RESTORE HEALTHY STEM CELL FUNCTION

PLUS: SUZANNE SOMERS—A New Way to Age
Enzymatically Active Vitamins

BioActive Complete B-Complex provides enzymatically active forms of meaningful potencies of each B vitamin.

This includes the pyridoxal 5'-phosphate form of vitamin B6 shown to protect lipids and proteins against glycation and the most biologically active form of folate called 5-methyltetrahydrofolate (5-MTHF), which is up to 7 times more bioavailable than folic acid.*

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

Reference

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ON THE COVER

RESTORE HEALTHY STEM CELL FUNCTION
Using deep-learning artificial intelligence, scientists have identified three plant-based nutrients that can help reverse age-related damage to our existing pool of stem cells.

NEW HOPE FOR DIABETIC NEUROPATHY
Diabetic neuropathy is an emerging epidemic of pain, loss of function, and even limb amputation. Seven nutrients demonstrate risk reduction and partial symptomatic respite.

AGE REVERSAL UPDATE
An unprecedented human study aims to induce statistically significant and meaningful biological age reversal using multi-model interventions that include metformin, dasatinib, rapamycin, and NAD+ restoration therapy.

WILL SUZANNE'S CELEBRITY STATUS WAKE UP THE WORLD?
Mass media’s focus on Suzanne Somers’ new book, A New Way to Age, may ignite widespread recognition that rejuvenation of older adults will soon become part of routine medical practice.

RESEARCH UPDATE: OLDER PEOPLE GROW 2.5 YEARS YOUNGER
A study conducted in collaboration with researchers from Stanford University and UCLA showed that a combination of nutrients, hormones, and a drug resulted in significant human age reversal. Patients measured 2.5 years younger than they would have without treatment.

TOPICAL PROBIOTIC-FERMENTED COMPLEX
Age-related imbalances in skin microbiota can prematurely age skin. Topical fermentation products of Lactobacillus and Aspergillus work together to help restore youthful skin tone.

AS WE SEE IT
Until stem cell therapies are perfected, a safe regenerative strategy is to restore functionality to aging stem cells. The good news is that certain low-cost nutrients already taken by Life Extension readers may facilitate this. The goal is whole-body rejuvenation.

IN THE NEWS
Saturated fat linked to fatal prostate cancer; supplements support mental health; B12 deficiency implicated in migraines; and more.

HEALTHY EATING
In Breakfast: The Cookbook, breakfast expert Emily Elyse Miller offers 380 recipes representing the best breakfast specialties from 80 different countries. We provide four of them.

AUTHOR INTERVIEW
In her book, The Way We Eat Now, food historian Bee Wilson explains how big changes in the way we eat are taking a toll on lives around the globe—and how we can have a healthier future.
Tap the Power of N-Acetyl-L-Cysteine TO BOOST GLUTATHIONE LEVELS

**N-acetyl-L-cysteine** supports healthy levels of *glutathione*, a molecule utilized by all cells for protection against free-radical damage and attacks from foreign compounds.

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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.
With age, the body’s nocturnal peak of melatonin declines, making it harder to fall asleep and stay asleep.

Melatonin IR/XR contains MicroActive® Melatonin, an innovative 50/50 blend of:

• Immediate-release melatonin to help you get to sleep.*

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Take Melatonin IR/XR at night for better bedtimes.

For full product description and to order Melatonin IR/XR, call 1-800-544-4440 or visit www.LifeExtension.com
Stem cell research, however, was torpedoed by federal edict in 2001 and has only recently regained serious momentum. The encouraging news is that we may be able to regenerate our existing pool of stem cells today. The significance of this cannot be overstated.

If we replenish our pool of healthy stem cells, we may regain the ability to repopulate our tissues with fresh functional cells. The good news is that certain nutrients that readers of this magazine already supplement with have stem cell-renewing properties. This can buy precious time as ongoing research develops systemic stem cell rejuvenation therapies envisioned 20 years ago.

To put this into historic context, the image on this page is the March 2002 cover of Life Extension® magazine. Our message back then was that therapeutic cloning of stem cells might enable our biology to be transported back in time to a younger state.

In that 2002 magazine article, we described how fresh, young stem cells can regenerate tissues throughout our body, thereby reversing the course of degenerative disorders.

This article describes findings that may enable you to rejuvenate your stem cells using low-cost approaches available right now.

WILLIAM FALOON

How to Renew Your Own Stem Cells

Stem cell research, however, was torpedoed by federal edict in 2001 and has only recently regained serious momentum. The encouraging news is that we may be able to regenerate our existing pool of stem cells today. The significance of this cannot be overstated.

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**Stem Cells Needed to Sustain Life**

Our tissues rely on **functional cells** to sustain organ viability.

With age, our **functional cells** deteriorate.

In youth, as **functional cells** die off, they are replaced with **new cells** created from **stem cells** present in our body.1-3

**Stem cells**, however, are affected by the same **degenerative problems** as **functional cells**.4

As **stem cell** vitality deteriorates, we lose the ability to **repopulate** tissues with fresh **functional cells**.4

What few people understand is that **stem cells** are capable of **self-renewal**, as well as producing mature **functional cells**.1,4

In medical practice today, **stem cells** are used for **regenerative purposes**. This is evidenced by the ability of bone marrow **stem cell transplants** to help **leukemia patients**.5

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**Based on the phenomenon of self-renewal, if our old stem cells can be reactivated, the effect could be whole-body rejuvenation.**

Nutritional interventions may provide an effective approach to activate dormant **stem cells**, thereby enhancing **tissue regeneration**. Using several lines of preclinical evidence from the scientific literature, we can outline a rational approach that could allow us to **reactivate** aging stem cells.

**Stem Cells Are Retained with Age**

Many stem cells are retained as we age and have the capacity to **self-renew** and **differentiate** into mature **functional cells**.4

Several factors that drive the aging process also reduce the **regenerative potential** of **stem cells** and contribute to worsening of age-related conditions.4

**Stem Cells Needed to Sustain Life**

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**Bone Marrow**

**Stem Cells**

**Progenitor Cells**

**Functional Cells**

**Healthy Tissues**

This flow chart shows how stem cells (hematopoietic and mesenchymal) are released from bone marrow and differentiate to provide fresh blood and functional cells to maintain tissues throughout the body.

**How Stem Cells Convert to Functional Cells**

**Bone Marrow**

**Blood**

**Tissue**

**Recruitment**

**Mobilization**

**Proliferation**

**Differentiation**

**EPCs**

**HSC**

**(hematopoietic stem cells)**

**(endothelial progenitor cells)**

**Endothelial progenitor cells** (or EPCs) are cell types that play roles in regenerating the endothelial lining of blood vessels.

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**Rejuvenating Aged Stem Cells**

Normal aging (along with excess calorie ingestion) causes **AMPK** and **NAD** to plummet, **mTOR** to be imbalanced, and **SIRT1** signaling to be downregulated.7-10

The impact of this is depletion of our **stem cell** pools and a reduced regenerative potential.11

**Stem cell** malfunction can be partially **corrected** with many of the **nutrients** that readers of **Life Extension®** magazine supplement with today.
This includes curcumin, resveratrol, Gynostemma pentaphyllum, NAD+ precursors, and drugs like metformin, along with sensible eating patterns.

Stem Cell Rejuvenation in Laboratory Models

The challenge of maintaining healthy stem cells requires fighting off the same damaging factors that compromise our functional tissue cells.

These factors include damaged DNA, mitochondrial dysfunction, chronic inflammation, and oxidative stress.

Emerging data indicate that interventions that blunt the effects of excessive calorie intake can rejuvenate some lineages of stem cells by:

- ACTIVATING AMPK
- SUPPRESSING mTOR
- BOOSTING sirtuins

Sirtuins are indispensable for DNA repair, controlling inflammation and other life sustaining processes. Resveratrol activates sirtuins but requires NAD+ for optimal functionality.

In aged mice, treatment with the NAD+ precursor nicotinamide riboside rejuvenated muscle stem cells.

This study showed that boosting NAD+ improved mitochondrial function in muscle stem cells and inhibited stem cell senescence. The researchers also showed that boosting NAD+ decreased senescence of brain and skin stem cells.

An ongoing clinical trial may reveal neurological improvement in response to aggressive NAD+ boosting therapy.

Clinical trials have demonstrated that oral administration of NAD+ precursors results in increased NAD+ levels, which are vital for stem cell functionality.

\[
\text{AMPK} + \text{Resveratrol} + \text{NAD}^+ = \text{STEM CELL REJUVENATION}
\]

In response to resveratrol, cells express proteins called sirtuins that provide several benefits including generating new mitochondria.
One way of inducing autophagy is suppression of excess mTOR via AMPK activation.38

According to a report published in the journal Nature:

“...it will be exciting to test whether rejuvenation interventions aimed at activating autophagy in unhealthy autophagy-inactivated oHSCs [old hematopoietic stem cells] will improve the health of the aging blood system.”38

Most People Need to Lower mTOR

Regulation of mTOR represents a viable approach to preserve the stem cell pool.

This, in turn, would help maintain functionality of our tissues and organs over time.
When calorie intake is reduced, mTOR activity diminishes, and autophagy is beneficially activated. This process (autophagy) cleans up accumulated cellular waste products and preserves cell function. The autophagy-regulating signaling network that includes AMPK and mTOR serves to maintain this delicate autophagy balance. Interventions that activate AMPK serve to balance mTOR and enable optimal levels of cellular autophagy.

**Boost Cell AMPK To Lower mTOR**

AMPK was first identified in 1973 for its role in fat metabolism. Based on evidence from preclinical studies, it is expected that when people practice severe calorie restriction, AMPK activity increases, which confers protective effects.

One of AMPK’s benefits is to signal cells to consume stored fat. One way that AMPK performs this fat-removing process is by down-regulating mTOR. AMPK is a master energy sensor in cells. When AMPK is activated by compounds like metformin or Gynostemma pentaphyllum, cells think they are energy deprived. The desired effect for most aging people is to prompt cells to turn down excess mTOR and utilize fat stores for energy production.

Balancing mTOR activity and autophagy can be achieved via increasing cellular AMPK in the following six ways:

1. Reduce calorie intake and more specifically, avoid sugars and simple carbohydrates. High blood levels of glucose (and insulin) fuel excess mTOR activity.

2. Brief periods (3-5 days) of calorie restriction per month have shown great benefits indicative of balanced mTOR, but compliance is difficult.

3. Consider “intermittent fasting” for 14-18 hours five days a week, based on voluminous data, including a fascinating report published in the December 26, 2019 issue of the New England Journal of Medicine.

4. Preclinical studies show that calorie restriction mimetics such as resveratrol and NAD⁺ can be used to support SIRT1 and FoxO function.

5. AMPK activators such as the drug metformin and/or nutrients such as Gynostemma pentaphyllum extract and hesperidin help support mTOR activity and autophagy.

6. Increased physical activity can meaningfully boost AMPK.

**Multi-Modal Approach to Stem Cell Renewal**

We now know of several factors involved in the maintenance and potential rejuvenation of our aging stem cells.

The encouraging aspect of all this is we can target these stem cell renewal processes today via:

1. AMPK activation
2. Sirtuin activation
3. FoxO activation
4. NAD⁺ replenishment
5. mTOR regulation (via AMPK activation)

This approach may enable elderly individuals to rejuvenate their aged stem cells, which would then repopulate senile tissues with fresh, functional (somatic) cells.
Rejuvenating Bone Marrow Stem Cells

The impact of boosting AMPK and lowering excess mTOR may enable rejuvenation of aging bone marrow (hematopoietic) stem cells. A safe way of balancing mTOR is to boost cellular AMPK activity.

Increasing AMPK regulates mTOR, which facilitates removal of cellular debris (via autophagy). As it relates to combatting aging, activating autophagy appears to be a critical factor for the rejuvenation of aged hematopoietic stem cells.

Hematopoietic stem cells are crucial for producing new immune cells, platelets and red blood cells.

Middle aged and elderly people today have ready access to low-cost approaches to help preserve their bone marrow stem cell pools.

When the bone marrow stem cell niche becomes exhausted, life can no longer be sustained.

That’s because oxygen-carrying red blood cells, immune-protecting white cells and hemorrhage-guarding platelets must be continually produced in the bone marrow for systemic existence.

Increase SIRT1 with Resveratrol

Resveratrol activates SIRT1 inside cells, which is linked to many of the same longevity-enhancing benefits as calorie restriction.

Based on our interpretation of emerging evidence, age control could be enhanced by modest doses of resveratrol, with adequate NAD+ replenishment to ensure sirtuin functionality.

Most people over age 40 should initiate supplementation with the oral NAD+ precursor (nicotinamide riboside) in the daily dose of 300 mg to 600 mg, along with 100 mg to 300 mg of resveratrol and AMPK-activating compounds.

By targeting known regulators of stem cell self-renewal and differentiation, we are proposing a unique protocol to rejuvenate your own stem cells.

Summary Overview

Adult stem cells lose their ability to repopulate tissues with fresh functional cells.

The result is systemic deterioration of tissues throughout our aging bodies.

Treatments that are currently being used to slow aging, such as boosting AMPK and sirtuins, appear likely to facilitate stem cell rejuvenation.

Regulation of mTOR enhances the regenerative capacity of hematopoietic stem cells in aged mice.

mTOR is hyperactive in the bone marrow stem cell niche of aged mice. Excess mTOR can be balanced by increasing AMPK.

Published data indicate that agents that boost NAD+, sirtuins and FoxO, along with compounds that increase AMPK (and down-regulate mTOR) may work together to improve stem cell function.

Metformin is an FDA-approved drug with potent AMPK-activating properties. It and other compounds that activate AMPK (like Gynostemma pentaphyllum) represent a potential option for induction of stem cell rejuvenation in adult stem cell therapies.

The combined application of these mechanistic approaches in clinical medical practice could induce systemic rejuvenation of dysfunctional stem cells.

Factors that Confer Stem Cell Health

As it relates to stem cell regeneration, the following processes are intimately involved:

1. DNA repair pathways affected by:
   - SIRT1
   - NAD+
   - FoxO

2. Protein synthesis affected by:
   - AMPK
   - mTOR
   - FoxO

3. Mitochondrial function affected by:
   - SIRT1
   - NAD+
   - FoxO

Hallmarks of degenerative aging include dysregulation of AMPK, FoxO and SIRT1, depletion of NAD+, and excessive activation of mTOR.

In what may be a unified approach to living healthier, the ability to reactivate aged stem cells is already being practiced by some enlightened people today.

This includes those who take steps to balance AMPK, SIRT1, FoxO and NAD+ while normalizing excess mTOR.
A multi-year investigation using deep-learning AI technology has led to the discovery of three natural compounds that favorably modulate signaling pathways associated with stem cell health.

One of these compounds was shown to promote hematopoietic stem cell expansion in a laboratory model, while the other demonstrated reductions in metabolic parameters (like reduced fasting insulin).

This nutrient formula is described on page 46 of this month’s issue.

Page 65 describes a published clinical trial in which biological aging was reversed on average by 2.5 years using three compounds that have a long history of use.

Page 34 is an Age Reversal Update that introduces new human studies, one that aims to achieve significant rejuvenation effects in only 12 months.

An article on page 24 reveals how type II diabetics may delay or prevent the onset of disabling neuropathy.

In the meantime, readers of Life Extension® magazine should appreciate that many of the nutrients they take today are demonstrating beneficial effects on the health of their stem cell pools.

For longer life,

William Faloon, Co-Founder
Life Extension Buyers Club

References


Caution:
Consult a physician or licensed, qualified healthcare professional before using these products if you have, or have a family history of, breast cancer, prostate cancer, or other hormone-sensitive diseases.

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.
This new 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

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In the News

High Saturated-Fat Diet and Fatal Prostate Cancer

A more rapid progression of prostate cancer is associated with consuming a high-fat diet and with obesity, an article published in the journal Nature Communications reported.*

Researchers examined how intake of dietary saturated fat by prostate cancer patients contributes to the growth of tumors and to mortality.

The scientists demonstrated that higher consumption of saturated fat mimicked an MYC overexpression, both in a mouse study and in humans. (The oncogene c-MYC plays a role in cancer initiation and progression.)

"c-MYC is a key factor in tumorigenesis, i.e. it induces malignant properties in normal cells and fuels the growth of cancer cells," said lead author Dr. David Labbé, assistant professor in the Department of Surgery, Division of Urology at McGill University.

In 319 human patients, those who had the highest level of saturated-fat-intake c-MYC signature were four times more likely to have fatal prostate cancer than men with the lowest intake.

Editor's Note: “Even after removing obesity from the equation, patients with high levels of the saturated-fat-intake MYC signature are still three times more likely to die of prostate cancer,” Dr. Labbé said.

Dietary Supplements Can Benefit Mental Health

A meta-review of meta-analyses published in World Psychiatry: The Official Journal of the World Psychiatric Association found a benefit for several dietary supplements in mental health disorders.*

Researchers selected 33 meta-analyses of randomized, controlled trials that included a total of 10,951 individuals with depression, stress and anxiety disorders, bipolar disorder, personality disorder, schizophrenia, and ADHD.

The strongest evidence emerged in favor of omega-3 fatty acid supplementation for major depression, as an add-on treatment to antidepressant drugs. Omega-3s may also be effective in ADHD.

The review found evidence to support the use of N-acetylcysteine in mood disorders and schizophrenia.

5-MTHF (the bioactive form of folic acid) was beneficial as an add-on therapy for schizophrenia as well as major depression.

Editor's Note: "Future research should aim to determine which individuals might benefit most from evidence-based supplements and to better understand the underlying mechanisms so we can adopt a targeted approach to supplement use in mental health treatment," recommended senior author Jerome Sarris.

Migraines Associated with Low Vitamin B12

Among individuals who suffer from migraine headache, there is a greater risk of low levels of vitamin B12, and higher levels of methylmalonic acid (which is increased with B12 deficiency) according to a study published in the journal *Headache.*

The study compared 70 men and women who experienced chronic or episodic migraines, to 70 healthy adults who did not have the condition. Fasting blood samples were analyzed for serum vitamin B12 and methylmalonic acid levels.

While the healthy group had vitamin B12 levels that averaged 667 pg/mL (picograms per milliliter), levels among migraine patients averaged 512 pg/mL.

As expected, methylmalonic acid levels (which are increased with B12 deficiency) were lower in the healthy group than in the migraine group.

Those whose vitamin B12 levels were among the top 25% of participants had an 80% decrease in the odds of having migraine compared to participants whose levels were among the lowest 25%.

*Editor's Note:* The authors discuss the hypothesis that elevated levels of homocysteine could provoke migraine and suggest that vitamin B12’s involvement in the regulation of homocysteine may help support the association revealed by this study.

IN THE NEWS

37% Lower Risk of Mild Cognitive Impairment with Higher Magnesium Intake

A study of 6,473 women in the U.S., aged 65-79, found that those who consumed magnesium in amounts between 257.3 mg/day and 317.8 mg/day lowered their risk of developing mild cognitive impairment by 37%, compared to those who consumed less than 197 mg/day.*

The study, published in BMJ Open, looked at the intake of dietary and supplemental magnesium in postmenopausal women who were participants in the Women’s Health Initiative Memory Study (WHIMS) and who did not have dementia when they enrolled.

Magnesium consumption was compared with cognitive outcomes. Mild cognitive impairment was defined as being not enough to interfere with everyday activities.

The authors concluded that:

“Total magnesium intake between the estimated average requirement and the recommended dietary allowances may associate with a lower risk of mild cognitive impairment and/or probable dementia.”

Editor’s Note: While the recommended daily allowance of magnesium is 420 mg/day for men and 320 mg/day for women, Life Extension® and many health experts now advise that adults consume at least 500 mg each day.

Restricting Eating to a 10-Hour Window Can Improve Cardiometabolic Health

Time-restricted eating, a type of intermittent fasting, promoted significant health benefits in patients with metabolic syndrome, a pilot study published in the journal *Cell Metabolism* reported.*

The study suggests that eating only within a 10-hour window, and not eating for a 14-hour stretch of time, can benefit individuals at risk for type II diabetes, heart disease, and stroke.

A research team from the University of California, San Diego, and The Salk Institute for Biological Studies, enrolled 19 participants, 13 men and six women, who had been diagnosed with metabolic syndrome. For a 12-week period, their eating was restricted to a maximum of 10-hours daily, during which time they could eat anything they wanted, in whatever quantities they wished.

At baseline, the participants’ eating window, defined as the interval during which 95% of calories were consumed, was about 15 hours every day.

At the end of the study, the 29% reduction in the eating interval to 10 hours daily, was associated with a 3% reduction in weight, BMI, and percent of body fat, and a 4% reduction in waist circumference. Individuals also reported that they had more restful sleep. Many also saw lower cholesterol and blood sugar levels.

**Editor’s Note:** “Time-restricted eating is a potentially powerful lifestyle intervention that can be added to standard medical practice to treat metabolic syndrome,” the authors stated.

*https://doi.org/10.1016/j.cmet.2019.11.004.*
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3. Cyanidin-3-glucoside to assist with night vision.⁶⁻⁸
4. Astaxanthin for comprehensive eye health support and to fight eye fatigue.⁹
5. Saffron to help support vision, based on study subjects seeing an average of two additional lines on eye chart used by doctors to test vision.¹

References

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New Hope for Relief from Diabetic Neuropathy
It’s one of the most common complications of diabetes: **Nerve damage known as diabetic neuropathy.**

About 30% to 50% of individuals with **type II diabetes** will develop this debilitating condition, often in the legs and feet.\(^2\)

**Diabetic neuropathy** frequently causes severe pain and loss of mobility. When the condition worsens, it can lead to amputation and even fatal infections.\(^3,4\)

By the time symptoms arise, the nerve damage has already progressed and become severe—and very difficult to fully repair.

That makes it crucial for diabetics to take aggressive measures to prevent the horrors of diabetic neuropathy.

Managing this disorder is challenging. Damage can continue even if sugar levels are under control,\(^2,5,6\) and no drug can reliably stop the nerve damage from getting worse.\(^5\)

Increasing evidence has identified **seven nutrients** that may provide relief from symptoms and protect against the development of diabetes-induced neuropathy.\(^7\)–\(^23\) They are:

- Omega-3 fatty acids
- Vitamin D
- Curcumin
- Lipoic acid
- Folic acid
- Acetyl-L-carnitine
- Benfotiamine

Working in overlapping ways, each of these compounds protects tiny nerves through important mechanistic pathways.
NEW HOPE FOR RELIEF FROM DIABETIC NEUROPATHY

What Is Diabetic Neuropathy?

Diabetic neuropathy occurs when prolonged elevation of blood sugar levels damages tiny capillaries feeding blood to nerve fibers.

As nerves shrivel and die from lack of blood flow, there is a loss of nerve function, loss of sensation in affected areas, and progressive manifestation of pain and immobility.

There are several types of diabetic neuropathy, categorized by which nerves are affected.

Diabetic neuropathy occurs in both type I and type II diabetes, and about 40% to 70% of diabetics will develop the condition.24-28

Symptoms depend on the type of neuropathy and which nerves are affected. Usually the symptoms develop gradually, and can include severe pain, numbness or tingling of extremities, balance problems, erectile dysfunction, and more.29

Published research indicates how seven nutrients can offer relief of symptoms and even slow the processes that lead to nerve dysfunction.7-23

Omega-3 Fatty Acids

Fish and flaxseed oils are rich in anti-inflammatory omega-3 fatty acids.

Increasing intake of omega-3s shows great promise in preventing and relieving diabetic neuropathy. In rodent studies, fish oil can slow and even reverse the progression of diabetic nerve damage.22,23

Here are some critical ways in which omega-3s may help treat diabetic neuropathy:

- People with diabetic neuropathy suffer from a decrease in nerve conduction velocity, which measures how fast an electrical impulse moves through the nerves. In animals, fish oil rapidly restores nerve conduction velocity and reduces visible damage to crucial nerve bundles.30

- Pain and hypersensitivity to touch are reduced in diabetic animals after treatment with fish oil.31

- Nerve clusters from fish-oil-treated animals show a reduction in inflammation, and lower levels of the “master inflammation promoter” nuclear factor kappa B (NF-kB).31

- After treatment with DHA or EPA, nerve cells in lab cultures sharply ramp up their production of proteins that fight harmful oxidative stress.32

The above differing actions have major consequences. In a study of people with diabetic foot ulcers, complications of neuropathy that can lead to amputation, taking one gram per day of omega-3 significantly decreased ulcer size.

At the same time, markers of inflammation were lower and total antioxidant levels rose significantly.33
NEW HOPE FOR RELIEF FROM DIABETIC NEUROPATHY

Curcumin

Curcumin is prized for its anti-inflammatory properties and has recently been studied for its potential in pain control.40,41

In fact, curcumin has been shown to significantly raise the pain threshold and reduce pain hypersensitivity in lab animals.41-44

For people suffering from diabetic nerve damage, curcumin offers much more than pain relief. The compound, found in the spice turmeric, may also slow or reverse some of the processes that produce neuropathic pain in the first place.

Pre-clinical studies show that curcumin:

• Reduces production of TNF-alpha, an inflammatory protein and contributor to pain,43

• Activates the internal pain-relief system (known as the endogenous opioid system),41

• Inhibits oxidative stress in cells, which is a major trigger of nerve pain,44 and

• Reduces aberrant electrical impulses in diabetic nerves.45,46

Vitamin D

Vitamin D is best known for its role in building strong bones. But it also has an important impact on brain and nerve tissue.34,35

Numerous studies have established that vitamin D deficiency (levels less than 20 ng/mL) and insufficiency (20 ng/mL to 30 ng/mL) are strongly associated with neuropathy in diabetics.1,36-38

One study found that diabetics with deficient vitamin D levels have two-fold greater odds of neuropathy.37

Clinical trials have established that 50,000 IU of vitamin D3 weekly significantly reduces symptoms of diabetic nerve damage and improves quality of life.18,19

And in one study, 50,000 IU of vitamin D given every two weeks significantly reduced the size of diabetic foot ulcers after 12 weeks.39

WHAT YOU NEED TO KNOW

Nutrients Help Protect Against Nerve Damage

Diabetic neuropathy, nerve damage caused by high blood sugar from diabetes, affects up to half of all people with type II diabetes.

This nerve damage can cause severe pain and loss of mobility and can lead to deadly infections and the risk of amputation.

No existing drug can reverse the course of this disease. But seven nutrients may slow the events leading to diabetic neuropathy.

Anyone with type II diabetes, pre-diabetes, or impaired glucose tolerance could benefit from increasing the intake of these nutrients.

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Anyone with type II diabetes, pre-diabetes, or impaired glucose tolerance could benefit from increasing the intake of these nutrients.
Lipoic Acid

A number of human studies show that in diabetes patients with painful nerve damage, 600 mg daily of alpha-lipoic acid produces significant improvements in:14-17

- Pain,
- Burning,
- Numbness,
- Ability to feel pin pricks and touch pressure,
- Ankle reflexes,
- Muscle weakness,
- Need for “rescue” pain medications,
- Quality of life scores, and
- Reports of overall health status.

At the same dose, alpha-lipoic acid also prevents worsening of impairment caused by neuropathy.15

Folic Acid

Folic acid is a B vitamin that lowers levels of homocysteine,47 an amino acid that is linked to the development of cardiovascular disease and is dangerously toxic to nerves.48

In a 2001 study involving 65 patients with type II diabetes, the risk of nerve damage more than doubled with each 5 mmol/L increase in homocysteine.49

Chinese patients who have type II diabetes with neuropathy also have significantly lower levels of folate than those without neuropathy.50

A recent study of patients with diabetic neuropathy showed that 1,000 mcg of folic acid given daily for 16 weeks, lowered homocysteine levels, and markedly increased nerve conduction velocity and signal strength.13

An animal study found that folic acid treatment could protect against neuropathy by increasing nerve growth factor, a protein essential for promoting nerve healing.51

Acetyl-L-Carnitine

Acetyl-L-carnitine is a form of the amino acid L-carnitine that has shown to have neuroprotective and analgesic effects in the peripheral nervous system.52

Acetyl-L-carnitine works in multiple ways to protect nerves, including:53

- Reducing harm from oxidative stress and helping to prevent nerve cell death,
- Relieving pain by reducing the concentration of the pain-signaling neurotransmitter glutamate at the synapses,
- Facilitating nerve regeneration and nerve damage repair,
- Promoting the health of nerve cell membranes, and
- Amplifying responses to nerve growth factor.

In people with diabetes, acetyl-L-carnitine at doses of 1,500 mg/day to 3,000 mg/day improves nerve conduction velocity and strength, reduces pain and disability scores, increases numbers of nerve fibers, and regenerates damaged nerve fibers.10-12
Benfotiamine

Benfotiamine is the fat-soluble form of thiamine (vitamin B1).

One key factor involved in the development and progression of diabetic neuropathy is increased glycation, a process in which glucose and other sugars interact with proteins.

Glycation is a process in which glucose and other sugars bind irreversibly to proteins, lipids and nucleic acids, causing them to become dysfunctional. The dysfunctional molecules created by glycation are known as advanced glycation end products (AGEs).54-56

AGEs damage nerves by inhibiting their function, which in turn affects their activity, and by triggering an inflammatory response that further damages nerve cells.57

Studies have shown that benfotiamine reduces pain and restores normal sensation in patients suffering from diabetic neuropathy.7-9

The best results have been seen with doses ranging from 320 mg to 600 mg daily, for periods as short as three weeks, though benefits steadily increased with longer treatment duration.7-9

Summary

Diabetic neuropathy—nerve damage resulting from diabetes—can lead to severe pain, numbness, loss of function, and even limb amputation.

No drug can reliably stop or reverse the progression of diabetic neuropathy.

Seven nutrients may be capable of slowing the progression of diabetic neuropathy.

They work in many ways, offering a broad range of protection against this debilitating ailment. •

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

NEW HOPE FOR RELIEF FROM DIABETIC NEUROPATHY


Research has found that taurine can promote **new cell formation** in the area of the brain associated with **learning** and **memory**.

Taurine also enhances **neurites**, tiny projections that help brain cells communicate with each other.

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Each year I dedicate enormous time to a scientific conference titled *Revolution Against Aging and Death*. The abbreviation for this event is “RAADfest.”

It is presented by a charitable group called the Coalition for Radical Life Extension. The inspiration for RAADfest occurred in 2015, as a confluence of biomedical advances made clear that it may be possible to turn degenerative aging into a manageable condition in our lifetime.

Findings from small human studies that I help organize and fund, show improvements in clinical measures (such as blood pressure and joint function) and aging biomarkers (such as DNA health and inflammatory indicators).

I’ve self-experimented with many of these age reversal interventions.

So far, objective measures indicate that I may be growing biologically younger. The same may be true of most of the volunteers who participated in the proof-of-concept clinical trials.

The results of these studies are so impressive that a new charity was established in 2019 to fund a human age reversal trial that is unparalleled in the history of medical science.

The objective of this study is to carefully measure the effects of a combination of regenerative approaches that include:

1. AMPK activation,
2. Removal of senescent cells (using senolytics),
3. Suppression of excess mTOR,
4. Restoration of NAD⁺,
5. Additional approaches being explored now.

This article will summarize a few of the major announcements made at RAADfest 2019. These include published results from a clinical trial that resulted in an unprecedented 2.5-year average reversal of biological age as measured by epigenetic aging clocks!

None of this would be possible without your purchases of Life Extension® nutrient formulas and laboratory tests.

Proceeds from these sales support scientific endeavors that have little or no commercial value but may enable substantive increases in healthy longevity to benefit all of humanity.
RAADfest 2019 may go down in the history books as a major inflection point in our battle against and victory over degenerative aging.

More than 260 people enrolled in a new project called the Vitality in Aging Longitudinal Study. This represented 25% of the 1,000 or so RAADfest 2019 attendees!

Even more would have enrolled if the Vitality in Aging research group had the time to expand its staff to accommodate the tremendous interest shown.

People had to be turned away from the clinic established in the hotel because the resources were not sufficient to enroll everyone who was eager to join.

The Vitality in Aging Longitudinal Study will enable meticulous measures of regenerative interventions, including the stair-step approach to biological age control outlined below.

Many more are expected to enroll as new clinical study sites open throughout the United States and beyond.

Human Age Reversal Demonstrated!

Unparalleled results from a published clinical trial were presented at RAADfest 2019.

The findings reveal a 2.5-year reversal in biological age markers in healthy men aged 51-65!

This study was conducted by Dr. Greg Fahy’s Intervene Immune group in collaboration with researchers from Stanford University and UCLA. This one-year treatment protocol showed:

1. Regenerated thymic structure,
2. Improved immune function with signs of increased cancer protection,
3. Improved prostate cancer markers (PSA and percent free PSA),
4. Regenerative effects on kidney function and bone marrow, and
5. 2.5 years of age reversal, on average, as measured by four different DNA methylation tests.

Biological age was assessed by multiple epigenetic aging clocks. Dr. Steve Horvath from UCLA, the original developer of this technology, who is considered to be the world’s foremost expert in its use, was one of the investigators in this trial.

Measurement of DNA methylation patterns may be the most accurate biomarker test to assess biological age and can be a strong predictor of future healthspan and lifespan.

The interventions used by Dr. Fahy’s group were individualized doses of metformin, DHEA, and human growth hormone.

The rationale for the study is that growth hormone is known to regenerate the thymus gland, which is vital for youthful immune responses. Downsides to growth hormone are insulin resistance and a potential to stimulate proliferation of malignant cells, but both problems were apparently contained by the protocol employed.

By combining metformin and DHEA with growth hormone for just one year, the benefits of growth hormone (such as systemic tissue regeneration) occurred with no significant side effects and the unexpected side benefit of an average of 2.5 years of biological age reversal as measured by DNA methylation clocks.

Before and after MRI tests validated the regeneration of thymic structure. (These MRI scans were funded in part by our Life Extension® group.)

And breaking news I just learned is that the study subjects that demonstrated 2.5 years of age-reversal continue to demonstrate rejuvenating signs after the one year of low-dose growth hormone was discontinued.
Many of you already take DHEA as well as AMPK-activating compounds like metformin or AMPK-activating nutrients like Gynostemma pentaphyllum.

Dr. Fahy’s group at Intervene Immune is now launching an expanded study of this longevity protocol in Southern California and exploring ways to make treatment widely available and affordable. Additional information about their work appears on page 65 of this month’s issue.

My goal is to enable readers of Life Extension magazine to gain access to this new age reversal intervention at ultra-low pricing as part of a large new study group managed by Intervene Immune.

Other potential longevity approaches were introduced at RAADfest 2019.

The Vitality in Aging Longitudinal Study looks forward to measuring the efficacy of these interventions and reporting the results to rapidly advance the science.

New Human Rejuvenation Trial

Those who enrolled in the Vitality in Aging Longitudinal Study are being carefully screened to meet eligibility criteria to enroll in the:

Vitality in Aging Interventions Trial

This clinical trial aims to induce statistically significant and meaningful age reversal in only 12 months. It will entail very close physician oversight and precise, careful introduction of the regenerative interventions.

Funding has been secured to study 40-50 people using multiple therapies and in-depth biomarkers to ascertain the degree of age reversal that may be occurring.

The interventions that will be introduced are represented by the first four steps in the image on the facing page to the left. Later Vitality in Aging studies will include newer interventions as cutting-edge research continues to provide more healthy longevity options.

New Donations Received

Right before my keynote RAADfest presentation, one of our supporters let me know that he was not happy about the progress made with a new charity I established called the Human Age Reversal Project.

Specifically, his concern was that as of October 1, 2019, we had only raised $395,000.

He made a new donation of more than $200,000. This, along with other donations received to date, brings our total to more than $675,000.

All Human Age Reversal Project donations are placed in an interest-bearing brokerage account. I expect this to grow much higher as more people understand the ramifications of this research for themselves and all of humanity.

I provided hundreds of thousands of dollars to launch the Vitality in Aging Longitudinal Study in 2019 and will continue to support it.

For the Vitality in Aging Interventions Trial, we will need new donations to expand beyond the first 15 months.

I ask that you help support the Human Age Reversal Project. We are accelerating age reversal initiatives and every penny goes towards the research; there are no salaries or fixed overhead costs!

Donation information is in the box below:
The Medical Clinic at RAADfest

The medical clinic set up at RAADfest was filled with people seeking to enroll in the Vitality in Aging (VIA) Longitudinal Study.

Many who wanted to join could not because the lines were too long.

While huge resources were spent to open the Vitality in Aging Longitudinal Study clinic, the staff was unable to handle the unexpectedly large response.

Another temporary enrollment center was set up in Phoenix, Arizona, in November 2019 so that some of those who want to join this study could do so.

The Vitality in Aging research group spent three months after RAADfest 2019 processing applications, baseline clinical data, the many different blood samples taken, and enrolling more study subjects.

From the group of over 300 enrollees in the Vitality in Aging Longitudinal Study, an initial 40-50 will be selected who meet the eligibility criteria to qualify for the Vitality in Aging Interventions Study.

Just to clarify, before it can be determined if you meet the eligibility criteria to join the Vitality in Aging Interventions Study, you first need to enroll in the Vitality in Aging Longitudinal Study so your data can be collected and analyzed.

My RAADfest keynote talk introduced and explained the differences between these two human age reversal studies.

To view my 55-minute presentation (with new slides added), log on to the home page of the Age Reversal Network: www.age-reversal.net

How to Enroll in the Longitudinal Study

The Vitality in Aging Longitudinal Study is modeled after the famous Framingham Heart Study that enabled scientists to identify risk factors that cause heart attack and stroke.

Copied in these pages are Power Point slides I used at RAADfest to describe the Framingham Heart Study and how many lives were saved.

The plan is to rapidly identify risk factors that cause accelerated aging and what lifestyles and interventions (such as senolytic therapy) can reverse aging biomarkers.

Vitality in Aging Longitudinal Study sites are expected to open in most major cities. This will provide convenient access to people interested in joining a team effort to defeat aging.

The goal is to have qualified volunteer doctors in most major metropolitan areas, or you can travel to one of the study sites expected to open in Southern California, South Florida, Las Vegas, and Idaho.
The first step for those interested in participating in either of these studies is to have an Age Management Blood Test Panel. The results enable the research group and you to determine if you best qualify for either:

Vitality in Aging Longitudinal Study

or

Vitality in Aging Interventions Trial

The retail price of the individual tests included in this new Age Management Blood Test Panel is around $3,000.

It is being made available for a limited time for $495, which includes your registration in the Vitality in Aging Longitudinal Study.

For those who utilize the Male or Female Blood Test Panels from LifeExtension®, the new Age Management Panel can be used to take its place with many more tests included.

The individual tests in the new Age Management Blood Test Panel can be viewed on the next page.

To order this blood test and enroll in the Vitality in Aging Longitudinal Study electronically, please log on to: VitalityInAging.org/sign-up

If you don’t want this blood test now, but want to be kept informed about the studies for your future consideration, please register your name and contact information at: VitalityInAging.org

By enrolling in the Longitudinal Study or registering your potential interest, you will be kept informed about new and current research initiatives spearheaded by the Vitality in Aging research group and local meetings.

To receive email updates about results from regenerative medicine trials, as well as about how you can gain affordable access to many of the interventions, you can join a private association called the Age Reversal Network at no cost by logging on to: https://age-reversal.net/join

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Vitality in Aging Longitudinal Study

Modeled on the Framingham Heart Study

✓ Long-term and Ongoing
✓ No Upper Age Threshold
✓ No Strict Exclusion Criteria!

Vitality in Aging Longitudinal Study

Battle Plan to Defeat Aging

✓ Identify “Risk Factors” That Cause Aging
✓ Access Biomarker Tests at Subsidized Prices
✓ Access Interventions at Discount Prices
✓ Test Safety and Efficacy of Self-experimentation
✓ Accelerate Science of Human Age Reversal

Become Part of a Team Effort to Defeat Aging!

Framingham Heart Study

Began in 1948 with 5,209 adults from Framingham, MA.

Prior to Framingham, little was known about hypertension/cardiovascular risks.

At that time, doctors did not know how to prevent heart attacks.

Atherosclerosis was thought to be an unavoidable aspect of normal aging.

Framingham Heart Study

Millions of Lives Saved
Framingham findings revealed role of diet and other artery-clogging factors.

3,000 medical papers published using Framingham—now in its third generation.

Framingham heart study is source of the term "risk factor".
NEW!

Age Management Blood Panel

The Vitality in Aging research group has come up with a blood test panel that provides keen insight into our “biological age,” along with affordability and ease of access.

The Age Management Blood Panel will enable as many people as possible to have these tests performed at baseline (before undergoing a potential age reversal intervention), and at follow-up intervals afterwards.

This new panel enables most to have a blood draw done in their local area. The results provide an in-depth snapshot of current health status to help determine what lifestyle changes or experimental interventions you may consider.

The cost of having all these tests done by commercial labs is outrageous. One large commercial lab quoted us over $3,000 for this elaborate test panel.

Through group purchasing, the Vitality in Aging research group has arranged for this comprehensive test panel to be available for $495, a savings of almost 85%.

This heavily subsidized price will be in effect only for a limited time. It will move higher as more people enroll and use up the subsidized pricing allotted for this study.

You can order the Age Management Blood Panel now and defer your blood draw until you are ready to initiate one of several experimental age reversal options. Current research protocol summaries are posted on https://vitalityinaging.org/via-interventions-trial/

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<td>• PSA—(Prostate-Specific Antigen)</td>
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To order the new Age Management Blood Test Panel, log on to VitalityInAging.org/sign-up

Here is a list of the tests included in the new Age Management Panel. Descriptions of the importance of some of the tests are provided below:
Here is a description of some of the unique tests included in the Age Management Blood Test Panel:

- **IGF-1** (Insulin-like Growth Factor-1) is a surrogate marker of growth hormone status. Growth hormone is associated with muscle and skeletal strength, cognition, sleep, energy, and importantly, tissue recovery and repair. Too much growth hormone can create health issues just as too little can.

- **IGF1-BP3** (IGF Binding Protein 3)—This protein helps ensure IGF-1 is transported efficiently to tissues throughout the body. Both low and high levels may lead to concerns with IGF-1’s distribution and biological activity.

- **IL-6** (Interleukin-6)—A pro-inflammatory cytokine associated with chronic and acute inflammatory states. High levels may be associated with increased presence of senescent cells as well as many other degenerative and malignant health processes that may limit the efficacy of age reversal therapies. Long-lived individuals usually have low blood levels of IL-6.2,3 If your IL-6 is elevated, then measures will be recommended to reduce it.

- **Apolipoprotein B**—A surface marker on non-HDL cholesterol, low blood levels of apolipoprotein B have been shown to be associated with decreased coronary artery disease risk by up to 90%.8 Another study shows regression of arterial plaque when apolipoprotein B blood levels are reduced.9

- **Omega-3 Index**—An in-depth analysis of blood fatty acid profile, reflective of long-term dietary patterns and balance of proinflammatory and anti-inflammatory signaling molecule precursors. This comprehensive fatty acid profile includes the following individual tests:
  - **Omega-3 Index**—Overall percentage of omega-3 fatty acids in the blood. An optimal omega-3 index corresponds with positive cardiovascular, cognitive, and whole-body health and can be achieved through dietary consumption of omega-3-rich foods as well as with high-quality marine oil supplementation. Life Extension® recommends most people seek to achieve an Omega-3 Index score of 8% and higher.
  - **Omega 6: Omega-3 ratio**—Ratio of total omega-6 fatty acids compared to omega-3 fatty acids. To maintain healthy inflammatory response activity, Life Extension believes this ratio should remain under 4:1 and as close to 1:1 as possible.
  - **AA:EPA ratio**—A specific ratio of arachidonic acid (AA) and healthy eicosanoid promoting eicosapentaenoic acid (EPA). Ideal AA:EPA ratios are 1.7:1 or less.
  - **Trans-Fat Index**—Percentage of blood fatty acids in the unnatural trans-configuration, associated with higher processed food intake. Trans fats may interfere with the normal activity of natural fatty acids.
  - **Full Fatty Acid Profile**—Whole blood analysis of 24 fatty acids, including various polyunsaturated, monounsaturated, saturated, and trans-fatty acids. May help reveal irregular patterns of fatty acid conversion or imbalanced dietary fat intake.

- **NMR LipoProfile**—A deep analysis of blood lipids, the NMR offers insight into LDL particle count, as well as average particle size (LDL pattern) providing better risk analysis of cholesterol lipoproteins and their relationship to atherogenesis. The NMR LipoProfile includes the following tests:
  - **LDL particle number (LDL-P)**—A direct measurement of LDL particle count, an independent risk factor for cardiovascular disease.
  - **Small LDL particle number (small LDL-P)**—Number of small, dense, LDL particles. Smaller LDL particles are considered more atherogenic, so higher levels are considered a cardiovascular risk factor.
  - **HDL particle number (HDL-P)**—A count of HDL particles, where higher levels are considered more protective, due to their role in reverse-cholesterol transport.
  - **LDL particle size**—Pattern A is considered an ideal result, corresponding with larger, less atherogenic LDL particles.
  - **Standard cholesterol test** (LDL-C, HDL-C, triglycerides, and total cholesterol)—More predictive of risk than a simple total cholesterol test.
  - **LP-IR (Insulin Resistance Score)**—A composite score, based on various lipoprotein markers, that indicates risk of developing insulin resistance. Higher values indicate increased risk of developing insulin resistance. Note: If the address you enter at (VIA blood test order landing page) is from one of the following states: NY, NJ, RI, MA, or MD, you will not be able to select “requisition” from the drop-down menu. If you have a residential address from one of the other 44 continental U.S. states, please enter that instead. Then you can drive to a LabCorp facility in any of the states other than the above-named five with the requisition that will be emailed to you, and have your blood drawn. An alternative for those in the five states with restrictions would be to get a prescription from a doctor for the Age Management Panel. The much higher commercial lab price may make a blood draw trip to a neighboring state more cost effective.
Concluding Remarks

The Vitality in Aging research groups are making headway in measuring the efficacy of currently available regenerative interventions.

The goal is to identify which combinations of interventions are most effective in inducing meaningful human age reversal.

By enrolling in the Vitality in Aging Longitudinal Study, you obtain baseline measures of your state of health and can track improvements that occur in response to whichever rejuvenation protocol you choose (or do NOT choose).

Data sets will be compared to enable rapid identification of the most robust approaches to age reversal available today!

I look forward to keeping you posted on new plans for transforming emerging scientific findings into practical steps to improve your health and longevity.

To receive email updates about results from regenerative medicine trials, as well as about how you can gain affordable access, you can join a private association called the Age Reversal Network at no cost by logging on to: https://age-reversal.net/join

Note the Age Reversal Network is entirely separate from the Life Extension® group I founded in 1977 (and first published in 1980).

You can read a description of the Age Reversal Network on the next page.  

For longer life,

William Faloon
Co-Founder,
Coalition for Radical Life Extension
Age Reversal Network

Enroll for RAADfest 2020 At Discount Prices

RAADfest 2019 attendees gained unexpected access to medical exams and advanced diagnostics at a fraction of normal pricing.

What’s more, a company that wants to support our studies committed to providing the initial study subjects with a complimentary bottle of dasatinib, a (senolytic drug), provided they have a prescription. This bottle of medication may last most of the early participants in the Vitality in Aging Longitudinal Study for several years. (New study subjects will have to purchase this medication, and the Age Reversal physicians’ network can refer them to low-cost sources.)

Most of the diagnostic tests performed at RAADfest 2019 will be repeated at RAADfest 2020 to see how much age reversal may have occurred in each study subject.

Large rooms have been reserved in the hotel to accommodate the expected number of people who want to enroll in clinical studies and initiate interventions at the RAADfest clinic, such as NAD+ infusions.

There has never been such an interactive conference where attendees not only learn about healthy longevity advances, but also get to participate as study subjects at the same time!

The potential value of having attended RAADfest 2019 cannot be overstated.

You can enroll now for RAADfest 2020 at a special rate of 15% off the current published price, which increases incrementally as we approach RAADfest.

Just log on to www.raadfest.com and use the discount code “LEF” when you register, in order to receive this special offer of 15% off.

This code is valid until March 1, 2020. To register at these lower prices, log on to:

www.raadfest.com

P.S. The Age Reversal Network is an informal association, with no funding for staff. If you contact us with questions, please be patient with communication delays, as we have minimal staff to answer questions of a few thousand people currently registered to receive updates.
About the Age Reversal Network (Age-Reversal.net)

The purpose of the **Age Reversal Network** is to exchange scientific information, foster strategic alliances, and support biomedical endeavors aimed at reversing degenerative aging.

We seek to unite people in ways that will accelerate the availability of rejuvenation technologies to benefit all of humanity, including members of the group. As data emerge, the **Age Reversal Network** will seek to rapidly convey this to members of our private association.

The **Age Reversal Network** consists of several thousand individuals who have expressed their desire to donate to and/or actively participate in advancing human age reversal studies.

Our public benefit group functions as a **private association** and consists of physicians, scientists, activists, donors, and participants in previous age reversal initiatives. These individuals share a common desire to rejuvenate aged people.

Partnerships may form within or outside the group in any manner the individual members choose. Information will be shared at the discretion of the individual members.

The **Age Reversal Network** serves as an open-source communications channel to a wide variety of experimental technologies.

There are some individuals in this group who are bound by confidentiality/nondisclosure contracts. We nonetheless welcome their input and any meaningful scientific data they are permitted to disseminate. A key to our success will be open-source information sharing whenever feasible.

Those who choose to participate in clinical trials or self-experiment with therapies described by the **Age Reversal Network** should do so with the knowledge that any intervention can have unknown risks.

Members of this private association acknowledge they are embarking on a voyage with historic implications relating to human longevity. As with any exploratory venture, the outcome cannot be predicted, and any medical intervention carries inherent risks, especially for elderly individuals.

Professional medical advice should be sought before undergoing any potential treatment you learn about from the **Age Reversal Network**.

To register as a member of the **Age Reversal Network** and receive updates about regenerative medicine research initiatives, please log on to [Age-Reversal.net/join](http://Age-Reversal.net/join). (There is no cost to join.)

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**References**

COMBAT
Senescent Cells
and AGING

Science of Senolytics!

Senescent cells are old cells that no longer divide but they emit factors that accelerate aging.

Senolytic compounds selectively help target senescent cells in the body. Laboratory studies show evidence of systemic rejuvenation when the senescent cell burden is reduced.

Once-Weekly Senolytic Formula

Senolytic Activator provides a highly absorbable form of quercetin phytosome and black tea theaflavins designed to enhance the body’s ability to manage senescent cells.

The suggested dose is to take two capsules of Senolytic Activator just once weekly.

For full product description and to order Senolytic Activator, 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.
Increase AMPK to Lower mTOR

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.

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.
ARTIFICIAL INTELLIGENCE
The tissues of your body come with a built-in “backup” system known as tissue-specific stem cells.

As functional cells in our tissues grow old, embedded stem cells can replace them by producing new healthy cells.

These fresh functional cells rejuvenate aging tissues.

What few people know is that stem cells have the power to reproduce themselves (self-renew) so they can continue to replace aging functional cells.

So why do our tissues still grow old and lose function as we age?

The problem is that stem cells are also adversely impacted by aging.

Over time, our stem cells accumulate damage just like other cells do. This compromises their ability to keep tissues healthy and fully functional.¹

Scientists at Life Extension® partnered with a deep-learning AI biotech group called InSilico Medicine. The mission was to discover ways to keep stem cells young and refreshed.

Three plant-based nutrients (garcinol, piceatannol and resveratrol) have been found to promote stem cell health.

Researchers showed that these compounds can help protect and revitalize stem cells.²⁻¹⁰
What Are Stem Cells?
Most cells in our tissues are specialized for specific functions.
A neuron, for example, is a cell in the nervous system which has been specifically designed to respond to stimuli and conduct electrical impulses. A muscle cell has developed a distinct machinery to enable it to contract—to shorten forcefully to create movement.
These cells, and others throughout the tissues of the body, cannot change types once they mature. A neuron is always a neuron. A muscle cell is always a muscle cell.
In addition, many of these kinds of cells cannot divide to produce more cells. They die off and must be replaced by new cells.
But most tissues also have a small population of stem cells (also referred to as tissue-specific progenitor cells). They are critically important for the maintenance and health of every tissue.

How Do Stem Cells Regenerate?
Stem cells act as a reservoir to replace old, damaged, or dying cells.
When specialized (functional) cells in tissues stop working or are impaired by injury or disease, stem cells have the ability to develop into the needed cell type to replace them.
This helps rejuvenate and repair the tissues themselves.

To work properly, stem cells must perform two basic functions:

- **Self-renewal.** Stem cells continue to divide, forming new stem cells. This maintains the available pool of stem cells and ensures there are enough cells to allow some to develop into specialized cells.

- **Differentiation.** When needed, stem cells transform into specialized functional cell types which replace ones that have been lost or damaged.

When stem cells are working properly, they help maintain tissue and organ function and repair/defend tissues against disease, injury, and aging.

**Stem Cells and Aging**
It’s a nearly perfect system—with one huge flaw. While stem cells are meant to keep tissues young and healthy, advancing age takes its toll on them as well. As this damage accumulates over time, stem cells stop dividing as effectively, lose the ability to replace old and damaged tissue cells, and begin to die. This causes the entire tissue to age more rapidly and lose its function. Physical frailty advances, cognitive abilities decline, metabolism slows, and the body becomes more susceptible to age-related disease and dysfunction.
Revitalizing Stem Cells

The deterioration of stem cells may seem inevitable. But it’s not. Scientists have found that there are ways to protect these cells and restore their youthful function:

- Activating the enzyme AMPK—considered the “master regulator” of metabolism in the body. This improves energy balance in stem cells and leads to replacement of old, damaged proteins.11,12

- Inhibiting mTOR (an enzyme that regulates protein synthesis and cell growth) and activating FoxO (a protein that regulates the expression of genes). This limits the buildup of toxins and enhances autophagy, cellular “housekeeping” that keeps stem cells running smoothly.13-15

- Activating sirtuins, proteins that regulate cellular health, and protect and repair DNA.16,17

- Blocking the action of enzymes (called histone acetyltransferases) to reduce changes to genetic material that lead to cellular dysfunction.18

Nutrients That Improve Stem Cell Health

Three nutrients found in plants, garcinol, piceatannol, and resveratrol, have been shown to perform all these stem-cell-protecting actions.

Garcinol

As stem cells age, their expression of genetic material can be changed by a process known as histone acetylation.

In some cases, histone acetylation can drive up expression of damaging factors which can be very detrimental to the cell. This is one of the main causes of stem cell aging and loss of function and can lead to cellular dysfunction and risk for age-related disease.

An enzyme called histone acetyltransferase (HAT) is required for histone acetylation to occur. If we can block the enzyme, we can stop certain harmful processes and restore youthful stem cell function.

Scientists are looking for synthetic drugs that can inhibit HAT, but there’s already a nutrient that can do it.

Garcinol is a compound extracted from the fruit of the mangosteen tree.19 Preclinical studies have shown garcinol to be a potent HAT inhibitor. By inhibiting HAT (histone acetyltransferase), it reduces harmful chemical changes that affect gene expression.7,20
This directly benefits stem cells, promoting the expression of genes involved in self-renewal and suppressing others that restrict it. In an ex vivo study of human blood stem cells, garcinol caused their numbers to increase more than 4.5-fold.7

Garcinol may also promote the development of stem cells into specialized tissue cells. For example, garcinol treatment promotes differentiation of rat neural stem cells into neurons.9

Piceatannol

Piceatannol is found in fruits including red and white grapes, passion fruit, and blueberries.21

Preclinical studies indicate that it has the ability to stimulate cellular housekeeping and sirtuin function, which has a beneficial impact on stem cells.22

In a preclinical study, human stem cells isolated from fat tissues were differentiated into mature fat cells in the presence or absence of piceatannol. The cells grown with piceatannol displayed improved fat metabolism and healthier function, as well as reduced uptake of sugar which normally would be converted into fat.3

And in cell culture and adult mice, piceatannol helped neural stem cells differentiate to produce new, specialized brain cells called astrocytes.2

Resveratrol

Resveratrol, a nutrient found in the skin of red grapes, has long been known to have a wide range of health benefits.

Several recent studies have shown that it may specifically help restore healthy stem cell function by:

- **Activating SIRT1.** In a study of human stem cells, resveratrol increased activity of SIRT1, a sirtuin protein linked to longevity and anti-aging. This resulted in improved self-renewal of the stem cells as well as differentiation into specialized cells.8

- **Activating AMPK.** One recent study showed that resveratrol helps osteogenic stem cell differentiation via AMPK activation.23

- **Enhancing mitochondrial function.** In aging mice and in cell culture, resveratrol restored healthier cellular metabolism by improving the function of mitochondria.6

- **Inhibiting mTOR.** Too much activity of the enzyme mTOR can lead to premature cellular aging.24 Mouse embryonic stem cells treated with resveratrol had decreased mTOR activity, making them more youthful and enhancing their self-renewal ability.5

In one recent study, researchers subjected mice to chemotherapy, a harsh treatment that accelerates the aging of ovarian stem cells. But when the animals were treated with resveratrol, the loss of ovarian stem cells was alleviated.10
Protecting stem cells translates into clear improvements in tissue function. In a rat animal model, scientists created an injury to the aorta, the artery that carries blood from the heart to the rest of the body. In the rats treated with resveratrol, their stem cells were better able to replace the damaged endothelial cells, leading to accelerated healing/repair of the injured artery.4

In humans, resveratrol treatment reduced mean fat cells’ size and improved adipogenesis (differentiation of pre-adipocytes into fat cells) related to improved sensitivity of tissues to insulin.25

Resveratrol and piceatannol are both stilbenes, close relatives. In one cell study, resveratrol and piceatannol worked synergistically to enhance each other’s ability to stimulate cellular housekeeping and sirtuin function.22

Taken together with garcinol, they may provide thorough benefits to stem cells.

**Summary**

*Stem cells* are present in many tissues, providing a built-in means to replace dead, dying, and damaged cells, rejuvenating the tissue.

But stem cells are also damaged over time, reducing their ability to function properly.

Scientists have identified three nutrients found in plants that have a powerful impact on stem cell health and functions: garcinol, piceatannol and resveratrol.

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**Garcinol’s Anti-Cancer Activity**

Garcinol can stimulate the self-renewal and growth of healthy stem cells.

The activity of cancer stem cells has been linked to drug resistance and tumor relapse.

In one study garcinol treatment inhibited both lung tumor growth and viability of lung cancer stem cells.26

Several preclinical studies have shown that it may suppress the growth of various types of cancers, including cervical, breast, oral, and prostate cancers.27-30

Each of these compounds protects and revitalizes stem cells, enhancing their self-renewal and their ability to grow into mature tissue cells.

Maintaining a healthy pool of stem cells can keep tissues functioning optimally, warding off age-related degeneration and loss of function. ●

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

References


Spearmint tea has been shown in human studies to boost:¹

- Mental focus
- Working memory
- Concentration

Lab data suggest spearmint polyphenols may promote the growth of new brain cells.²

Just open a packet, pour Focus Tea™ into hot water, stir, and enjoy. No steeping needed.

References

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

Neumentix™ is a trademark of Kemin Industries, Inc.
Mega GLA is 33% more potent than our previous formula, in a smaller softgel.

This means 400 mg of GLA can now be obtained in just one daily softgel.

Mega GLA also provides sesame lignans to optimize benefits inside one’s body.

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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.
This new 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

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Will Suzanne Somers’ Celebrity Status Wake the World Up to HUMAN AGE REVERSAL?
Will Suzanne Somers’ Celebrity Status Wake the World Up to HUMAN AGE REVERSAL?

BY WILLIAM FALOON

As a Life Extension® reader, you are aware of methods to delay and reverse certain aspects of biological aging.

You accomplish this through healthy behavior patterns, along with personalized doses of hormones (like DHEA), standardized nutrients, and often proper use of medications (like metformin).

What you do today, however, was virtually unheard of when I incorporated the Life Extension® group in the 1970s.

Back then, people accepted pathological aging as inevitable. Instead of taking steps to forestall it, they often engaged in unhealthy behaviors that accelerated the onset of degenerative illnesses.

What has transpired over the last five decades is nothing short of a biomedical renaissance.

Instead of waiting for disease to manifest, enlightened individuals nowadays have preventive medical checkups including blood tests so they can initiate corrective actions before a crippling disease strikes.

Suzanne Somers has written a new book titled A New Way to Age.

It reveals information about regenerative interventions that Life Extension® readers have learned about in recent years.

What makes Suzanne’s book different is that it will be discussed in the mass media, and the scientific details made available to a huge audience.

There is potential for A New Way to Age to be read by enough people so that the public’s perception of human age reversal will evolve from “can it be done?” to “how soon will it happen?”

This article discusses how Suzanne’s book may ignite widespread recognition that rejuvenation of older individuals will soon become part of routine medical practice.
Slowly Reaching Critical Mass

Beginning in 2014, a series of discoveries converged in a way to indicate that aging can be partially reversed. As regenerative interventions moved from lab animals to small human studies, demonstrations of efficacy spawned significant viewpoint changes. The realization that older people might grow younger garnered favorable coverage in journals and the general media.

Despite a series of advances, the majority remain ignorant of even basic ways to counteract degenerative aging processes.

Need to Prioritize Human Research

In 2015, the FDA approved the first trial of a drug (metformin) to delay or reverse aging. Funding ($75 million) was secured in 2019 to initiate a study of elderly people to ascertain what degree of age control might be achieved using this one drug.

Readers of Life Extension® were informed about metformin back in 1995. If it continues to take decades to initiate clinical trials for simple treatments like metformin, then most of us will miss the super-longevity boat.

There is thus an urgent need to accelerate the pace of age-reversal research and make it a societal priority!

A New Way to Age

In today’s fragmented media world, Suzanne Somers remains one of the world’s most recognizable celebrities. When she writes a book, she garners extensive news and mainstream media coverage.

The trend towards use of “bioidentical hormone replacement” away from synthetic hormones did not occur because of an overnight change in mainstream medical practice.

It was largely due to Suzanne’s books and media appearances where she passionately advocated for more natural hormone replacement therapies. Suzanne’s pleas resulted in an avalanche of patients demanding natural hormones from their doctors. As patients educated their doctors, there were improvements in physicians’ prescribing practices that focused on more rational hormone therapies, such as natural progesterone in lieu of dangerous synthetic progestins.

In her latest book, titled A New Way to Age, Suzanne reveals a variety of anti-aging strategies that, up to now, have been limited to a minority of health-conscious individuals such as Life Extension® readers.

If A New Way to Age garners mass readership, it could ignite a revolutionary approach to human age reversal analogous to the tidal-wave switch to bioidentical hormones that occurred beginning in the late 1990s.
What Happens When We Reach the “Tipping Point”?

Once critical mass about human age reversal is attained, the political, economic, charitable, and scientific dynamics undergo radical transformations. As society prioritizes healthy lifespan extension, the pace of progress will accelerate, emulating other fields where technical advances transform the seemingly impossible into the routine at an even faster pace.

In 2014, the funding available to support age reversal research was virtually non-existent. It has since grown to hundreds of millions of dollars, aimed at finding ways to make old people grow biologically younger!

Just imagine when annual spending to transform aging into a manageable condition reaches the billions. This will happen as commercial interests compete to develop better rejuvenation therapies, while charities and governmental institutions simultaneously dedicate more funding to this research arena.

What’s in Suzanne’s Book?

Unlike Life Extension® supporters, typical readers of Suzanne’s books may require a lot of fundamental guidance as it relates to healthy lifestyle behaviors. The initial chapters of A New Way to Age describe the basics relating to proper diet, exercise, supplements, hormones, stress management, and environmental toxins.

The importance of a balanced microbiome, why testosterone does not cause prostate cancer in men, and how to avoid heart attacks, are critical knowledge for novices who often only know conventional medicine’s side of the story.

Moving past the basics are interviews with doctors engaged in a variety of experimental treatments. These include age reversal strategies you may already be practicing such as:

- Activating cellular AMPK
- Removal of senescent cells (senolytics)
- Suppression of excess mTOR
- Restoring youthful levels of NAD⁺
- Stem cell enhancements

Can you imagine what will happen if millions of people start insisting their physicians prescribe interventions to enable all the above rejuvenation effects?

Are we Reaching a Tipping Point?

Major advances are fast-tracking our understanding of why we age and what interventions can partially reverse it.

In her New Way to Age book, Suzanne Somers advocates that people fight back by initiating interventions aimed at circumventing underlying aging processes.

While this is not new to Life Extension® readers, it will likely be the first time a large segment of the public learns that aging can be at least partially controlled.

I cannot predict if Suzanne’s new book will be the tipping point that ignites the ultimate societal rebellion against degenerative aging.

Over the past 40 years, I’ve witnessed huge behavior changes in those who pay attention to the science of healthy aging.

I’ve had the privilege of actively participating in changing the public’s view as it relates to slowing premature aging and reducing one’s risk of common age-related disorders.

People today say that they are not going to age like their parents did.
If all this translates into a critical mass that realizes how close we are to meaningful human age reversal, significant resources will be expended toward achieving this goal.

As favorable data from clinical trials continue to be published, the fervor to grow biologically younger will be the inspiration for even more resources to be committed to this universal, benevolent cause.

We are rapidly approaching a time when degenerative aging will be looked back on the same way we see smallpox, polio, and the many infectious diseases that are now largely vanquished.

By challenging the notion that humans must inevitably degenerate as they grow older, we remove the artificial barrier of cynicism and ignorance that historically has delayed introductions of lifesaving techniques, from the ones as simple as cardiopulmonary resuscitation, to those as advanced as organ transplantation.

If Suzanne’s A New Way to Age book leads to the tipping point of scientific and public acceptance, look forward to exponential expansions of healthy human lifespans and personally participating in the science of living longer.

It all begins with taking care of yourself today! This includes healthy lifestyle choices advocated since we first published a newsletter (Anti-Aging News) in 1980.

We endured fierce criticism (and governmental persecution) back in those days because the notion of slowing aging was considered “impossible” and serving no public interest.

But science is finally catching up to what Life Extension® advocated. The work we have done for over 40 years is changing how long and how healthy people live. Life Extension® continues to deliver scientifically validated information long before it becomes routine practice by the medical mainstream.

What’s so exciting is that the prospect of age reversal is rapidly transforming into biomedical reality! •

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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tipping point

definition noun

the point at which a series of small changes or incidents becomes significant enough to cause a larger, more important change.

—Lexico.com

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References

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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.

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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.1,4

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References

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With age, our bifidobacteria levels decline to as little as 5%, creating gut imbalance.¹

Increasing bifidobacteria levels enhances digestion and carbohydrate metabolism.

Strawberry flavored FLORASSIST® Prebiotic Chewable helps restore healthy bifidobacteria levels in as little as 14 days using XOS prebiotic fiber.²

1,000 mg of XOS (xylooligosaccharides) per prebiotic chewable.

A major advance in healthy longevity potential was published on September 8, 2019, in the journal Aging Cell. A combination of nutrients, hormones, and a drug resulted in significant human age reversal, as measured by DNA methylation, in nine men aged 51 to 65. The study was conducted by Dr. Greg Fahy and colleagues at the biotechnology company Intervene Immune, Inc., in collaboration with researchers from Stanford University and the University of California, Los Angeles (UCLA). The study protocol consisted of individualized doses of:

1. Human growth hormone (hGH),
2. DHEA, and
3. Metformin.

Study subjects were also provided with 3,000 IU of vitamin D3 and 50 mg of elemental zinc daily. After one year, the study participants were 2.5 years younger, as measured by multiple DNA methylation aging tests, than they would have been without treatment.
This innovative protocol resulted in multiple, system-wide, anti-aging benefits:

1. Regenerated thymic structure,
2. Improved immune function with signs of increased cancer protection,
3. Improved prostate cancer markers (PSA and percent free PSA),
4. Regenerative effects on kidney function and bone marrow, and
5. On average, 2.5 years of age reversal, as measured by four different DNA methylation tests.

This study, called the TRIIM trial, captured worldwide media attention. Favorable commentary was published in the prestigious journal Nature.

It was the first topic of discussion on Joe Rogan’s podcast with Harvard scientist David Sinclair. (Joe Rogan reaches more people than many network TV shows.)

In fact, according to Altmetric, four months after publication, the paper was number four out of 1,455 in attention score (99th percentile) among similar sources, and in the top 5% of all “research outputs” ever scored.

TRIIM stands for:

- Thymus Regeneration,
- Immunorestoration, and
- Insulin Mitigation = TRIIM

This combined protocol was designed to reach just the first two of the above goals.

The TRIIM trial results, therefore, were far greater than expected.

Regeneration of the Thymus

The thymus is a gland located behind the sternum (breastbone) and in front of your lungs, and it is responsible for the development of T-cells.

Beginning at the age of one, although the thymus continues to grow, it begins to become replaced with fatty tissue. The absolute mass of functional thymic tissue continues to increase until the early teenage years, but after that, progressive replacement by fat combined with a slow loss of thymic volume—a process known as thymic involution—results in a net decrease in thymic function. By the time we reach 50 years of age, the functional mass of the thymus is just a fraction of what it was at the onset of adolescence.

The shrinkage, or involution, of the thymus has been correlated with:

1. Reductions in functional thymus-educated immune cells (T-cells),
2. Reductions in T-cell receptors,
3. Increased risk of several diseases, and
4. Increased risk of all-cause mortality.

Earlier research had shown that growth hormone treatment can regenerate the thymus gland in animals and relatively young immunodeficient HIV patients, but the thymus of HIV patients is not normal.

“Cocktail of Drugs Gives First Hope That ‘Biological Age’ Can Be Reversed

Scientists at Intervene Immune and Stanford Medical Center say they have proven that ‘epigenetic aging can be reversed in humans.’

...they are optimistic that a person’s biological age can be reversed.”

Age markers reversed by 2.5 years!

The trial also uncovered the fact that, according to sophisticated test results, the treated study subjects had an increased lymphocyte to monocyte ratio. A higher lymphocyte to monocyte ratio (LMR) has been linked to better outcomes for many types of cancer, atherosclerosis, cardiovascular disease, stroke,18-21 and all-cause mortality. Furthermore, the increase in LMR did not change even six months after treatment ended.1

Dr. Fahy and his fellow researchers speculated that the benefits of having more lymphocytes in relation to monocytes might be due in large part to the fact that most monocytes express CD38, an enzyme that destroys NAD+ and may drive age-related NAD+ depletion in tissues.22 The LMR increase was driven mostly by a decrease in monocytes. Although monocytes play an important role in “innate” immunity,23 higher monocyte levels are associated with age-related frailty,24 and CD38 expression increases as we age. We need NAD+ for a myriad of biochemical processes including DNA repair and cell energy production.25 Therefore, it may be that the TRIIM protocol achieves systemic age-reversing effects at least in part by limiting the levels of NAD+-depleting CD38 monocytes while also restoring youthful thymic immunity.

Regeneration was so clear-cut that it was statistically significant at many time points in seven out of nine participants. Two others showed about a 10% increase in functional thymic mass, but the increase did not reach statistical significance because their baseline thymic fat contents were low for some reason. Overall, the probability that thymus regeneration did not occur was about one billionth of one billionth (p<9x10^-17), meaning that MRI evidence of thymic regeneration was incontrovertible.1 (MRI scanning was funded in part by Life Extension®.)

As seen in Daily Mail, October 22, 2019

"Turning back time!

As seen in Daily Mail, October 22, 2019

Aging is REVERSED in men using a cocktail of growth hormones and diabetes drugs in study that saw test group shed 2.5 biological years."

Source: https://www.dailymail.co.uk/health/article-7435427/Aging-REVERSED-small-group-men-study-reveals.html

Until the TRIIM trial, hGH had never been used with the aim of reversing immunological aging in otherwise healthy, aging volunteers.

**Growth Hormone Safety**

Traditionally, there has been concern that growth hormone treatment can cause insulin resistance, leading to a damaging and pro-aging increase in insulin levels, and might stimulate proliferation of malignant cells,15,16 although actual long-term population studies on hGH safety have not found an increased cancer risk.17

In the TRIIM trial, both problems were apparently successfully contained by the combination protocol employed in this study: insulin levels remained lower than average, and cancer risk seemed to decrease based on three independent indices of cancer risk.

Remarkably, all study subjects showed regeneration of their thymus, which was validated by MRI scanning using a special imaging technique at Stanford after 0, 9, 12, and sometimes also after five months of treatment. Regeneration of the thymus was reflected by the replacement of age-related non-functional fat tissue with functional, fat-free tissue.

**Immune System Benefits**

Several blood tests revealed that there was significant improvement in many biomarkers of immune function from the treatment protocol. Notably, there was an increase in the production of new T-cells, indicating that the basic T-cell manufacturing function of the thymus had been reactivated.

Three classes of new or “ naïve” T-cells were shown to increase. Since new T-cells normally seem to survive and function for many years, the hope is that these new immune defenders will continue to protect the TRIIM participants from immunological aging for many years to come.
Reduced Cancer Risk Indicators

Immune function was also improved, as shown by a reduction in PD-1 expression on cytotoxic T-cells.1

PD-1 is a receptor that cancer cells hijack to trick immune T-cells into thinking that the cancer is not a threat and they should not be attacked.26

Drugs that block the PD-1 receptor such as Opdivo® and Keytruda® have become multi-billion-dollar blockbuster drugs in recent years due to the survival improvement they demonstrate against several different cancers.27

Prostate cancer risk decreased in these study participants as shown through decreased PSA and improved percentage of free PSA.1

Additionally, C-reactive protein (a marker for systemic inflammation) decreased significantly.1

Elevated C-reactive protein is a biomarker for risk of both acute and chronic inflammatory conditions, including cardiovascular disease, surgical outcomes, and cancer mortality28-32 and is an important marker for the generalized inflammation that normally accompanies aging (“inflammaging”).

Kidney Function

One unexpected discovery was that there was a significant improvement in kidney function, as demonstrated by an increased glomerular filtration rate, or GFR.1

Normally, kidney function never improves as aging proceeds, and end-stage renal failure now costs taxpayers more than $30 billion a year.

During the TRIIM treatment, GFR steadily improved, and the trend even seemed to continue for six months after discontinuing treatment. These results were one sign that perhaps the TRIIM treatment could influence systemic aging and might not be confined only to rejuvenation of the immune system.

Reversal of Epigenetic Age

Within the last six years or so, measurement of DNA methylation patterns has enabled the most accurate measurement of biological age presently available. These DNA methylation “clocks” are an exciting new development and are also allowing scientists to accurately predict future healthspan and lifespan.

Several different “clocks” of this kind have been developed, each with a somewhat different purpose.
Each clock, by itself, showed highly statistically significant results. In combination, the evidence for aging reversal across all clocks was overwhelming.

Interestingly, the average age reversal of 2.5 years was mirrored almost exactly by the original Horvath DNAm clock result. The DNAm clock for blood is known to correlate with aging of the brain, muscle, and other tissues, supporting a global aging reversal effect of the TRIIM protocol.

**Summary**

Regenerating thymic function, improving immunity, reversing epigenetic aging, and the other favorable effects seen in the TRIIM trial are required if we are to advance toward a more youthful state.

Dr. Greg Fahy’s company, Intervene Immune, Inc., is seeking to replicate and extend these results in a larger clinical trial that is expected to launch in the first quarter of 2020. The second phase of the clinical trial will not only have many more study subjects, but will also implement more tests, such as clinically significant and hopefully FDA-approvable health endpoints and will include women, minorities, older and younger participants, and those with imperfect health, as well as a control comparator group.

Life Extension® has long advocated for use of several of the various interventions used in the TRIIM trial. These include DHEA and metformin. For those who don’t take metformin, we have discovered other AMPK-activating compounds. Most readers of this publication utilize these and other methods to support healthy, youthful immunity and DNA.
However, we have not previously recommended hGH, or the combination of hGH, metformin, and DHEA, which breaks new ground, and we welcome this advance.

Dr. Fahy’s group is seeking to identify an affordable source of growth hormone as well as other ways to make this longevity protocol available to almost everyone. For more information, see www.interveneimmune.com.

We applaud Dr. Greg Fahy, his team, and all the researchers involved for their arduous and excellent work in this historical clinical trial!

Look forward to future updates!

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

References

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*For pricing available to readers of this magazine, call 1-800-544-4440 or visit LifeExtension.com/NAD*
Topical Probiotic-Fermented Complex Protects the Skin

BY ROBERT GOLDFADEN AND GARY GOLDFADEN, MD

Many think of probiotics and beneficial microorganisms only as related to gut health.

But bacteria on our skin are important contributors to dermatological health and appearance.¹ ³

Aging, overuse of facial cleansers, and anti-bacterial soaps, disrupt the delicate balance between good and bad bacteria on the skin.⁴ ⁵

This contributes to premature skin aging.

Fermentation products of Aspergillus and the probiotic Lactobacillus produce substrates that have been shown to rebalance skin flora and promote DNA repair. The result is more youthful, vibrant skin.
The Skin Microbiota

The skin’s surface is home to diverse and complex microbial communities collectively known as the skin microbiota.6,7

Most of these bacteria work on our behalf. Researchers are discovering their unique ability to provide an optimized inflammatory response that eradicates pathogens, mitigates harmful effects of sun exposure, and maintains a well-hydrated and intact barrier function.6-12

Aging, stress, and excessive washing create an imbalanced skin microbiome characterized by the depletion of good bacteria and multiplication of bad bacteria.13,14

Lactobacillus Ferment Rebalances Skin Flora

Scientists turned to one of the most well-recognized and proven probiotic bacterial groups, Lactobacillus, to rebalance an ailing skin microbiome.

Lactobacillus ferment promotes the growth of beneficial lactic acid bacteria. It also suppresses the colonization by pathogenic bacteria, through the synthesis of anti-microbial peptides called bacteriocins.15-18 In the laboratory, Lactobacillus ferment significantly reduced the reproduction of multiple bacterial species, including S. aureus associated with chronic inflammatory skin diseases.19-22

By limiting the growth of bad bacteria, while still allowing friendly bacteria to flourish, Lactobacillus ferment restores the skin flora to a healthy, balanced state. This, in turn, normalizes immune function and controls inflammation to help the skin regain youthful function and appearance.

Lactobacilli also synthesize free fatty acids during the fermentation process, which promotes a slightly acidic environment in the skin, conducive to anti-microbial defense, barrier function regeneration, and moisture retention.23

A recent clinical study showcased the hydrating properties of Lactobacillus ferment. When topically applied for four weeks, it was shown to increase participants’ skin moisture by 10% compared to baseline.22 This finding is noteworthy, as boosting moisture in the skin increases volume and fullness that diminishes the appearance of wrinkles and fine lines.

Let’s now look at how Aspergillus ferment protects against UV-induced damage to skin cells and supports DNA repair.
The skin’s surface houses bacteria and other microorganisms collectively known as the skin microbiota.

Most of these bacteria are harmless and beneficial, protecting against infection, chronic inflammation, and barrier dysfunction.

Sun exposure generates a storm of destructive free radicals in the skin that cause cumulative DNA damage and contribute to the breakdown of structural proteins collagen and elastin, which ultimately leads to photoaging. Proanthocyanidins are polyphenols that combat UV-induced oxidative damage by blocking multiple inflammatory pathways and exerting potent antioxidant effects.

Scientists discovered that Aspergillus ferment is rich in proanthocyanidins and can deliver greater concentrations of these beneficial compounds to the skin, and for a longer time period.

As a result, Aspergillus ferment was shown to strengthen skin’s antioxidant protection, exhibiting greater suppression of free radicals than the well-known endogenous antioxidant superoxide dismutase (SOD).

This effect completely protected skin cells from DNA damage under UV-radiated and non-radiated conditions. Aspergillus ferment also repaired existing sun damage by producing greater activation in DNA reparative processes compared to a control. These DNA-protective and DNA-repair effects lower skin cancer risk and increase the survival of healthy cells, to slow or even reverse cutaneous deterioration.

Topical Skin Protection with Probiotic-Fermented Complex

- The skin’s surface houses bacteria and other microorganisms collectively known as the skin microbiota.
- Most of these bacteria are harmless and beneficial, protecting against infection, chronic inflammation, and barrier dysfunction.
- Aging and excessive washing are among the numerous factors that cause an imbalance in the ratio of good to bad bacteria on the skin.
- Lactobacillus ferment rebalances skin flora and produces anti-microbial peptides called bacteriocins that limit the growth of bad bacteria.
- Aspergillus ferment is rich in proanthocyanidins that protect against and repair UV-induced DNA damage.
- These anti-aging compounds have now been combined into one topical serum that promotes healthy, youthful skin.
Summary

It’s becoming increasingly clear that an unbalanced cutaneous microbiota compromises optimal skin health and appearance. *Aspergillus* and *Lactobacillus* ferment have been shown to bring the skin back into a healthy equilibrium, while inhibiting UV-induced damage and boosting advanced DNA repair.

This combination has now been formulated into one topical serum to create fresher, healthier, younger-looking skin.

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

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

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23. Yadav H, Jain S, Sinha PR. Production of free fatty acids and conjugated linoleic acid in probiotic dahi containing *Lactobacillus acidophilus* and *Lactobacillus casei* during fermentation and storage. *International Dairy Journal*. 2007 2007/08/01/;17(8):1006-10.
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**Advanced Probiotic-Fermented Eye Serum** contains *Lactobacillus* ferment to promote a healthy balance of skin flora.

In a clinical study, *Lactobacillus* ferment increased skin moisture by 10%.*

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

* 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.
Some consider breakfast to be the most important meal of the day. Some simply grab a sugar-laden pastry to eat “on the go.” Others skip it altogether.

But for breakfast expert Emily Elyse Miller, breakfast is “sacred,” bringing back some of the sweetest memories of her childhood. That love of morning foods has followed her into adulthood, where she has traveled the world, exploring other cultures through the lens of people’s morning routines.

It inspired her to start a global culinary series called BreakfastClub in 2015 and to curate guided breakfast tours in cities across the world.

*Breakfast: The Cookbook* is the result of years of extensive travel and research, boiled down to a collection of 380 recipes that represent the best of breakfast specialties from 80 countries around the globe.

The dishes range from Mexican huevos rancheros, to Jamaican green banana porridge, to a full English breakfast. Each recipe also has helpful icons to identify it as vegan, vegetarian, gluten-free, or dairy-free.

Miller’s hope is that, “These recipes should encourage everyone to explore and travel the world through breakfast, connecting us at breakfast tables near and far.”

On the following pages, *Life Extension®* Magazine highlights four of these international morning recipes.

—Laurie Mathena
In the reserved frying pan, heat 1 tablespoon of oil over medium heat. Pour half of the egg mixture into the pan and use a spatula to spread it out, but no larger than the diameter of the chapati. Allow the egg to cook and set on the bottom, about 30 seconds. Flip, using the spatula, and cook for 30 seconds more. Top the cooked egg pancake with a chapati.

Flip the chapati and egg out of the pan egg-side up onto a plate. Roll it up into a wrap. Repeat with the remaining 1 tablespoon oil and remaining egg mixture to make a second omelet.

Roll with the remaining chapati.

Serve with chili sauce.

**Rolled Flatbread Omelet Sandwich**

**UGANDA**

**Preparation time:** 15 minutes, plus 30 minutes resting time

**Cooking time:** 20 minutes

**Serves:** 2

**FOR THE CHAPATI:**

½ cup (70 g) all-purpose (plain) flour
Pinch of salt
4 tablespoons warm water
Vegetable oil, for brushing

**FOR THE OMELET:**

4 eggs
½ cup (35 g) shredded green cabbage
4 tablespoons diced red onion
½ medium tomato, diced
Salt and freshly ground pepper
2 tablespoons vegetable oil
Chili sauce, for serving

**Make the chapati:**

In a medium bowl, combine the flour and salt. Slowly incorporate the warm water and stir with a wooden spoon until a shaggy dough forms. Transfer the dough to a floured work surface and knead with your hands until the dough is smooth, 10 minutes.

If the dough is too wet, add a sprinkle more of flour. If it is too dry, add a touch more water and knead again until smooth. Cover with a tea towel and allow the dough to rest for 30 minutes.

Divide the dough in half and roll into individual balls. On a lightly floured work surface, use a rolling pin to roll out the balls into rounds, ¼ inch (6 mm) thick. Brush both sides of each chapati with some of the vegetable oil. Heat a frying pan or cast-iron skillet over medium heat. Cook one side of the chapati until it begins to brown and bubble, about 1 minute.

Flip the chapati and cook for 30 seconds more or until brown spots appear and the bread is cooked through. Transfer to a tea towel and cover. Repeat for the second piece of dough. Set the frying pan aside for the omelet.

**Make the omelet:**

Crack the eggs into a bowl. Whisk in the cabbage, onion, and tomato. Season with salt and pepper.

In the reserved frying pan, heat 1 tablespoon of oil over medium heat. Pour half of the egg mixture into the pan and use a spatula to spread it out, but no larger than the diameter of the chapati. Allow the egg to cook and set on the bottom, about 30 seconds. Flip, using the spatula, and cook for 30 seconds more. Top the cooked egg pancake with a chapati.

Flip the chapati and egg out of the pan egg-side up onto a plate. Roll it up into a wrap. Repeat with the remaining 1 tablespoon oil and remaining egg mixture to make a second omelet.

Roll with the remaining chapati. Serve with chili sauce.
Chickpea and Torn Bread Stew

TUNISIA

Preparation time: 10 minutes, plus 4 hours soaking time
Cooking time: 1 hour 10 minutes
Serves: 2-4

1 cup (200 g) dried chickpeas (see Note), soaked for at least 4 hours and drained
Salt and freshly ground black pepper
1 tablespoon olive oil
1 small onion, chopped
3 cloves garlic, minced
1 teaspoon ground cumin
1 tablespoon harissa, or to taste
1 tablespoon lemon juice
2 cups (70 g) torn stale bread
2 Poached eggs

FOR SERVING (optional):
Capers
Chopped onions
Cilantro (coriander) leaves
Parsley leaves
Canned tuna
Olive oil, for drizzling

Make the stew:
In a medium saucepan, combine the chickpeas and 4 cups (950 ml/32 fl oz) water and bring to a boil over high heat. Season with salt to taste, reduce to a simmer, and cook the chickpeas until tender, about 1 hour. Drain, reserving 1 tablespoon liquid, and return the chickpeas to the saucepan.

In a medium frying pan, heat the oil over medium heat. Add the onion, season with salt, and cook until soft and translucent, about 5 minutes. Stir in the garlic, sprinkle the cumin over everything, and stir to coat.

Season with more salt and pepper to taste. Add the reserved chickpea cooking liquid or 1 tablespoon water and cook, scraping up any browned bits.

Transfer the onion-garlic mixture to the saucepan of chickpeas. Stir in the harissa. Remove from the heat and stir in the lemon juice.

To serve:
Place torn bread in a bowl and pour the chickpea mixture on top to soak the bread. Top with the poached eggs. If desired, serve with an assortment of capers, raw onions, cilantro, parsley, tuna, and a drizzle of olive oil.

Note: You can make this with 1½ to 2 cups (245g to 330g) canned chickpeas, liquid reserved from the can. Omit the first step. Saute the onion/garlic mixture as directed. Place the chickpeas in a saucepan and add the onion/garlic mixture and 2 cups (475 ml/16 fl oz) water.

Simmer uncovered for 15-20 minutes to reduce the water by half. Stir in the harissa. Remove from the heat and stir in the lemon juice. Using canned chickpeas will cut the prep time by 4 hours and the cook time by 50 minutes.
Heat a cast-iron skillet over medium heat. Flatten each ball slightly and shape it into a round about 6 inches (15 cm) in diameter and 1/8 inch (6 mm) thick. Place in the hot pan and cook on both sides until lightly browned, about 8 minutes. Make small slits into the koki throughout the cooking process to vent heat from the pan and help the koki cook all the way through. Brush both sides with ghee or oil and continue to cook until browned, about 5 minutes. Repeat with the remaining koki.

Transfer to a plate. Serve with yogurt.

Israeli Breakfast Plate

ISRAEL
Preparation time: 40 minutes
Cooking time: 5 minutes
Serves: 2

4 Fried Eggs
2 tablespoons Schug
(recipe follows)
½ cup (115 g) labneh, store-bought
1 cup (135 g) Middle Eastern Chopped Salad (recipe follows)
4 tablespoons olives
4 slices smoked salmon or lox, store-bought
2 slices challah, store-bought

Serve the fried eggs with schug, labneh, Middle Eastern chopped salad, olives, smoked salmon or lox (if using), and challah.

Savory Spiced Flatbread with Yogurt

INDIA
Preparation time: 20 minutes
Cooking time: 1 hour
Makes: 4 koki

1 cup (120 g) whole wheat (wholemeal) flour, plus more for dusting
1 teaspoon fine sea salt
1 small onion, diced
1 small hot green chili, finely chopped
½ teaspoon ground cumin
½ teaspoon anardana (dried pomegranate seeds), ground or whole
½ teaspoon freshly ground black pepper

1 tablespoon white sesame seeds, toasted
5 tablespoons cilantro (coriander) leaves, finely chopped
1 tablespoon dried fenugreek leaves (optional)
3 tablespoons melted ghee, oil, or butter, plus more for pan-frying

Yogurt, for serving

In a medium bowl, combine the flours, salt, onion, green chili, cumin, anardana, black pepper, cilantro (coriander), fenugreek leaves (if using), and ghee, butter, or oil. Knead until you get a crumbly dough, then gradually add 3–4 tablespoons water and stir until a firm dough comes together. Knead in the bowl until it comes together in a firm ball. Divide the dough into 4 equal portions, dust with flour, and roll into balls.
**Middle Eastern Chopped Salad**

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**Preparation time: 15 minutes**  
Serves: 2

1 medium tomato, diced  
2 mini cucumbers, diced  
¼ red onion, finely diced  
2 tablespoons finely chopped parsley  
2 tablespoons lemon juice  
3 tablespoons olive oil  
Salt and freshly ground pepper

In a food processor, combine the jalapeno, poblano, cilantro (coriander), parsley, garlic, cardamom, and salt and pepper to taste.

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**Schug**

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**Preparation time: 15 minutes**  
Serves: 2

1 jalapeno chili, seeded  
1 poblano chili, seeded  
½ cup (10 g) cilantro (coriander), coarsely chopped  
½ cup (10 g) parsley, coarsely chopped  
2 cloves garlic, mashed  
½ teaspoon ground cardamom (or seeds from 2 cardamom pods)  
Salt and freshly ground pepper  
3 tablespoons olive oil

In a bowl, combine the tomato, cucumbers, onion, and parsley. Toss with the lemon juice and olive oil. Season with salt and pepper to taste.

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Pulse the mixture until chopped, then add the olive oil gradually as you pulse to emulsify the mixture. Pulse until the mixture is combined and completely smooth. Serve with everything.
The world has undergone a bigger transition in the way we eat over the past 100 years than ever before in human history.

We’ve experienced easier access to food, more variety on a global level, and less hunger and starvation in many countries. At the same time, the abundance of food, and the type of food we’re eating has given rise to diseases of modern, western civilization, like heart disease and type II diabetes.

For the first time in history, even when food is plentiful, the leading cause of mortality is poor diet.

In her latest book, *The Way We Eat Now*, food historian and award-winning food writer Bee Wilson explains how the food revolution has transformed our bodies and our world (both for good and for bad).

She details how the transition from savory foods to sweet ones, from home cooking to eating out, from meals to snacks, from independent food shops to supermarkets, and from fresh food to ultra-processed junk food is taking a toll on lives around the globe.

But Wilson believes we are on the cusp of another major food revolution that will bring about greater health and greater sustainability on a global level.

In this interview with *Life Extension® Magazine*, Wilson talks about how we got to where we are—and more importantly, how we can bring about the changes necessary for a healthier future.

—Laurie Mathena
Our new global diet is replete with sugar and refined carbohydrates yet lacking in crucial micronutrients such as iron and trace vitamins. Malnutrition is no longer just about hunger and stunting; it is also about obesity. The literal meaning of malnutrition is not hunger but bad feeding, which covers inadequate diets of many kinds.

**LE:** What are the consequences of malnutrition?

**Wilson:** Malnutrition in all its forms now affects one in three people on the planet. Plenty of countries—including China, Mexico, India, Egypt, and South Africa—are suffering simultaneously from overfeeding and undernutrition, with many people suffering from a surfeit of calories but a dearth of the crucial micronutrients and protein a body needs to stay healthy. As a result, not just in the West but across the world, people are suffering in growing numbers from diseases such as hypertension and stroke, type II diabetes, and preventable forms of cancer. The lead cause of these diseases is what nutritionists call “suboptimal diet” and what to the rest of us is simply “food.”

**Wilson:** Our ancestors could not rely on there being enough food. Our own food fails us in different ways. We have markets heaving with bounty, but too often what is sold as “food” fails in its basic task: to nourish us.

**LE:** Can you paint a picture for us of “the way we eat now?”

**Wilson:** For most people across the world, life is getting better, but diets are getting worse. This is the bitter-sweet dilemma of eating in our times. Unhealthy food, eaten in a hurry, seems to be the price we pay for living in liberated, modern societies. Millions of us enjoy lives that are freer and more comfortable than those our grandparents lived; a freedom underpinned by the amazing decline in global hunger. Yet our free and comfortable lifestyles are undermined by the fact that our food is killing us, not through its lack but through its abundance—a hollow kind of abundance.

What we eat now is a greater cause of disease and death in the world than either tobacco or alcohol. In 2015, around seven million people died from tobacco smoke and 3.3 million from causes related to alcohol, but 12 million deaths could be attributed to “dietary risks” such as those that arise from diets low in vegetables, nuts, whole grains, and seafood or diets high in salt (mostly from processed food) and sugary drinks.

Where humans used to live in fear of plague or tuberculosis, now the leading cause of mortality worldwide is diet. Most of our problems with eating come down to the fact that we have not yet adapted to the new realities of plenty, either biologically or psychologically.

**LE:** What is the paradox of being overfed and undernourished?

**Wilson:** As of 2006, for the first time the number of overweight and obese people in the world overtook the number who were underfed, in absolute terms. That year, 800 million individuals still did not have enough to eat, but more than one billion were overweight or obese.

To our hungry ancestors, having too much to eat might have looked like the gold at the end of the rainbow, but what these new calories are doing to our bodies is not a happy ending.

The problem isn’t just that some people are overfed, and others are underfed. The new difficulty is that billions of people across the globe are simultaneously overfed and undernourished: rich in calories but poor in nutrients.

**LE:** We can’t talk about “the way we eat now” without mentioning the way our ancestors ate “then.” How have eating habits changed over the course of history?

**Wilson:** One way to think about human history is as a series of diet transitions, with each stage driven by
Changes in the economy and society, as well as shifts in technology, climate, and population.

In the beginning, we were hunter-gatherers, eating a mostly low-fat diet of varied wild greens, berries, and wild animals. Stage two, starting around 20,000 BCE, was the agricultural age, which was characterized by a switch to staple cereals and a huge increase in population.

In Europe, we could go back a mere couple of hundred years to the third stage. During this period, advances in agriculture, such as crop rotation and fertilizer, led to a more varied and plentiful diet, with fewer starch-based staples and a bigger variety of vegetables along with animal protein.

LE: What makes our current stage—stage four—different from the rest?

Wilson: One of the frightening things about stage four has been how fast it has happened. It took thousands of years to get from a hunter-gatherer society to one based on farming (from stage one to stage two).

The effects of the Industrial Revolution in Europe and the United States took only a couple of centuries (stage two to stage three). But the new shifts in the West away from home-cooked meals and tap water and on to packaged snacks and sugary drinks were speedier still, taking only a couple of decades.

This era is different in quality from any of the other stages. Suddenly, the diet changes much more rapidly, with consequences for human health that are more extreme.

The economy shifts away from manual labor and toward mechanization, people move from the countryside to cities, and they start to expend less energy. There are revolutions in food processing and marketing, and people start to eat more fat, more meat, and more sugar, with far less fiber.

Stage four sees human life expectancy hit new highs with the decline of deficiency diseases and the wonders of modern medicine. But it also sees populations suffering from diet-related chronic illness as never before.

This “nutrition transition” happened all over the Western world in the decades after the Second World War and is now happening even faster among low- and middle-income nations in the rest of the world. This transition explains why our food is sickening us now, through excess rather than hunger.

LE: Another major change in recent years has been the rise in eating out (as opposed to cooking at home). Why is this problematic?

Wilson: In general, the nutritional quality of what we eat when out is not the same as what we eat at home. Analysis by the USDA in the 1970s found that the nutrient quality of food eaten out in the United States tended to be significantly lower in vitamins and higher in calcium and fat than food eaten at home.

Back in the 1970s, this didn’t matter for the overall quality of American diets, because eating out was still a rare treat back then. It is different now that ever-more meals in the week are eaten out. The nutrients that we get—or don’t get—from these meals starts to matter more.

LE: What is one major obstacle keeping people from consuming a healthier diet?

Wilson: When it comes to choosing healthy foods, the dice are heavily loaded against consumers on low incomes. Over the past thirty years, the cost of healthy foods has consistently risen faster than the price of junk foods. Fruits and vegetables have always been expensive to produce; crops such as bell peppers or spinach take a lot of water to grow and are by their very nature costly to ship and store.
The salient point, however, is not just that vegetables are expensive in absolute terms but that they are much more expensive than they used to be, relative to other foods.

In the United States from 1980 to 2011, it became more than twice as expensive for Americans to purchase fresh fruit and vegetables compared to purchasing sugary carbonated beverages. Energy-dense foods such as cakes and burgers have become far cheaper now in comparison to fruits and vegetables.

**LE:** How is the government of Chile stepping in to change the destructive patterns of eating in its country?

**Wilson:** As of 2016, Chile had the highest average consumption of sugar-sweetened beverages on the planet. More than half of the food purchased by the average household was ultra-processed, and Chileans had the second-highest rates of obesity in Latin America, after Mexico.

According to estimates by the Chilean Ministry of Health, around 66% of Chilean adults were overweight or obese, when as recently as the 1980s it was more common to be malnourished.

All the Latin American countries have suffered the worst effects of the nutrition transition later than the United States or Europe but at an accelerated pace.

The difference was that as of 2016, Chile also enacted the most aggressive range of laws against unhealthy foods the world has yet seen. The government passed an 18% tax on sugar-sweetened sodas, one of the highest sugar taxes to date. Schools in Chile are no longer allowed to sell ultra-processed foods such as chocolate or potato chips.

[But] the most striking aspect of the Chilean food laws has been the new food labeling requirements. It started in 2014 with a series of warning labels on children’s foods such as flavored milks and highly sweetened yogurts and breakfast cereals.

Simple hexagonal labels announced “warning: high in sugar,” “warning: high in salt,” “warning: high in saturated fat,” and “warning: high in calories.”

By the standards of US food labeling, the messages were astonishingly blunt.

**LE:** What kind of impact have these changes had?

**Wilson:** There is no denying that the new laws have spurred the food industry into action. As many as 20% of all food products for sale in Chile—more than 1,500 items—have been reformulated in response to the law, with sugars and fats reduced, in order that foods can avoid the dreaded black labels. Coca-Cola has said that 65% of the drinks it sells in Chile are now low sugar or reduced sugar beverages.

**LE:** What’s next for the nutrition transition?

**Wilson:** I remain hopeful that we can somehow fight our way through stage four of the nutrition transition to stage five. This stage would be characterized by people eating more vegetables and fruits and experiencing a rapid decline in degenerative diseases.

During this phase, greater knowledge of the links between diet and health would lead people to eat better diets. Phase five is where we would all like to be living and eating: a comfortable life with neither hunger nor disease, with delicious food but not an excess of it.
PRODUCTS

ACTIVE LIFESTYLE & FITNESS
01529 Creatine Capsules
02318 Keto Brain and Body Boost
02020 Super Carnosine
02023 Tart Cherry with CherryPURE®
02146 Wellness Bar–Chocolate Brownie
02147 Wellness Bar–Cookie Dough
02246 Wellness Code® Advanced Whey Protein Isolate Vanilla
02221 Wellness Code® Muscle Strength & Restore Formula
02127 Wellness Code® Plant Protein Complete & Amino Acid Complex
02261 Wellness Code® Whey Protein Concentrate Chocolate
02260 Wellness Code® Whey Protein Concentrate Vanilla
02243 Wellness Code® Whey Protein Isolate Chocolate
02242 Wellness Code® Whey Protein Isolate Vanilla
02220 Wellness Shake • Chocolate
02219 Wellness Shake • Vanilla

AMINO ACIDS
01039 Arginine & Ornithine Capsules
00038 Arginine Ornithine Powder
01253 Branched Chain Amino Acids
01829 Carnosine
01671 D-L-Phenylalanine Capsules
01624 L-Arginine Caps
01532 L-Carnitine
00345 L-Glutamine
00141 L-Glutamine Powder
01678 L-Lysine
00133 L-Taurine Powder
00326 L-Tyrosine Tablets
01827 Taurine

BLOOD PRESSURE & VASCULAR SUPPORT
01824 Advanced Olive Leaf Vascular Support with Celery Seed Extract
02004 Arterial Protect
70000 Blood Pressure Monitor Arm Cuff
70004 Blood Pressure Monitor Digital Wrist Cuff
02097 Endothelial Defense™ Pomegranate Complete
00997 Endothelial Defense™ with GliSODin®
02320 NitroVasc™ Boost
00984 Optimal BP Management
01953 Pomegranate Complete
00956 Pomegranate Fruit Extract
02024 Triple Action Blood Pressure AM/PM
02102 VenoFlow™

BONE HEALTH
01726 Bone Restore
02123 Bone Restore-Sugar-Free
01727 Bone Restore with Vitamin K2
01725 Bone Strength Collagen Formula
00313 Bone-Up™
01963 Calcium Citrate with Vitamin D
01506 Dr. Strum’s Intensive Bone Formula
01476 Strontium Caps

BRAIN HEALTH
01524 Acetyl-L-Carnitine
01974 Acetyl-L-Carnitine Arginate
01008 Blast™
02321 Cognitex® Basics
02396 Cognitex® Elite
02397 Cognitex® Elite Pregnenolone
01659 Cognizin® CDP-Choline Caps
01540 DMAE Bitartrate (dimethylaminoethanol)
02006 Dopa-Mind™
02212 Focus Tea™
01658 Ginkgo Biloba Certified Extract™

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

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

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

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

FISH OIL & OMEGAS
02311 Clearly EPA/DHA Fish Oil
00463 Flaxseed Oil
01937 Mega EPA/DHA
02218 Mega GLA Sesame Lignans
01983 Super Omega-3 EPA/DHA Fish Oil, Sesame Lignans & Olive Extract
IMMUNE SUPPORT
00681 AHCC®
02302 Bio-Quercetin
01961 Enhanced Zinc Lozenges
01704 Immune Modulator with Tinofend®
00955 Immune Protect with PARAUT®
02005 Immune Senescence Protection Formula™
29727 Kinoko® Gold AHCC
24404 Kinoko® Platinum AHCC
00316 Kyolic® Garlic Formula 102
00789 Kyolic® Reserve
01681 Lactoferin (Apolactoferin) Caps
01903 NK Cell Activator™
01394 Optimized Garlic
01309 Optimized Quercetin
01811 Peony Immune
00525 ProBoost Thymic Protein A
01708 Reishi Extract Mushroom Complex
01906 Standardized Cistanche
13685 Ten Mushroom Formula®
01097 Ultra Soy Extract
01561 Zinc Lozenges

INFLAMMATION MANAGEMENT
01639 5-LOX Inhibitor with AprèsFlex®
02324 Advanced Curcumin Elite™
European Milk Thistle • 60 veg capsules
European Milk Thistle • 60 softgels
01709 Black Cumin Seed Oil
02310 Black Cumin Seed Oil and Curcumin Elite™
Turmeric Extract
00202 Boswellia
02467 Curcumin Elite™ Turmeric Extract • 30 veg capsules
02407 Curcumin Elite™ Turmeric Extract • 60 veg capsules
01804 Cytokine Suppress® with EGCG
02223 Pro-Resolving Mediators
00318 Serraflosa
01203 Specially-Coated Bromelain
01254 Zyflamend™ Whole Body

JOINT SUPPORT
02404 Arthro-Immune Joint Support
02238 ArthroMax® Advanced NT2 Collagen™ & AprèsFlex®
01617 ArthroMax® with Theaflavins & AprèsFlex®
02138 ArthroMax® Elite
00965 Fast-Acting Joint Formula
00522 Glucosamine/Chondroitin Capsules
01609 Krill Healthy Joint Formula
01050 Krill Oil
00451 MSM (Methylsulfonylmethane)
02231 NT2 Collagen™

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

LIVER HEALTH & DETOXIFICATION
02240 Anti-Alcohol HepatoProtection Complex
01651 Calcium D-Glucarate
00530 Chlorella
01571 Chlorophyllin
01922 European Milk Thistle • 60 softgels
01925 European Milk Thistle • 120 softgels
01522 European Milk Thistle • 60 veg capsules
02402 FLORASSIST® Liver Restore™
01541 Glutathione, Cysteine & C
01393 HepaPro
01608 Liver Efficiency Formula
01534 N-Acetyl-L-Cysteine
**PRODUCTS**

**LEMMAR20p.indd   94**

**PRODUCTS**

**LONGEVITY & WELLNESS**

00457 Alpha-Lipoic Acid
01625 AppleWise Polyphenol Extract
01214 Blueberry Extract
03270 Blueberry Extract with Pomegranate
02270 DNA Protection Formula
02119 GEROPROTECT® Ageless Cell™
02133 GEROPROTECT® Longevity A.L.™
02401 GEROPROTECT® Stem Cell
02211 Grapeseed Extract
02109 Mediterranean Whole Food Blend
00954 Mega Green Tea Extract (decaffeinated)
00953 Mega Green Tea Extract (lightly decaffeinated)
01513 Optimized Fucoidan with Maritech® 926
02230 Optimized Resveratrol
01637 Pycnogenol® French Maritime Pine Bark Extract
02210 Resveratrol
00070 RNA (Ribonucleic Acid)
02301 Senolytic Activator
01208 Super R-Lipoic Acid
01919 X-R Shield

**MEN’S HEALTH**

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

**MINERALS**

01661 Boron
02107 Extend-Release Magnesium
03731 Ionic Selenium
01677 Iron Protein Plus
01459 Magnesium Caps
01682 Magnesium (Citrate)
01328 Only Trace Minerals
01504 Optimized Chromium with Crominex 3+ 200 mg, 30 enteric coated tablets
01740 Potassium with Extend-Release Magnesium
01740 Sea-Iodine™
01879 Se-Methyl L-Selenocysteine
01778 Super Selenium Complex
00213 Vanadyl Sulfate
01813 Zinc Caps

**MISCELLANEOUS**

00577 Potassium Iodide
00657 Solarshield® Sunglasses

**MOOD & STRESS MANAGEMENT**

02312 Cortisol-Stress Balance
00987 Enhanced Stress Relief
01074 5-HTP
01683 L-Theanine
02175 SAMe (S-Adenosyl-Methionine)
02176 SAMe (S-Adenosyl-Methionine) 200 mg, 30 enteric coated tablets
02176 SAMe (S-Adenosyl-Methionine) 400 mg, 30 enteric coated tablets
02174 SAMe (S-Adenosyl-Methionine) 400 mg, 60 enteric coated tablets

**MULTIVITAMINS**

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

**NERVE & COMFORT SUPPORT**

02202 ComfortMax™
02303 PEA Discomfort Relief

**PERSONAL CARE**

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

**PET CARE**

01932 Cat Mix
01931 Dog Mix

**PROBIOTICS**

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

**SKIN CARE**

80157 Advanced Anti-Glycation Peptide Serum
80165 Advanced Growth Factor Serum
80170 Advanced Hyaluronic Acid Serum
80154 Advanced Lightening Cream
80155 Advanced Peptide Hand Therapy
80175 Advanced Probiotic-Fermented Eye Serum
80152 Advanced Triple Peptide Serum
80140 Advanced Under Eye Serum with Stem Cells
80137 All-Purpose Soothing Relief Cream
80139 Amber Self MicroDermAbrasion
80118 Anti-Aging Mask
80151 Anti-Aging Rejuvenating Face Cream
80153 Anti-Aging Rejuvenating Scalp Serum
80133 Anti-Oxidant Facial Mist Hydrator
## PRODUCTS

### SLEEP

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<tbody>
<tr>
<td>01533</td>
<td>Ascorbyl Palmitate</td>
</tr>
<tr>
<td>00920</td>
<td>Benfotiamine with Thiamine</td>
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<tr>
<td>00664</td>
<td>Beta-Carotene</td>
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<tr>
<td>01945</td>
<td>Bioactive Complete B-Complex</td>
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<tr>
<td>00102</td>
<td>Biotin</td>
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<tr>
<td>00084</td>
<td>Buffered Vitamin C Powder</td>
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<tr>
<td>02229</td>
<td>Fast-C® and Bio-Quercetin Phytosome</td>
</tr>
<tr>
<td>02075</td>
<td>Gamma E Mixed Tocopherol Enhanced with Sesame Lignans</td>
</tr>
<tr>
<td>02070</td>
<td>Gamma E Mixed Tocopherol/Tocotrienols</td>
</tr>
<tr>
<td>01913</td>
<td>High Potency Optimized Folate</td>
</tr>
<tr>
<td>01674</td>
<td>Inositol Caps Liquid Emulsified</td>
</tr>
<tr>
<td>02244</td>
<td>Liquid Vitamin D3 • 2,000 IU, 1 fl oz</td>
</tr>
<tr>
<td>02232</td>
<td>Liquid Vitamin D3 • 2,000 IU, 1 fl oz, mint</td>
</tr>
<tr>
<td>01936</td>
<td>Low-Dose Vitamin K2</td>
</tr>
<tr>
<td>01356</td>
<td>Methylcobalamin • 1 mg, 60 veg lozenges</td>
</tr>
<tr>
<td>01357</td>
<td>Methylcobalamin • 5 mg, 60 veg lozenges</td>
</tr>
<tr>
<td>00065</td>
<td>MK-7</td>
</tr>
<tr>
<td>00373</td>
<td>No Flush Niacin</td>
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<tr>
<td>01939</td>
<td>Optimized Folate (L-Methylfolate)</td>
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<tr>
<td>01217</td>
<td>Pyridoxal 5'-Phosphate Caps</td>
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<tr>
<td>01400</td>
<td>Super Absorbable Tocotrienols</td>
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<tr>
<td>02334</td>
<td>Super K</td>
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<tr>
<td>02335</td>
<td>Super K Elite</td>
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<tr>
<td>01863</td>
<td>Super Vitamin E</td>
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<tr>
<td>02028</td>
<td>Vitamin B5 (Pantothenic Acid)</td>
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<td>01535</td>
<td>Vitamin B6</td>
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<tr>
<td>00361</td>
<td>Vitamin B12</td>
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<tr>
<td>02228</td>
<td>Vitamin C and Bio-Quercetin Phytosome</td>
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<tr>
<td>02227</td>
<td>Vitamin C and Bio-Quercetin Phytosome</td>
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<tr>
<td>01753</td>
<td>Vitamin D3 • 1,000 IU, 90 softgels</td>
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<tr>
<td>01751</td>
<td>Vitamin D3 • 1,000 IU, 250 softgels</td>
</tr>
<tr>
<td>01713</td>
<td>Vitamin D3 • 5,000 IU, 60 softgels</td>
</tr>
<tr>
<td>01718</td>
<td>Vitamin D3 • 7,000 IU, 60 softgels</td>
</tr>
<tr>
<td>01758</td>
<td>Vitamin D3 with Sea-Iodine™</td>
</tr>
<tr>
<td>02040</td>
<td>Vitamins D and K with Sea-Iodine™</td>
</tr>
</tbody>
</table>

### WEIGHT MANAGEMENT & BODY COMPOSITION

<table>
<thead>
<tr>
<th>Product</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>00658</td>
<td>7-Keto® DHEA Metabolite • 25 mg, 100 capsules</td>
</tr>
<tr>
<td>02479</td>
<td>7-Keto® DHEA Metabolite • 100 mg, 60 veg capsules</td>
</tr>
<tr>
<td>01509</td>
<td>Advanced Anti-Adipocyte Formula</td>
</tr>
<tr>
<td>01807</td>
<td>Advanced Appetite Suppress</td>
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<tr>
<td>02207</td>
<td>AMPK Metabolic Activator</td>
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<tr>
<td>01823</td>
<td>CalReduce Selective Fat Binder</td>
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<tr>
<td>02478</td>
<td>DHEA Complete</td>
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<tr>
<td>01738</td>
<td>Garcinia HCA</td>
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<tr>
<td>29754</td>
<td>HCAActive Garcinia Cambogia Extract</td>
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<tr>
<td>01292</td>
<td>Integra-Lean®</td>
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<tr>
<td>01908</td>
<td>Mediterranean Trim with Sinetrol™ -XPur</td>
</tr>
<tr>
<td>01492</td>
<td>Optimized Irvingia with Phase 3 ™ Calories Control Complex</td>
</tr>
<tr>
<td>01432</td>
<td>Optimized Saffron with Satiereal®</td>
</tr>
<tr>
<td>00818</td>
<td>Super CLA Blend with Sesame Lignans</td>
</tr>
<tr>
<td>01902</td>
<td>Waist-Line Control™</td>
</tr>
<tr>
<td>02151</td>
<td>Wellness Code® Appetite Control</td>
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</tbody>
</table>

### WOMEN'S HEALTH

<table>
<thead>
<tr>
<th>Product</th>
<th>Description</th>
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<tbody>
<tr>
<td>01942</td>
<td>Breast Health Formula</td>
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<tr>
<td>01626</td>
<td>Enhanced Sex for Women 50+</td>
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<tr>
<td>01894</td>
<td>Estrogen for Women</td>
</tr>
<tr>
<td>01064</td>
<td>Femmenessence MacaPause®</td>
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<tr>
<td>02204</td>
<td>Menopause 731™</td>
</tr>
<tr>
<td>02319</td>
<td>Prenatal Advantage</td>
</tr>
<tr>
<td>01441</td>
<td>Progesta-Care®</td>
</tr>
<tr>
<td>01649</td>
<td>Super-Absorbable Soy Isoflavones</td>
</tr>
</tbody>
</table>
SUPER K

Comprehensive Vitamin K Formula!

Item #02334 • 90 softgels
1 bottle $22.50
4 bottles $20.25 each

Just one daily softgel of Super K provides:

| Vitamin K1 | 1,500 mcg |
| Vitamin K2 (MK-4) | 1,000 mcg |
| Vitamin K2 (trans MK-7) | 100 mcg |

For full product description and to order Super K, 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.
Most Complete Omega-3

FISH OIL FORMULA

Fish oil boosts blood levels of EPA and DHA omega-3 fatty acids.

Few people take enough fish oil to obtain optimal levels of EPA/DHA.

Super Omega-3 formulas provide higher EPA/DHA potencies PLUS additional components found in Mediterranean-style diets.

Our most advanced fish oil formula provides:

1. **EPA/DHA Fish Oil**
   (ultra pure/ double potency)

2. **Olive polyphenols**
   (to inhibit LDL oxidation)

3. **Sesame lignans**
   (to extend stability of DHA in the blood)

4. **Astaxanthin**
   (protects against lipid peroxidation)

5. **Krill oil**
   (a source of EPA/DHA)

Item #01988 - 120 softgels

1 bottle $33.75

4 bottles $31.50 each

For full product description and to order Super Omega-3 Plus EPA/DHA Fish Oil, Sesame Lignans, Olive Extract, Krill & Astaxanthin, 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.
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Pursuing innovative formulas for the well-being of all

Passionate Excellence
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7  HOW TO RENEW YOUR OWN STEM CELLS
Certain low-cost nutrients taken by Life Extension® readers may restore functionality to aging stem cells.

24  NEW HOPE FOR DIABETIC NEUROPATHY
Seven nutrients reduce the risk and symptoms of diabetic neuropathy.

34  AGE REVERSAL UPDATE
A new human study aims to induce age reversal using multiple interventions, including metformin, dasatinib, rapamycin, and NAD+ restoration therapy.

46  RESTORE HEALTHY STEM CELL FUNCTION
Scientists have identified three plant-based nutrients that help reverse age-related damage to our stem cells.

56  IMPACT OF SUZANNE’S CELEBRITY STATUS
Media focus on Suzanne Somers’ book, A New Way to Age, may ignite widespread recognition that rejuvenation of older adults will soon become part of routine medical practice.

65  OLDER PEOPLE GROW 2.5 YEARS YOUNGER
Researchers showed that a combination of nutrients, hormones, and a drug resulted in significant human age reversal.

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