at a rate of roughly 5% every year.\(^\text{18}\)

One effective way to raise DHEA levels in the blood in older adults is by taking oral DHEA.

As with any hormone, excess levels of DHEA are not desirable.

A simple blood test called DHEA-S can assess current levels. The results can then be used as a guide to determine how much oral DHEA is needed to achieve youthful levels.

For women, an ideal DHEA-S blood level is 275 ug/dL-400 ug/dL. For men, it’s 350 ug/dL-500 ug/dL.

Most older people can achieve optimal results by taking 15 mg-50 mg of DHEA daily.

WHAT YOU NEED TO KNOW

Keeping Youthful with DHEA

- **Dehydroepiandrosterone (DHEA)** is a hormone produced primarily in the adrenal glands, testes, and ovaries.
- It’s needed by the body to produce the sex hormones testosterone and estrogen.
- DHEA also has many health-promoting effects of its own, directly impacting many bodily functions.
- Levels of DHEA drop as much as 80%-90% by later adulthood, declining in parallel with our vitality and health.
- These low levels are associated with increased risk of disease, diminished quality of life, frailty, and shortened lifespan.
- Blood testing for DHEA can identify low levels and help guide proper oral intake to attain more youthful levels.
- Most older people can achieve optimal, youthful levels by taking 15 mg-50 mg of DHEA daily.
Quality of Life

The impact of *higher* DHEA levels can be dramatic. A recent study assessed the relationship between DHEA and *quality of life*, using the World Health Organization Quality of Life Scale. The researchers found that in adults of various ages, *higher* DHEA levels corresponded to *better* results in three areas of the scale:

- **Physical health**, including levels of energy and fatigue, pain and discomfort, and sleep and rest,

- **Social relations**, including quality of personal relationships and sexual activity, and

- **Environmental dimensions**, including participation in recreation and leisure activities.

Those with higher DHEA also had better *working memory*, the ability to hold and use information in the short term, which is an important marker of cognitive function.

Other studies have reported similar findings related to cognitive function. For example, one recent study found *lower* levels of DHEA-S in patients with *Alzheimer's disease*, compared to those with normal brain function.16

Improving Sexual Function

Many people consider a waning libido and diminished sexual function to be a normal part of aging. Studies of DHEA show that these signs of decline are closely associated with the age-related decline in levels of DHEA.

Studies have demonstrated that age-related *decline* in DHEA is associated with erectile dysfunction in men along with a drop in libido, ability to reach orgasm, and sexual frequency.20

In women and men, *higher* levels of DHEA are associated with *improved* sexual function, including arousal, libido, ability to orgasm, and sexual frequency.20,21

DHEA and Longevity

DHEA’s impact goes far beyond quality-of-life issues. Low levels are associated with increased risk for several disorders of older age, including cardiovascular disease, inflammatory disorders, and metabolic disorders.2-5,14,16

Maintaining youthful levels of DHEA could help ward off these diseases, leading to a longer and healthier life. Aside from its impact on disease, DHEA has also demonstrated an association with *longevity*. Blood levels of DHEA correlate with longevity in primates.22
This appears to be done by activating various “housekeeping” responses that keep tissues youthful and functioning optimally, thus maintaining balance in the body, supporting a healthy immune system, and improving resistance to the development of cancer.

In humans, studies have shown that lower levels of DHEA are predictive of earlier death.\(^6,23-27\)

For example, a study published in the New England Journal of Medicine followed older men for 12 years.\(^3\) It found that those with lower levels of DHEA-S were more likely to die from cardiovascular causes than those with higher levels.

The same study found that an increase of 100 ug/dL in DHEA-S reduced the risk of death from any cause by 36%.

Many other studies have reported similar findings.\(^6,23-27\)

One study took a different approach, tracking DHEA levels over time in older individuals.\(^24\) It found that those people whose levels dropped at a faster rate were at greater risk of death than those whose levels declined at a slower rate.

In fact, the steeper downward trajectory was associated with a 75% greater likelihood of death.

Tracking DHEA levels over time may give a better picture of overall health and identify those individuals who are most in need of taking oral DHEA to get back to youthful levels.

Life Extension\(^\text{®}\) suggests checking DHEA-S levels as part of people’s yearly battery of lab tests.

**Summary**

DHEA is a vital hormone needed to produce testosterone and estrogen. It also has many direct health-promoting effects throughout the body.

Its levels drop dramatically in older age.

Many quality-of-life factors that deteriorate with age, such as sexual function, mood, cognitive function, and physical health, are associated with low DHEA levels.

Decreased DHEA levels are correlated with risk for age-related disorders and overall mortality.

Blood testing can help identify individuals with low levels and guide how much oral DHEA intake is needed to restore youthful levels, to help ward off aging and a diminished quality of life.

**Note:** Concerns have been raised regarding DHEA supplementation and hormone-sensitive cancers. To date, no study has convincingly shown an increased risk of hormone-dependent cancer in people supplementing with DHEA. As always, anyone with a medical condition should consult their doctor before beginning a new supplement or medication. •

If you have any questions on the scientific content of this article, please call a Life Extension\(^\text{®}\) Wellness Specialist at 1-866-864-3027.
References


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**References**

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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.
If we are to live longer, healthier lives, we need our immune system to function at peak capacity.

The following plant-derived compounds have shown an ability to help rescue the immune system from senescent decline:

- **Cistanche**
- **Reishi mushrooms**
- **Pu-erh tea**

Together, these natural extracts help combat immune senescence by several complementary mechanisms that include enhancing activity of natural killer cells and T cells and turning down overactive immune reactions.

This article describes research supporting the use of low-cost plant extracts to help support immune health.
**Reishi Mushroom Extract**

The immune-boosting properties of Reishi mushrooms have been appreciated in Eastern medicine for thousands of years. Modern science is now validating their health-promoting properties.1,2 Studies show that consuming these mushrooms improves immune function and has anti-tumor effects.3-9 In mice, Reishi has been found to promote the maturation and activation of immune system cells such as T cells, natural killer cells, dendritic cells, and macrophages.3,6 Lab studies show that Reishi also helps raise protective IL-10 levels and lower pro-inflammatory IL-6 levels.10,11 This indicates that Reishi augments the function of both the innate and adaptive immune system.

The innate immune system can be thought of as the body’s first line of defense, responding rapidly to potentially harmful insults such as viruses, bacteria, and cancer cells.

Natural killer cells are an important component of this innate immunity.12-17 The diminished activity of natural killer cells that occurs with aging predisposes the elderly to high rates of infection by viruses ranging from influenza to various herpes viruses.16-21

The **adaptive immune system** responds more slowly than the innate immune system but mounts a more specific, powerful attack against pathogens using specialized immune system cells called T cells.

With its ability to boost components of both innate and adaptive immunity, Reishi can protect the aging body from infections. This benefit has been borne out in laboratory studies demonstrating activity against many common viruses, including:

- Herpes simplex viruses—which cause oral and genital herpes
- Influenza viruses—which cause the flu
- Epstein-Barr virus—which causes mononucleosis but can also contribute to the formation of cancer
- Hepatitis B virus—a common cause of liver disease that can lead to liver failure
- Human immunodeficiency virus (HIV)—the virus which causes AIDS

**Premature Death of Jack LaLanne Likely Caused by Immune Senescence**

It is impossible to overstate the magnitude of disability and death that immune senescence inflicts on aging human populations. When you hear a person died from “old age,” in almost every instance the underlying culprit is a dysfunctional immune system that ignites deadly inflammatory fires while failing to protect against infections and malignancies.

No one we know tried to live for over 100 years more than health pioneer Jack LaLanne. He engaged in rigorous lifelong exercise and ate a low-calorie healthy diet. He followed an old-line supplement program probably devoid of vitamin K and DHEA, which may have contributed to his premature death at age 96.

Jack LaLanne died of pneumonia following aortic valve surgery. Aortic valve stenosis is caused by calcification, chronic inflammation, and other factors such as elevated homocysteine.31

Vitamin K prevents calcification that is so often the reason why an elderly person’s aortic valve fails.32-37 DHEA partially protects against inflammation.38-40

Immune senescence may very well have contributed to Jack LaLanne’s early demise by crippling his ability to fight off the pneumonia, which was the acute cause of his death.

It is difficult to imagine someone as fit and vigorous as Jack LaLanne succumbing to pneumonia. Yet a dysfunctional immune system deprives even the hardiest of us from warding off infections that were easily overcome in our youth.

Clearly, protecting against immune senescence is a mandatory component of a longevity program.
Anti-Cancer Properties

In addition to supporting protection from infection, Reishi exhibits anti-cancer properties as well—largely because of its ability to enhance immune function.

In particular, the boost Reishi gives to natural killer cell, T cell, and macrophage function aids in the identification and destruction of abnormal cells that may develop into cancer.²,⁹

Reishi may also directly combat tumors through an array of mechanisms it has demonstrated in the lab: impairing the ability of tumor cells to grow, preventing tumor blood vessels from developing, starving the abnormal cells, and even directly killing cancer cells.²,⁹

In one study, Reishi mushrooms were applied to various human cancer cell lines.⁹ Not only did the Reishi reduce the growth of the cells, but it induced cell death in many of the diseased cells.

Lifespan Extension

Perhaps most impressively, Reishi has been shown to significantly extend lifespan of mice.³⁰ Researchers followed two groups of mice, one fed a normal control diet and the other fed a diet enriched with a Reishi extract.

The Reishi supplemented group lived as much as 148 days longer than the control group. Given that the lifespan of a mouse is typically less than two years, this represents a dramatic increase in longevity.
**Cistanche Extract**

*Cistanche* is a type of desert plant that, like Reishi mushrooms, has long been appreciated for its medicinal uses in Eastern medicine.

Several studies have confirmed the ability of *Cistanche* extract to boost immune cells in the body.\(^{41-44}\)

In one study, researchers utilized a strain of senescence-accelerated mice. These mice age more rapidly than normal mice and display the same deterioration in immune function seen in human immune senescence. The mice fed a diet supplemented with *Cistanche* extract for four weeks had a significantly increased number of T cells and natural killer cells in the blood, and lower *pro-inflammatory* interleukin-6 (IL-6) levels.

This enhancement in immune function translated to an extended lifespan as well. The average age after supplementation with *Cistanche* was 15% longer than the controls'.\(^{41}\)

In addition to T cells and natural killer cells, *Cistanche* also helps activate other important immune cells, including macrophages, dendritic cells, and B cells.\(^{42,43}\)

Encouraging results have been demonstrated in a human study as well. When elderly subjects took 100 mg of *Cistanche* extract daily for 12 weeks, there was a 6.1% increase in helper T cells and an almost 12% increase in natural killer cell activity. This increase represents an immune-boosting effect.\(^{44}\)

Patients also experienced improved markers of vascular function and a decrease in fatigue. No significant adverse effects were observed.

Given that these same improvements in immune function resulted in enhanced longevity in animal studies,
Pu-erh Tea Extract’s Immune Effects

A fermented black tea called Pu-erh has shown benefits for the aging immune system. Studies show that Pu-erh tea and its extract combat immune senescence by multiple mechanisms. Two of the chief ones include increasing natural killer and T cells.

Pu-erh increased survival of age-accelerated mice. Control mice (green line) were all dead by about 382 days, and low-dose (pink) Pu-erh mice had all died by about 413 days. About 5% of mice supplemented with medium (blue) and about 10% of mice supplemented with high (gold) doses of Pu-erh were still alive by the end of the study, at 425 days.

Pu-erh increased average lifespan of mice. Control age-accelerated mice (blue) lived on average about 325 days, as did mice supplemented with low-dose Pu-erh (green). Mice supplemented with medium (yellow) and high (red) doses of Pu-erh, however, had longer lifespans compared with control mice, at about 350 and 375 days, respectively.

Cistanche increased survival of age-accelerated mice. Control mice (green line) were all dead by about 382 days, and low-dose (pink) Cistanche mice had all died by about 413 days. About 5% of mice supplemented with medium (blue) and about 10% of mice supplemented with high (gold) doses of Cistanche were still alive by the end of the study, at 425 days.

Cistanche increased average lifespan of mice. Control age-accelerated mice (blue) lived on average about 325 days, as did mice supplemented with low-dose Cistanche (green). Mice supplemented with medium (yellow) and high (red) doses of Cistanche, however, had longer lifespans compared with control mice, at about 350 and 375 days, respectively.

Pu-erh Tea and Cistanche’s immune effects on mice are shown in the graphs above.}

A hallmark marker of longevity potential is blood levels of interleukin-6 (IL-6).

Older individuals with higher levels of IL-6 tend to not live as long and tend to have a higher burden of chronic disease. On the other hand, older people with lower IL-6 levels tend to be healthier and have better prospects for even longer lives. (See table on next page.)

This makes sense because elevated IL-6 generates chronic inflammatory signals that result in tissue damage throughout the body.

Pu-erh Tea Extract’s Immune Effects

A fermented black tea called Pu-erh has shown benefits for the aging immune system. Studies show that Pu-erh tea and its extract combat immune senescence by multiple mechanisms. Two of the chief ones include increasing natural killer and T cells.

In addition to its ability to bolster the immune system itself, Pu-erh tea appears to provide direct antibacterial and antiviral effects as well. Several studies have demonstrated that Pu-erh tea directly kills or inhibits the growth of bacteria and suppresses the growth of viruses such as hepatitis B.
In one investigation, scientists studied the effects of Pu-erh tea on the senescence-accelerated strain of mice discussed previously. Before supplementation with Pu-erh tea, the mice demonstrated the same features of immune system deterioration seen in aging humans, including lower numbers of active T cells and natural killer cells. In addition, levels of the powerful pro-inflammatory cytokine IL-6 were markedly elevated in the senescence-accelerated mice, compared with controls. Feeding these mice with Pu-erh tea reversed these markers of immune senescence. The treated mice experienced enhanced numbers of T cells and natural killer cells and a significant 43% decrease in IL-6—benefits that more closely resemble a normal, healthy immune system. Based on these immune-boosting results, the researchers concluded that intake of Pu-erh tea may help older individuals prevent infection and cancer.

Anti-Inflammatory Effects in Humans

A human study of Pu-erh tea extract further demonstrated its role in reversing inflammatory cytokine levels. The study was performed among a group of patients with metabolic syndrome, a common condition defined by central obesity, borderline or high fasting glucose, high blood pressure, and elevated blood lipids. Those with metabolic syndrome have higher levels of inflammation and are at an increased risk of having immune impairments.

Subjects were given either Pu-erh tea extract twice daily or a placebo. They were instructed to exercise and observe a healthy diet during the study period but were permitted no medicines that might otherwise affect the results. After three months, patients provided blood samples for analysis of inflammatory cytokines and other markers of inflammation. As expected, placebo recipients showed no significant changes in blood levels of TNF-a or IL-6 (pro-inflammatory cytokines), IL-10 (an anti-inflammatory cytokine), or C-reactive protein (CRP, a marker of total body inflammation). Subjects supplemented with Pu-erh tea extract showed improvements in immune status as follows:

- 21% reduction in IL-6,
- 23% reduction in TNF-a, and
- 26% reduction in CRP.
These reductions indicate significant decreases in overall pro-inflammatory status.

This study also found a 34% increase of inflammation-quelling IL-10, which further demonstrates the overall reduction in inflammation possible with Pu-erh tea extract.

**Pu-erh tea extract** offers multiple pathways to potentially prevent progress of immune senescence.

**Summary**

**Immune senescence** occurs as people age and puts the elderly at increased risk for infections, cancers, and a variety of chronic inflammatory diseases.

Compounds naturally found in certain plants and fungi bolster weakened immune systems.

**Reishi mushrooms, Cistanche, and Pu-erh tea** can improve immune function by several complementary mechanisms, including amplifying the activity of natural killer cells, T cells, and various other immune system components.

They also help suppress over-activity of immune cells that can result in damaging inflammatory reactions.

Adding these nutrients to a healthy diet can help induce improvements in immune cell markers in older age.

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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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References
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Pu-erh tea
• Boosts natural killer and naïve T cells while decreasing interleukin-6 (IL-6).²

Reishi
• Helps reduce biomarkers of immune senescence.³

References

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Science has made remarkable strides in the fight against cancer. But too often, treatments still fail. Cancer remains the second most common cause of death in the U.S., after heart disease.

A new approach called personalized precision immunotherapy offers fresh hope to cancer patients who seem to have run out of options.

In the case of one leukemia patient who had failed chemotherapy and a bone marrow transplant, and was given less than a year to live, a cutting-edge treatment increased the activity of his own immune system more than nine-fold.

This helped his body destroy the cancer and restore his immune system, leading to a recovery so dramatic, he recently completed his first triathlon.

Three years after he began treatment, his cancer remains in complete remission.
A Diagnosis and Failed Treatment

It was 2015. Richard (the patient’s name has been changed to protect his privacy) was 37 years old, with no history of health problems, when he began feeling fatigue, lethargy, an ache in his back, and pain in his leg and ribs.1

Pain medication didn’t help, and after two weeks, doctors performed a series of tests, including a complete blood count and a follow-up bone marrow biopsy. The results confirmed his worst fear: He had an aggressive form of acute lymphoblastic leukemia, a cancer of the blood and bone marrow.

The news got worse. Those cancer cells all carried the Philadelphia chromosome, an abnormality that makes treatment more difficult, relapse more likely, and prognoses poorer.1,2

At the previous clinic, before coming to the Maharaj Institute of Immune Regenerative Medicine, Richard embarked on a complicated five-drug chemotherapy regimen, primarily consisting of medications that stop wildly reproducing cells—but that also shut down many vital natural processes in the body, leading to severe side effects.1

Richard also received one of a new generation of cancer drugs, imatinib, which succeeded in suppressing the activity of the Philadelphia chromosome.

He then underwent another round of high-dose chemotherapy, along with total body irradiation to destroy all vestiges of his cancer cells.

That was followed by a bone marrow transplant from his brother. The goal was to repopulate Richard’s cancer-ridden bone marrow with healthy donor stem cells from his brother, including donor immune cells that could directly attack the leukemia.

As often happens, Richard developed graft-versus-host disease, in which the immune cells from his brother turned on Richard’s own tissues, attacking them and threatening his life.1

To manage the graft-versus-host disease, Richard received several drugs including steroids, chemotherapy such as methotrexate, and severe immune-suppressing drugs such as cyclosporine, in the hope that they’d control the donor marrow cells and stop their attacks on Richard’s body. Fortunately, this approach worked—for a time.

But soon, a relapse occurred, with renewed activity of the Philadelphia chromosome evident. He then received an infusion of his brother’s lymphocytes (immune cells made in the bone marrow). It seemed to work, putting him into a second remission, but a second relapse occurred a few months later.

At 39, Richard was told he had less than a year to live.1

Remarkable Recovery

But Richard’s luck was about to change.

In March of 2017, he found his way to the Maharaj Institute of Immune Regenerative Medicine in Boynton Beach, FL, to discuss his few remaining options.1

Richard chose to go forward with an experimental treatment: personalized, low-dose immunotherapy.

Immunotherapy is a type of treatment that boosts the body’s own, natural immune system, helping it fight disease.

Treatment began with daily low-dose injections of interleukin-2 (IL-2), a naturally occurring human signaling protein. Its normal function from his brother, including donor immune cells that could directly attack the leukemia.
How Personalized Immunotherapy Works

Traditional chemotherapy or radiation treatments aim to wipe out cancer cells, but they kill so many healthy cells at the same time that they do severe damage to a patient. And when treatment stops, the cancer too often comes back.

Even bone marrow transplants, that are sometimes part of the treatment of leukemia, lymphoma, and similar cancer, and which replace diseased blood-forming cells with fresh, healthy ones, can fail or lead to graft-versus-host disease.

Personalized precision immunotherapy takes a new approach. Administering recombinant (genetically engineered) IL-2 stimulates our own natural killer cells to attack tumors.1,3

It also works to maintain the crucial condition of immune tolerance. That’s what keeps our immune systems from working against us, and it is what breaks down when patients develop graft-versus-host disease.1,4-7

In Richard’s case, IL-2 achieved both goals. It raised levels of tumor-killing natural killer cells and suppressed levels of cells trying to attack his healthy tissues. IL-2 also boosted levels of interferon gamma, which promotes the natural killer cells’ abilities.1,8,9

One size does not fit all with this kind of treatment. Doctors created a personalized approach, selecting just the right compound (IL-2), administering it in carefully monitored amounts, and altering the dose in response to daily blood testing.

They achieved a nearly unheard-of result: complete remission of an aggressive cancer, with minimal side effects and no evidence of new graft-versus-host disease.
Researchers believe this type of treatment holds great promise in treating patients with many different forms of cancer.

It is important to understand that IL-2 became available as a cancer drug decades ago, in 1992, and initially there was great hope that it might effectively treat most malignancies.

However, the high-doses of IL-2 used in those early days yielded only marginal benefits against patients’ cancers but inflicted serious side effects. Dr. Maharaj’s approach uses personalized IL-2 dosing about 10% as potent as when IL-2 is administered as frontline treatment. This lower dose yields marked improvements in immune function without serious side effects.

Summary

Many forms of cancer are still resistant to aggressive treatments like chemotherapy.

Adults with recurrent acute lymphoblastic leukemia, for example, have a dismal prognosis, with long-term survival measured in months.

But there’s a new hope: personalized precision immunotherapy.

Using this treatment on a patient who had been given less than a year to live, doctors administered a potent signaling molecule, IL-2, to stimulate the immune system. The dose was adjusted in response to daily blood testing.

After 23 weeks of treatment with almost no side effects, his cancer is effectively gone. He remains healthy and cancer-free three years later.

Personalized immunotherapy holds tremendous promise for treating deadly leukemias and may be of value for other cancers in the future. •

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


For more information on personalized precision immunotherapy, please contact the Maharaj Institute of Immune Regenerative Medicine at 561-752-5522 or info@miirm.org.

Dipnarine Maharaj, MD, FACP, has over 30 years of experience as an internist, hematologist, oncologist, and bone marrow/stem cell transplant physician. He is the Founder and Director of the South Florida Bone Marrow Stem Cell Transplant Institute DBA Maharaj Institute of Immune Regenerative Medicine in Boynton Beach, Florida. Dr. Maharaj is on the Scientific Advisory Board of Life Extension®.
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Price: $21
Item #: 00331

Enhanced Sleep without Melatonin
30 capsules
Price: $16.50
Item #: 01511

Melatonin 300 mcg
100 vegetarian capsules
Price: $5.25
Item #: 01668

Melatonin IR/XR
60 capsules
Price: $9
Item #: 02201

Caution: Consult your health care provider before taking this product if you are being treated for a medical condition (especially autoimmune or depressive disorders). Use caution if combining with alcohol. This product is not intended for children, pregnant or lactating women, or women trying to become pregnant. Do not attempt to drive or operate heavy machinery after taking this product.

For full product description and to order any of these premium-grade Melatonin supplements, call 1-800-544-4440 or visit www.LifeExtension.com

Sweet DREAMS

Choose the Melatonin That’s Right For You

Healthy sleep is one of the best ways to feel revitalized and maintain optimal health.

While many people find melatonin helps improve sleep, others take it nightly for its immune protection effects.

Individual doses range from 300 mcg to 10 mg taken 30-60 minutes before going to sleep.

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.
This GEROPROTECT® formula supports stem cell health and function.

Life Extension® scientists developed this proprietary formula in collaboration with the Deep-Learning AI Technology at Insilico Medicine.

Three plant-based nutrients (garcinol, piceatannol, and resveratrol) were selected for activating key cell-signaling pathways that support stem cell health.

Item #02401 • 60 vegetarian capsules

1 bottle $36

4 bottles $33 each

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

Livinol™ is a trademark of Sabinsa Corporation.

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.
Natural killer cell activity declines with normal aging, which can affect immune function.

NK Cell Activator™ supports healthy natural killer cell activity to promote a robust immune response.\(^1\text{-}^3\)

Functional NK cells also recognize and eliminate senescent cells that accumulate in aged tissues.

The standardized plant extract in NK Cell Activator™ supports the activity of natural killer (NK) cells.

Clinical Studies

In one clinical study, scientists documented a 3-fold increase of natural killer cell activity in healthy individuals within three to four weeks of receiving 500 mg daily of the rice bran compound found in NK Cell Activator™.

In another double-blind, randomized, placebo-controlled study, researchers noted that subjects taking the rice-bran compound found in NK Cell Activator™ experienced a boost in myeloid dendritic cells—cells that act as key messengers between the innate and the adaptive immune systems.\(^4\)

The suggested single serving of one vegetarian tablet of NK Cell Activator™ provides:

| Proprietary Enzymatically Modified Rice Bran | 500 mg |

Contains wheat.

References
Reduce Effects of Excess Stress to Protect Immunity

It’s hard to avoid stress during a global pandemic. The concern is that increased stress can weaken immune functions.

Ongoing stress triggers high levels of cortisol, a steroid hormone.

Excess cortisol diminishes immune functions, and has been shown to increase disease risk while shortening human lifespans.¹⁻¹⁷

A 2019 study found that anticipating stress the next day is associated with elevated cortisol soon after waking up in the morning.¹⁸

Human studies demonstrate that specific plant extracts can reduce cortisol levels and inhibit its destructive effects.¹⁹⁻²⁴
REDUCE EFFECTS OF EXCESS STRESS TO PROTECT IMMUNITY

Stress Weakens Immune Function

A recent poll reports that 45% of Americans feel that their mental health has been negatively impacted due to worry and stress over the novel coronavirus.25

Cortisol is one of the body’s main stress hormones. During stressful times, the adrenal glands release it as part of the “fight-or-flight” response.26

Necessary for life-or-death situations, cortisol directs a complex series of hormonal and physiological changes that support either fleeing to safety or fighting off the threat.27,28

Cortisol boosts muscle tension, blood sugar, heartbeat, tissue-repair substances, and mental focus. At the same time, cortisol turns down non-urgent processes such as immune functions, along with the digestive and reproductive systems.29

When the stressful threat has passed, cortisol is supposed to return to normal “balanced” levels.

When stressors are almost always present, as they have been since the coronavirus outbreak, cortisol remains “turned on.”

Its continuing high presence in the blood adversely affects critical functions of the body and brain.30

Danger of Elevated Cortisol

Stress results in a decrease in levels of lymphocytes. These immune cells are used to kill viruses and other invaders.31,32

Lymphocyte counts are often reduced when one is fighting a viral infection.33-35

Even if it’s just for a few days, social isolation and loneliness, both common during the current pandemic, also weaken immunity.36

Older individuals are more susceptible to stress and to stress-induced immune damage.37

Long-term overexposure to excess cortisol disrupts almost all body processes, increasing risk for health problems that include:1-17,38

- Immune impairment,
- Cardiovascular disease,
- Diabetes,
- Osteoporosis,
- Gastrointestinal problems,
- Obesity,
- Neurodegeneration, including Alzheimer’s disease, and
- Anxiety, depression, and insomnia.

Most worrisome, chronically elevated cortisol is linked to increased mortality risk.

A large study of people over age 65 found that men with high cortisol levels were 63% more likely to die than those with lower levels.

Women with elevated cortisol were 82% more likely to die than those with low levels.5 And those with high urinary cortisol had a five-fold increased risk of death from cardiovascular disease.3

Higher cortisol is also associated with shortening of telomeres, the stretches of DNA that cap the ends of chromosomes.39,40 As telomeres shorten, the cells that bear them get closer to the ends of their lives, aging the tissues and organs in which they dwell.

It’s impossible to avoid all stress, especially during a pandemic. But scientists have demonstrated that natural compounds can lower excess cortisol levels.
Lychee-Green Tea Blend
Lowers Cortisol

Grown in China since the 11th century, lychee fruit is rich in polyphenols that promote a variety of biological activities, most notably the ability to reduce inflammation and cortisol levels. Most lychee products sold today contain long-chain polyphenols, which are not easily absorbed in the intestinal tract.

To overcome this obstacle scientists developed a low molecular size extract derived from lychee fruit and green tea. The result is a new compound that is stable and highly absorbable.

Researchers tested this lychee-green tea blend on human monocytes, a type of immune cell. They found that it significantly suppressed inflammatory signaling molecules called cytokines, helping to decrease inflammation.

This confirmed earlier results from clinical trials that evaluated the lychee-green tea blend’s ability to lower stress and stress-induced cortisol.

WHAT YOU NEED TO KNOW

Counter the Immune-Damaging Effects of Stress

- Stress increases levels of the hormone cortisol, which can weaken immune function.
- A weak immune system raises the risk of infections caused by viruses and other pathogens.
- Chronically elevated cortisol increases the risk of other diseases—including cardiovascular disease, diabetes, and neurodegeneration—and of overall mortality.
- Human studies show that both a lychee-green tea blend and a combination of two bark extracts from Magnolia and Phellodendron trees reduce high cortisol levels.
- These compounds can effectively reduce unwanted circulating cortisol, safely inhibiting its destructive effects.
Reducing Stress-Induced Cortisol

Researchers randomly assigned 19 sedentary but healthy male volunteers (with an average age of 22) to take either a placebo or 100 mg of the lychee-green tea blend daily for four weeks.

They conducted blood tests for cortisol and other inflammatory markers before and after the study, and after exercise, which raises cortisol levels. Unlike those in the placebo group, the men taking the blend showed significant decreases in cortisol and the pro-inflammatory cytokines IL-1β and IL-6. The lychee-green tea extract also reduced the rate of increase of these factors following exercise.

In another study, 10 healthy men took either a placebo or 100 mg of the lychee-green tea blend twice daily for 10 days before exercising under low-oxygen conditions, to increase stress. Exercise increased cortisol substantially in the placebo group. The cortisol increase in the lychee-green tea group was significantly smaller.

Physically Induced Cortisol

Scientists next assessed the effects of the lychee-green tea blend on cortisol and inflammation caused by physical stress.

Either a placebo or 100 mg of the blend was given to 13 healthy males. After 30 minutes, the lower portion of each man’s legs was immersed in hot water for half an hour. Researchers measured cortisol and inflammatory cytokines before and after this procedure.

Compared to placebo subjects, lychee-green tea recipients had significantly lower concentrations of cortisol, IL-1β, and IL-6 after the heat-related stress. These benefits continued for up to two hours after the stress ended. (IL-1β and IL-6 are pro-inflammatory factors.)

Lychee-green tea recipients also had significantly lower increases in temperatures of the skin and body core during the application of heat, indicating a more balanced and improved response to the physically stressful event.

Later studies confirmed that the lychee-green tea blend prevents heat-induced elevations in body temperature. This reduces fluid loss from sweating under heat stress and prevents stress-induced blunting of immune response.

How to Measure Your Stress Levels

Living under the threat of a pandemic, stress can become so constant that you don’t even notice how stressed you are. A cortisol blood test allows you to find out whether your levels are elevated and by how much. If they’re high, that’s a sign of ongoing stress.

Lifestyle changes like meditation, exercise, and eating a healthy diet can bring this level down. Regular use of safe, plant compounds also lowers elevated cortisol and can prevent the immune-weakening effects of stress.

A follow-up cortisol test will show whether your efforts have been successful or need to be intensified.
REDUCE EFFECTS OF EXCESS STRESS TO PROTECT IMMUNITY

A combination of two bark extracts from the Magnolia and Phellodendron trees has also been shown, in human trials, to lower cortisol and reduce outward manifestations of stress.

These compounds offer one approach to reducing excess cortisol levels, which may counteract some of the harmful effects inflicted by chronic stress.

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


Effects of Tree Bark Extracts

Scientists have identified two tree bark extracts that deliver similar protection against elevated cortisol.

The extracts come from a magnolia species, *Magnolia officinalis*, and *Phellodendron amurense*, also known as Amur cork tree.

Both have been used in traditional Chinese medicine for centuries and have been shown to have non-sedating anti-anxiety effects.

In one study, investigators enlisted 56 healthy but moderately stressed individuals. Twice daily, participants were given either a placebo or 250 mg of a mixture containing both bark extracts.

After four weeks, the bark extract recipients had 18% lower cortisol levels compared to placebo recipients. They also had mood improvements and reduced feelings of stress, depression, anger, and fatigue, all likely related to lowered cortisol.

Two small, additional studies documented benefits of this bark extract blend:

- One six-week study was conducted on healthy but overweight premenopausal women (aged 20-50) with above-average anxiety. Compared to a placebo, a 250 mg dose of the bark extract combination, given three times a day, significantly decreased anxiety.

- A second study was conducted on a similar group of women with above-average anxiety, who reported eating more in response to stress. The placebo group had significant weight gain over the six-week study. But weight gain was prevented in the bark extract subjects.

Elevated cortisol weakens the immune system’s ability to fight infection. Lychee-green tea blend and the bark extract combination have been shown to reduce excessive cortisol secretion in response to stress.

Summary

Stress weakens immune functions by raising levels of cortisol.

This increases the risks of infections and chronic diseases and shortens lifespans.

A lychee-green tea blend provides highly absorbable nutrients that have been shown to lower cortisol in human studies.


30. Available at: https://www.ncbi.nlm.nih.gov/books/NBK39364-9; quiz S412.
Available in Vanilla and Chocolate Flavors!

**Whey protein**, packed with vital amino acids, also promotes **glutathione** synthesis.

Glutathione plays an important role in supporting immune balance in the body.¹

Whey fractions help modulate a full range of immune functions.²,³

For full product description and to order Wellness Code® Whey Protein Concentrate, call 1-800-544-4440 or visit www.LifeExtension.com

Use this product as a food supplement only. Do not use for weight reduction.


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.
Astaxanthin is a carotenoid that benefits the brain, heart, skin, and immune system.

Found naturally in seafood and algae, as little as 50% of astaxanthin is normally absorbed in the bloodstream.¹²

Life Extension® combines 4 mg of astaxanthin with a blend of four different phospholipids, which has been shown to enhance carotenoid absorption by several-fold.³

References

For full product description and to order Astaxanthin 4 mg with Phospholipids, call 1-800-544-4440 or visit www.LifeExtension.com

Item #01923 - 30 softgels
1 bottle $12
4 bottles $10.50 each

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.
Stress releases the hormone cortisol throughout the body. Maintaining healthy cortisol levels promotes healthy immune function.*

Cortisol-Stress Balance for a greater sense of calm amid today’s stressful challenges.

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


Relora® is a trademark of Lonza or its affiliates. Oligonol® is a registered trademark of Amino Up Chemical Co., Ltd.

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.
Digestive enzymes are essential to the body’s absorption and optimal utilization of food and all its nutrients.\(^1\,\!\!2\)

The body’s production of digestive enzymes decreases with age, leading to poor digestion and bloating, as well as other discomforts—especially after eating a large meal.

**Enhanced Super Digestive Enzymes** provides specific enzymes required to support the reactions that break down food proteins, fats, carbohydrates, and other nutrients.

**Enhanced Super Digestive Enzymes with Probiotics** provides the same enzymes that are in **Enhanced Super Digestive Enzymes**—but with the added benefits of the probiotic *B. coagulans*.

This probiotic creates a protective shield that resists digestion in the stomach, allowing it to fully colonize in the intestines to support digestive health and suppress less beneficial bacteria to improve digestive comfort.\(^3\,\!\!4\)

For full product description and to order **Enhanced Super Digestive Enzymes** or **Enhanced Super Digestive Enzymes with Probiotics**, call 1-800-544-4440 or visit www.LifeExtension.com

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**Enhanced Super Digestive Enzymes**

Item #02021 • 60 vegetarian capsules

1 bottle $16.50

4 bottles $15 each

**Enhanced Super Digestive Enzymes with Probiotics**

Item #02022 • 60 vegetarian capsules

1 bottle $21

4 bottles $18 each

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References


* Lactospore* is a registered trademark of Sabinsa Corp.
Pecans are often associated with sugary foods like pecan pie, sweet potato casserole, or marshmallows. But to get the most health benefits, skip the sugar-laden treats and grab a handful of pecans on their own.

Technically a fruit rather than a nut, pecans are high in protein, at three grams per ounce. They also contain healthy fats.

**Heart Health**

Pecans are high in healthy fats that are known to promote heart health, like monounsaturated and polyunsaturated fats.

In an eight-week, randomized, controlled study, one group of subjects consumed 68 grams of pecans with their meals, while a second group did not eat the pecans. After eight weeks, the pecan-eating group experienced a reduction in both LDL cholesterol and total cholesterol.1

**Cancer Prevention**

Pecans contain a high amount of a specific type of monounsaturated fat called oleic acid.

One important laboratory study showed that oleic acid dramatically lowered the expression of a gene called Her-2/neu that is involved in the development of breast cancer.2 This is significant, as activation of Her-2/neu is associated with aggressive tumors and a poor prognosis.

This finding is consistent with newer studies showing that adherence to the Mediterranean diet (high in monounsaturated fats like those in pecans) was associated with a reduced risk of breast cancer.3

**References**

SUPPORTS HEALTHY GLUCOSE METABOLISM IN THE BRAIN

Maintaining healthy blood sugar levels is essential for whole-body health.

Benfotiamine promotes healthy brain function by supporting healthy blood sugar metabolism and protects brain health.

References

Item #00925 - 120 vegetarian capsules
1 bottle $22.50 • 4 bottles $20.25 each

For full product description and to order Mega Benfotiamine, call 1-800-544-4440 or visit 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.
SAFE-GUARD Your Skin from Within

Unique ORAL formula provides *Polypodium leucotomos* fern extract along with nicotinamide and red orange extract.

Item #01938 • 120 vegetarian capsules

1 bottle $33

4 bottles $30 each

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

This product is not a substitute for topical sunscreens.

Red Orange Complex™ is a registered trademark of Bionap S.r.l.

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.
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</tr>
<tr>
<td>02121</td>
</tr>
<tr>
<td>02122</td>
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</tbody>
</table>
| 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 |
| 01503 | CinSulin® with InSea® and Crominex® 3+ |
| 01620 | CoffeeGenic® Green Coffee Extract |
| 02122 | Glycemic Guard™ |
| 00925 | Mega Benfotiamine |
| 01803 | Tri Sugar Shield® |
| 01066 | Aspirin (Enteric Coated) |
| 01842 | BioActive Folate & Vitamin B12 Caps |
| 01700 | Cardio Peak™ with Standardized Hawthorn and Arjuna |
| 02121 | Homocysteine Resist |
| 02122 | 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 |

**IMMUNE SUPPORT**

<table>
<thead>
<tr>
<th>Code</th>
<th>Product Description</th>
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<tbody>
<tr>
<td>00681</td>
<td>AHCC*</td>
</tr>
<tr>
<td>02302</td>
<td>Bio-Quercetin</td>
</tr>
<tr>
<td>01961</td>
<td>Enhanced Zinc Lozenges</td>
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<tr>
<td>01704</td>
<td>Immune Modulator with Tinofend®</td>
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<tr>
<td>00955</td>
<td>Immune Protect with PARACTIN®</td>
</tr>
<tr>
<td>02005</td>
<td>Immune Senescence Protection Formula™</td>
</tr>
<tr>
<td>29727</td>
<td>Kinoko® Gold AHCC</td>
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<tr>
<td>24404</td>
<td>Kinoko® Platinum AHCC</td>
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<tr>
<td>00316</td>
<td>Kyolic® Garlic Formula 102</td>
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<tr>
<td>00789</td>
<td>Kyolic® Reserve</td>
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<tr>
<td>00525</td>
<td>ProBoost Thymic Protein A</td>
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<tr>
<td>01708</td>
<td>Reishi Extract Mushroom Complex</td>
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<tr>
<td>01906</td>
<td>Standardized Cistanche</td>
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<tr>
<td>13685</td>
<td>Ten Mushroom Formula*</td>
</tr>
<tr>
<td>01097</td>
<td>Ultra Soy Extract</td>
</tr>
<tr>
<td>01561</td>
<td>Zinc Lozenges</td>
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**INFLAMMATION MANAGEMENT**

<table>
<thead>
<tr>
<th>Code</th>
<th>Product Description</th>
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<tbody>
<tr>
<td>01639</td>
<td>5-LOX Inhibitor with AprèsFlex®</td>
</tr>
<tr>
<td>02324</td>
<td>Advanced Curcumin Elite™ Turmeric Extract, Ginger &amp; Turmerones</td>
</tr>
<tr>
<td>01709</td>
<td>Black Cumin Seed Oil</td>
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<tr>
<td>02310</td>
<td>Black Cumin Seed Oil and Curcumin Elite™ Turmeric Extract</td>
</tr>
<tr>
<td>00202</td>
<td>Boswellia</td>
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<tr>
<td>02467</td>
<td>Curcumin Elite™ Turmeric Extract • 30 veg capsules</td>
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<tr>
<td>02407</td>
<td>Curcumin Elite™ Turmeric Extract • 60 veg capsules</td>
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<tr>
<td>01804</td>
<td>Cytokine Suppress* with EGCG</td>
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<tr>
<td>02223</td>
<td>Pro-Resolving Mediators</td>
</tr>
<tr>
<td>00318</td>
<td>Serraflazyme</td>
</tr>
<tr>
<td>01203</td>
<td>Specially-Coated Bromelain</td>
</tr>
<tr>
<td>01254</td>
<td>Zyflamend™ Whole Body</td>
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</table>

**JOINT SUPPORT**

<table>
<thead>
<tr>
<th>Code</th>
<th>Product Description</th>
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<tbody>
<tr>
<td>02404</td>
<td>Arthro-Immune Joint Support</td>
</tr>
<tr>
<td>02238</td>
<td>ArthroMax® Advanced NT2 Collagen™ &amp; AprèsFlex®</td>
</tr>
<tr>
<td>01617</td>
<td>ArthroMax® with Theaflavins &amp; AprèsFlex®</td>
</tr>
<tr>
<td>02138</td>
<td>ArthroMax® Elite</td>
</tr>
<tr>
<td>00965</td>
<td>Fast-Acting Joint Formula</td>
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<tr>
<td>00522</td>
<td>Glucosamine/Chondroitin Capsules</td>
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<tr>
<td>01600</td>
<td>Krill Healthy Joint Formula</td>
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<tr>
<td>01050</td>
<td>Krill Oil</td>
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<tr>
<td>00451</td>
<td>MSM (Methylsulfonylmethane)</td>
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<tr>
<td>02231</td>
<td>NT2 Collagen™</td>
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**KIDNEY & BLADDER SUPPORT**

<table>
<thead>
<tr>
<th>Code</th>
<th>Product Description</th>
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<tbody>
<tr>
<td>00862</td>
<td>Cran-Max® Cranberry Whole Fruit Concentrate</td>
</tr>
<tr>
<td>01424</td>
<td>Optimized Cran-Max® with Ellirose™</td>
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<tr>
<td>01921</td>
<td>Uric Acid Control</td>
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<tr>
<td>01209</td>
<td>Water-Soluble Pumpkin Seed Extract</td>
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**LIVER HEALTH & DETOXIFICATION**

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<thead>
<tr>
<th>Code</th>
<th>Product Description</th>
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<tbody>
<tr>
<td>02240</td>
<td>Anti-Alcohol HepatoProtection Complex</td>
</tr>
<tr>
<td>01651</td>
<td>Calcium D-Glucarate</td>
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<tr>
<td>00550</td>
<td>Chlorella</td>
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<tr>
<td>01571</td>
<td>Chlorophyllin</td>
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<tr>
<td>01922</td>
<td>European Milk Thistle • 60 softgels</td>
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<tr>
<td>01925</td>
<td>European Milk Thistle • 120 softgels</td>
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<tr>
<td>01522</td>
<td>Milk Thistle • 60 veg capsules</td>
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<tr>
<td>02402</td>
<td>FLORASSIST® Liver Restore™</td>
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<tr>
<td>01541</td>
<td>Glutathione, Cysteine &amp; C</td>
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<tr>
<td>01393</td>
<td>HepatoPro</td>
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<tr>
<td>01608</td>
<td>Liver Efficiency Formula</td>
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<tr>
<td>01534</td>
<td>N-Acetyl-L-Cysteine</td>
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</tbody>
</table>
PRODUCTS

LONGEVITY & WELLNESS

- PectaSol-C® Modified Citrus Pectin Powder
- PectaSol-C® Modified Citrus Pectin Capsules
- Silymarin
- SOD Booster

LONGEVITY & WELLNESS

- Alpha-Lipoic Acid
- AppleWise Polyphenol Extract
- Blueberry Extract
- Blueberry Extract with Pomegranate
- DNA Protection Formula
- GEROPROTECT® Ageless Cell™
- GEROPROTECT® Longevity A.I.™
- GEROPROTECT® Stem Cell
- Grapeseed Extract
- Mega Green Tea Extract (decaffeinated)
- Mega Green Tea Extract (lightly caffeinated)
- Optimized Fucoidan with Maritech® 926
- Optimized Resveratrol
- Pycnogenol® French Maritime Pine Bark Extract
- Potassium with Extend-Release Magnesium
- Resveratrol
- RNA (Ribonucleic Acid)
- Senolytic Activator
- Super R-Lipoic Acid
- X-R Shield

MEN'S HEALTH

- Male Vascular Sexual Support
- Mega Lycopene Extract
- Men's Bladder Control
- PalmettoGuard® Saw Palmetto with Beta-Sitosterol
- PalmettoGuard® Saw Palmetto/Nettle Root Formula with Beta-Sitosterol
- Pomi-T®
- Prelox® Enhanced Sex for Men
- Super R-Lipoic Acid
- X-R Shield

MINERALS

- Boron
- Extend-Release Magnesium
- Ionic Selenium
- Iron Protein Plus
- Lithium
- Magnesium Caps
- Magnesium (Citrate)
- Only Trace Minerals
- Optimized Chromium with Crominex® 3+
- Potassium with Extend-Release Magnesium
- Sea-Iodine™
- Se-Methyl L-Selenocysteine
- Super Selenium Complex
- Vanadyl Sulfate
- Zinc Caps

MISCELLANEOUS

- Potassium Iodide
- Solarshield® Sunglasses

MOOD & STRESS MANAGEMENT

- Cortisol-Stress Balance
- Enhanced Stress Relief
- 5 HTP
- L-Theanine
- SAme (S-Adenosyl-Methionine) 200 mg, 30 enteric coated tablets
- SAme (S-Adenosyl-Methionine) 400 mg, 30 enteric coated tablets
- SAme (S-Adenosyl-Methionine) 400 mg, 60 enteric coated tablets

MOOD & STRESS MANAGEMENT

- 5 HTP
- SAme (S-Adenosyl-Methionine)

MULTIVITAMINS

- Children's Formula Life Extension Mix™
- Comprehensive Nutrient Packs ADVANCED
- Life Extension Mix™ Capsules
- Life Extension Mix™ Capsules without Copper
- Life Extension Mix™ Powder
- Life Extension Mix™ Tablets
- Life Extension Mix™ Tablets with Extra Niacin
- Life Extension Mix™ Tablets without Copper
- Once-Daily Health Booster • 30 softgels
- Once-Daily Health Booster • 60 softgels
- One-Per-Day Tablets
- Two-Per-Day Capsules • 60 capsules
- Two-Per-Day Capsules • 120 capsules
- Two-Per-Day Tablets • 60 tablets
- Two-Per-Day Tablets • 120 tablets

NERVE & COMFORT SUPPORT

- ComfortMAX™
- PEA Discomfort Relief

PERSONAL CARE

- Biosil™ • 5 mg, 30 veg capsules
- Biosil™ • 1 fl oz
- Dr. Proctor's Advanced Hair Formula
- Dr. Proctor's Shampoo
- Hair, Skin & Nails Collagen Plus Formula
- Life Extension Toothpaste
- Venotone
- Xyliwhite Mouthwash
- Youthful Collagen
- Youthful Legs

PET CARE

- Cat Mix
- Dog Mix

PROBIOTICS

- Bifido GI Balance
- FLORASSIST® Balance
- FLORASSIST® GI with Phage Technology
- FLORASSIST® Heart Health
- FLORASSIST® Mood Improve
- FLORASSIST® Nasal
- FLORASSIST® Oral Hygiene
- FLORASSIST® Probiotic
- FLORASSIST® Throat Health
- Jarro-Dophilus® for Women
- Jarro-Dophilus EPS® • 60 veg capsules
- Jarro-Dophilus EPS® • 120 veg capsules
- Jarro-Dophilus EPS® - 60 veg capsules
- Jarro-Dophilus EPS® - 120 veg capsules
- Theralac® Probiotics
- TruFlora® Probiotics

SKIN CARE

- Advanced Anti-Glycation Peptide Serum
- Advanced Growth Factor Serum
- Advanced Hyaluronic Acid Serum
- Advanced Lightening Cream
- Advanced Peptide Hand Therapy
- Advanced Probiotic-Fermented Eye Serum
- Advanced Triple Peptide Serum
- Advanced Under Eye Serum with Stem Cells
- All-Purpose Soothing Relief Cream
- Amber Self MicroDermAbrasion
- Anti-Aging Mask
- Anti-Aging Rejuvenating Face Cream
- Anti-Aging Rejuvenating Scalp Serum
- Collagen Boosting Peptide Cream
- Collagen Boosting Peptide Serum
PRODUCTS

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  Benfotamine with Thiamine
00664  Beta-Carotene
01945  BioActive Complete B-Complex
00102  Biotin
00084  Buffered Vitamin C Powder
02229  Fast-C® and Bio-Quercetin Phytosome
02075  Gamma E Mixed Tocopherol Enhanced with Sesame Lignans
02070  Gamma E Mixed Tocopherol/Tocotrienols
01913  High Potency Optimized Folate
01674  Inositol Caps Liquid Emulsified
02244  Liquid Vitamin D3 • 2,000 IU, 1 fl oz
02232  Liquid Vitamin D3 • 2,000 IU, 1 fl oz, mint
01936  Low-Dose Vitamin K2
01536  Methylcobalamin • 1 mg, 60 veg lozenges
01537  Methylcobalamin • 5 mg, 60 veg lozenges
00065  MK-7
00373  No Flush Niacin
01939  Optimized Folate (L-Methylfolate)
01217  Pyridoxal 5′-Phosphate Caps
01400  Super Absorbable Tocotrienols
02234  Super K
02335  Super K Elite
01863  Super Vitamin E
02028  Vitamin B5 (Pantothenic Acid)
01535  Vitamin B6
00361  Vitamin B12
02227  Vitamin C and Bio-Quercetin Phytosome 1,000 mg, 60 veg tablets
02228  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
01823  CallReduce Selective Fat Binder
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
**THE VERSATILE BENEFITS OF**

**PYCNOGENOL®**

Pycnogenol® is a plant extract derived from French maritime pine bark. Its benefits are available in these three formulations:

---

**Arterial Protect**

Provides Pycnogenol® and standardized gotu kola leaf extract to help stabilize endothelial plaque and promote healthy blood flow throughout the body.

**VenoFlow™**

For those who sit for long periods while traveling or in the office, this proprietary blend of Pycnogenol® and nattokinase promotes healthy venous blood flow.

**Pycnogenol®**

Numerous published studies describe how concentrated extracts in Pycnogenol® help protect against multiple factors related to normal aging.

---

For full product descriptions and to order Pycnogenol®, Arterial Protect, or VenoFlow™, call 1-800-544-4440 or visit www.LifeExtension.com

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+Pycnogenol® is a registered trademark of Horphag Research, Ltd.

**CAUTION:** Consult your healthcare provider before use of VenoFlow™ if taking medication (especially those affecting blood coagulation or blood pressure), being treated for a medical condition (especially bleeding disorders), under the age of 18, pregnant, or lactating.

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.
Highly Absorbable CURCUMIN

Curcumin Elite™ utilizes a new patented turmeric extract that results in 45 times greater bioavailability of active or free curcuminoids and 270 times better total curcuminoid absorption compared to standard curcumin.

Curcumin Elite™ contributes to higher blood levels of bio-active curcuminoids that stay in the body longer to provide more health benefits.

Advanced Curcumin Elite™ contains the same optimal 500 mg potency of curcumin with the added benefits of ginger and additional turmeric actives.

45 times Greater Bioavailability At a Lower Price

For full product description and to order Curcumin Elite™ or Advanced Curcumin Elite™, call 1-800-544-4440 or visit www.LifeExtension.com

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.
7 WHAT IF COVID-19 SYMPTOMS WORSEN?
Currently available therapies may reduce the risk of a SARS-CoV-2 patient requiring ventilator support.

28 LITHIUM: CRITICAL FOR OVERALL HEALTH
Lithium, by inhibiting the enzyme GSK-3, can promote longevity, slow brain aging, and improve health parameters.

36 WHEN IMMUNE FUNCTION “FALLS OFF A CLIFF”
Standardized botanicals improve protective immune factors while reducing pro-inflammatory cytokines such as interleukin-6 (IL-6).

48 DHEA PROMOTES QUALITY OF LIFE
DHEA replacement can improve quality of life and reduce the risk of degenerative disorders.

58 NATURAL APPROACHES TO IMPROVE IMMUNE FUNCTION
Three plant-based compounds can improve immune function by augmenting natural killer cells and T cells that decline during immune senescence.

78 REDUCE ADVERSE EFFECTS OF STRESS
Ongoing stress triggers high levels of cortisol, which can weaken immune function.

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