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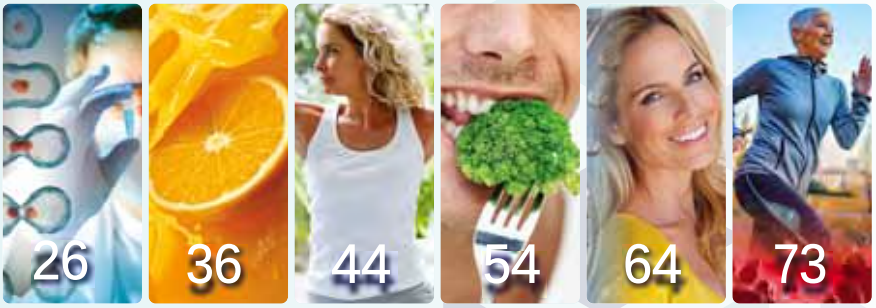

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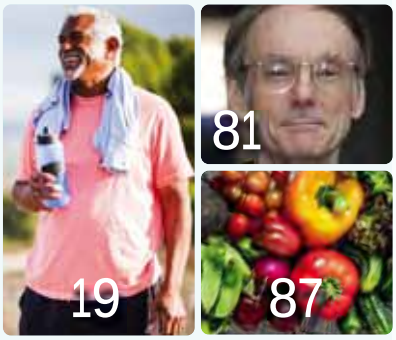

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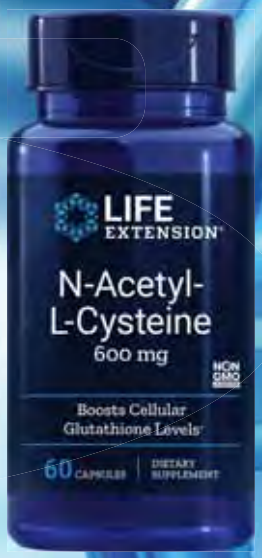

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Ralph W. Moss, PhD, is the author of books such as Antioxidants Against Cancer, Cancer Therapy, Questioning Chemotherapy, and The Cancer Industry, as well as the award-winning PBS documentary The Cancer War. Dr. Moss has independently evaluated the claims of various cancer treatments and currently directs The Moss Reports, an updated library of detailed reports on more than 200 varieties of cancer diagnoses.

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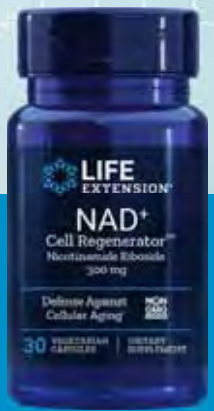

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Are We Finally Reaching Consensus About Fish Oil ?

Consumer access to fish oil has more to do with federal court rulings than findings from human studies

WILLIAM FALOON

In **2019**, the **FDA** sought the advice of an expert panel to review new data about a **fish oil** drug.

By a vote of **16-0,** the panel recommended that the **FDA** allow broader claims about its **ability to reduce cardiovascular** risks.

In **December 2019**, the **FDA** acted on this recommendation by expanding the "approved use" of this **fish oil** drug to reducing risk of **heart attack**, **stroke,** and **death** in high-risk patients.[1]

This decision was largely based on a study published in the ***New England Journal of Medicine*** showing remarkable benefits in people taking *high* doses of a **fish oil drug** that consisted of the **EPA** omega-3 fraction.[2]

Compared with placebo, there was a **25%** reduction in a composite of cardiovascular death, nonfatal myocardial infarction, nonfatal stroke, coronary stents/bypass surgeries, or unstable angina in the **fish oil** drug group.

The study observed several other benefits including:[2]

- Cardiovascular death reduced by **20%**
- Fatal or nonfatal heart attacks reduced by **31%**
- Fatal or nonfatal stroke reduced by **28%**
- Urgent or emergency coronary revascularization reduced by **35%**
- Hospitalization for unstable angina reduced by **32%**

This **fish oil** is marketed to doctors as a **drug** that lowers **triglycerides** without raising **LDL** cholesterol.[3]

To the physician, this may sound appealing compared to a competitor fish oil drug that contains both **EPA** *and* **DHA**.

What troubles us, however, is that patients taking the **EPA-only** fish oil drug (Vascepa®) are unlikely to take other fish oil supplements. This ignores the critical role of the **DHA** component of the **omega-3** family on life-sustaining processes, especially **brain** and **eye** health.

The estimated out-of-pocket cost, assuming no insurance coverage, is over **$300** a month for this **EPA-only** fish oil drug. This is about **seven times *higher*** than what a comparable amount of **EPA+DHA** can be obtained for when using **dietary supplements**.

This editorial describes **legal battles** that took place over decades regarding **fish oil**, and introduces new data that corroborate the benefits of consuming ***higher*** omega-3 potencies.[4]

Many of you may take for granted your ability to purchase affordable **fish oil** supplements, but it was not always this way.

On **February 26, 1987**, the **FDA** conducted an armed raid against **Life Extension®**.[5]

The **FDA** seized our **fish oil** and brochures describing fish oil's potential to reduce cardiovascular risk.

We fought a multi-year legal battle that resulted in the government dismissing all charges against **Life Extension®**, marking the first time in the FDA's 88-year history that it has been forced to give up on a criminal prosecution.

Seven years later, Congress passed legislation that allowed consumers to access a variety of affordable dietary supplements.[6]

This helped curb the FDA's appetite for overly aggressive and frankly police-state-like enforcement actions. The FDA nonetheless continued to **censor** lifesaving data about **fish oil** and other healthy foods (such as walnuts and cherries).[7,8]

This prompted another lawsuit filed in **1994** by Durk Pearson and Sandy Shaw that sought to force the FDA to allow the following health claim on fish oil supplement labels:[9]

"Consumption of omega-3 fatty acids may reduce the risk of coronary heart disease."

The FDA rejected this one-sentence claim, and multi-year litigation ensued based on scientific and constitutional grounds.

The **FDA** contended this health claim was not adequately backed by scientific studies and that the agency had the legal authority to ban these kinds of health claims.

After seven years of extensive litigation, the FDA capitulated and said it would permit the following claim:[9]

"Consumption of omega-3 fatty acids may reduce the risk of coronary heart disease. FDA evaluated the data and determined that although there is scientific evidence supporting the claim, the evidence is not conclusive."

Challenging FDA's Restricted Health Claim

The FDA's compromise claim that the evidence was "***not conclusive***" did not satisfy us. We viewed the scientific literature back then as providing evidence that consuming fish or fish oil could lower **heart attack risk**—the nation's leading killer.

Life Extension® and **Wellness Lifestyles, Inc.** filed a health-claim petition against the FDA on June 23, 2003. The petition urged the FDA to allow the following revised claim:

"Consumption of omega-3 fatty acids may reduce the risk of coronary heart disease."

To substantiate this position, a document enumerating the **scientific studies** backing the benefits of **omega-3** fatty acids was filed, along with arguments supporting the **constitutional** right to disseminate truthful, non-misleading information.

Everything I am describing has to do with what "words" the **FDA** allows to be on a fish oil label.

FDA Partially Capitulates

On September 8, 2004, the FDA decided to allow an expanded health claim on products containing the omega-3 fatty acids **EPA** and **DHA** as follows:

> ***"Supportive but not conclusive research shows that consumption of EPA and DHA omega-3 fatty acids may reduce the risk of coronary heart disease."***[10]

The **FDA** went on to recommend that consumers not exceed more than **3,000 mg** per day of EPA and DHA omega-3 fatty acids, with no more than **2,000 mg** per day derived from **dietary supplements**.[11]

Life Extension® argued that many studies show that ***higher*** amounts of **EPA** and **DHA** are often needed to obtain benefits, such as reduction of **triglycerides**.[12,13]

Our position continues to be vindicated in studies showing benefits when ***higher*** potencies of **omega-3s** are consumed.

FDA Suffers Major Defeat in Federal Court

The FDA strictly ***regulates*** what drug makers are permitted to say about their products. Until recently, what could be said was limited to what the FDA allowed.

A major victory over **FDA** censorship occurred when a maker of prescription-drug **fish oil** sued the **FDA** to make a health claim about fish oil's potential to reduce **cardiovascular disease** risk.[14]

The FDA insisted it was **illegal** for the maker of this **fish oil drug** to state a **coronary disease** prevention claim until the FDA said so.

After years of costly litigation and thousands of pages of documents produced, a **federal court** ruled that a qualified health claim could be made for a **fish oil drug** called Vascepa®.

The court based this **2015** ruling on the facts that:

- The claim is truthful and non-misleading.
- FDA accepted this phrasing elsewhere in its regulatory labyrinth.
- The First Amendment to the U.S. Constitution allows it.

Here is the revised claim the federal court ruled could be made to doctors about this fish oil drug in **2015**:[14]

> ***"Supportive but not conclusive research shows that consumption of EPA and DHA omega-3 fatty acids may reduce the risk of coronary heart disease. Vascepa® should not be taken in place of a healthy diet and lifestyle or statin therapy."***

After years of protracted disagreement that led to full-blown litigation, the above statement is the primary outcome of this legal victory over **FDA censorship**.

In the ruling, the judge quoted from prior cases that:

> ***"'Securing First Amendment rights is in the public interest'" and "'the government does not have an interest' in the unconstitutional enforcement of a law."***[14]

Battling the Medical Mainstream

The **fish oil** controversy did not end with the **FDA**.

Defenders of conventional medicine like the **American Medical Association** and **American Heart Association** issued contradictory proclamations about fish oil's benefits or purported lack thereof.[15,16]

The back-and-forth was based largely on studies with huge **variations** in **EPA/DHA** potencies and/or unrealistic expectations of fish oil monotherapy.

Studies using ***higher*** omega-3 doses generally demonstrated fish oil's efficacy, whereas ***lower***-dose studies were often disappointing and resulted in mainstream medicine questioning fish oil's value.

The media parroted conventional medicine's vacillating positions, running tabloid-like headlines touting fish oil's cardio-protective benefits or attacking it as worthless, depending on the study released that day.

There *were* some contradictions, such as a study showing low-dose fish oil (**1,000 mg** a day of **EPA/DHA**) markedly reducing **fatal heart attack** risk while other studies showed little value using this **low** dose.[17,18]

Overlooked in much of this were **dietary patterns** in countries that had *higher* omega-3 intake in foods, and thereby needed *less* supplemental fish oil. These population groups might have benefited from a **low-dose** EPA/DHA supplement whereas dietary **omega-3** consumption in much of the **United States** is woefully **insufficient.**

The **American Heart Association** confused matters more in **2017** by recommending **fish oil** to **heart failure** patients, but not to the general population.[19] This ignores the importance of **heart attack prevention**.

Life Extension® published a rebuttal in **February 2018** titled "**An Illogical Position of the American Medical Association**" to describe the absurdity of recommending people wait to develop **heart failure** before ensuring optimal **omega-3** intake.[20]

Is A Consensus Being Reached?

Results from recent, large studies continue to validate the need for ***higher***-dose **omega-3** intake.

As mentioned in the introduction of this article, and in the **November 2019** edition of ***Life Extension***® magazine, robust benefits were found when a high dose (**4,000 mg/day)** of an **EPA-only** fish oil drug (Vascepa®) was used. The study found a **25%** reduction across a broad spectrum of **cardiovascular** disorders.[2]

In this same issue, we described why **1,000 mg** a day of an **EPA/DHA** supplement (and only **2,000 IU/day** of **vitamin D**) failed in its primary endpoint, but did yield meaningful risk reduction in several subgroups including:[17,21]

- **25%** reduction in **cancer deaths** in the **vitamin D** group when the first two years of follow-up were excluded,
- **28%** reduction in **heart attack risk**, and **50%** reduction in fatal heart attack risk, in the **fish oil** group, and
- **22%** reduction in **angioplasty** procedures (opening a narrowed coronary blood vessel, often with a stent) in the **fish oil** group.

At the **American Heart Association** annual meeting in **November 2019**, a presentation on a study that administered about **3,300 mg** of an **EPA/DHA** fish oil drug called Lovaza® revealed striking improvements in **cognitive functions** in older individuals.[22]

What made this study so compelling is that **blood levels** of **EPA/DHA** were carefully **measured**. The **cognitive benefits** occurred in those with an **omega-3 index** over **4%**. Here is the conclusion from this presentation made at the **American Heart Association** meeting:[22]

> ***"High dose EPA and DHA prevented cognitive decline in cognitively healthy coronary artery disease subjects, with younger subjects, nondiabetic subjects, and those achieving an omega-3 fatty acid index ≥4% having greatest benefit. These findings are especially important for coronary artery disease patients as coronary artery disease is a risk factor for dementia."***

What I continue to observe in the published data is **consensus** that ***higher***-dose **omega-3** intake is what induces meaningful risk-reduction benefits.

Overlooked Role of Dietary Omega-3s

No one argues with the idea that eating two to three **cold-water fish meals** a week reduces cardiovascular and other disease risks. This is nearly universally agreed upon and accepted, including in the medical profession and among researchers.

Yet missing from virtually all research on **fish oil supplements** is each study subject's **dietary intake** of **EPA/DHA**-rich **foods**.

To put this into perspective, a 4-ounce can of **wild salmon** contains about **2,000 mg** of total **omega-3s** providing about **1,800 mg** of **EPA/DHA**.

So, a clinical trial using only **1,000 mg** of supplemental **EPA/DHA** in people who regularly consume canned **wild salmon** might yield benefits because the total daily consumption of **EPA+DHA** is around **2,800 mg**.

On the flip side, individuals consuming typical Western **dietary patterns** that are nearly devoid of omega-3s may require far ***higher*** amounts of supplemental **EPA/DHA** (**3,300 mg** to **4,000 mg**) to achieve the same results.

The significance of these differences cannot be overstated, both from a public health standpoint and on huge savings on fish oil drugs and supplements.

People whose diets *already* provide ample quantities of **EPA/DHA** will likely require lower potencies of fish oil drugs or supplements.

Yet a **one-size-fits-all** approach is the current protocol. The FDA now allows certain high-risk patients to be prescribed a **4,000 mg/**day potency of an expensive EPA-only **drug**—but advises against the same potencies of lower-cost **fish oil supplements**!

How This Impacts You

The importance of achieving optimal **EPA/DHA** status cannot be overstated. It impacts a person's risk of multitudes of disorders, many that are life threatening.

Your blood ratio of **omega-3 fats** to **omega-6 fats**—which can be measured with the **omega-3 index** blood test—is an important determinant of overall health status.

The good news is that pricing keeps dropping for the **omega-3 index** comprehensive fatty acid blood panel.

Results from this test can enable you to precisely determine how many **fish oil capsules** you need a day to achieve an optimal **omega-3 index**, which by most standards is over **8%**.

The recent study presented at the **American Heart Association** conference found meaningful **cognitive benefits** when omega-3-index scores were over **4%**.

I'll describe soon how you can obtain low-cost **omega-3/omega-6** blood tests that might enable you to reduce the number of fish oil capsules you take a day, saving you money over the long term.

Life Extension's Position on Fish Oil Dosing

For many decades, we've suggested most of our readers supplement with about **2,400 mg** of **EPA + DHA** each day from highly purified **fish oil**.

We know most of you consume **omega-3s** in your **diet** by eating cold-water **fish** meals and/or via **plant** sources like walnuts, flax, and other foods.

So, our typical reader may, on average, obtain over **3,000 mg-4,000 mg** each day of **EPA/DHA** from their **fish oil** supplement plus omega-3-rich dietary components.

We caution, however, that not all people, and perhaps very few, convert plant-based omega-3s to EPA/DHA. This is what makes **fish oil** so important but presents a dilemma for vegans.

People with stubbornly high **triglyceride** levels are advised to increase their fish oil intake to target a triglyceride **blood level** below **100 mg/dL**.

Based on published studies showing benefits with ***higher*** intake of **EPA/DHA**, more doctors are prescribing expensive **fish oil drugs**, often without considering an individual patient's **dietary** intake of the omega-3s.

Common-Sense Approaches

Supplementation with quality **fish oil** can cost about **$300** a year whereas fish oil **drugs** can cost over **$3,600** a year.

The **Omega-3 Index Complete** blood test includes the following measures:

- Omega-3 Index Percent (it should ideally be over **8%**)
- Trans Fat Index
- Omega-6:Omega-3 ratio
- Arachidonic acid:EPA ratio
- Full fatty acid profile

Results from this blood test provide a guideline for dietary changes and fish oil supplementation for each person's individual biochemistry.

Those who obtain few dietary omega-3s in their diet may want to boost their supplemental fish oil intake over **3,000 mg** a day, whereas those who eat **lots** of cold-water fish may reduce their supplemental dose below **2,400 mg** a day.

While these common-sense approaches are obvious to me and **Life Extension's** scientific staff, many hurried physicians are likely to stick with the labeled high doses of FDA-approved fish oil drugs, i.e. the *one-size-fits-all* approach.

Special Pricing: Omega-3 Index Complete Blood Test

We've recommended **omega-3 blood** tests for many years, but perhaps have not emphasized its importance enough.

With new studies validating the benefits of ***higher***-dose fish oil, there is an even greater value to optimizing one's fatty acid (**omega-3** and **omega-6**) blood status.

For a limited time, we are offering the comprehensive **Omega-3 Index Complete** test at the special low price of **$69**.

This pricing represents an exceptional value for all the important measurements you obtain.

We've extended our annual **Lab Test Super Sale** so this discounted price on the **Omega-3 Index** is valid for the next several months.

In This Month's Issue…

Most people don't know that after one suffers a **heart attack**, their risk of **stroke** is exponentially *higher*. A drug used to treat gout (colchicine) demonstrated a **74%** reduction in post-heart-attack **stroke risk**.

Learn what to ask your cardiologist regarding **colchicine** on page 73 of this month's issue.

The buildup of **senescent cells** continues to be recognized as a causative factor in degenerative **aging**. As you'll read on page 26 a plant flavonoid (apigenin) can reduce the **toxic secretions** that emanate from senescent cells.

Sulforaphane from broccoli has demonstrated powerful **anti-cancer** properties. Page 54 describes the best ways of transporting sulforaphane from the digestive tract into the blood.

Too Many Needless Heart Attacks

Growing consensus about **fish oil**, along with the new claims allowed by the FDA, will help enable more Americans to benefit from *higher* consumption of omega-3 fatty acids.

The tragedy is that it took so long for the benefits of omega-3s to be widely recognized.

Cardiovascular disease remains the leading cause of disability and death in the United States, especially in elderly population groups.

Armed raids by the **FDA** against those who recognized fish oil's benefits in the **1980s** resulted in countless numbers of cardiovascular events and astronomical medical costs for bypass procedures, stents and prescription drugs.

We look forward to science prevailing over the kinds of actions one might expect in an authoritarian, police state.

This happened when doctors in **Wuhan, China** warned of a **pneumonia** epidemic in **December 2019**, but were silenced with threats of arrests for "spreading false rumors."

This governmental **censorship** led to the deaths of hundreds of thousands of people worldwide from **COVID-19** disease.

FDA **censorship** of **fish oil** dating back to the **1980s** may have led to similar tragedies.

Turn the page for information on popular **Male** and **Female Blood Test Panels** and how you can obtain an **omega-3 index** at the lowest price ever.

For longer life,

William Faloon, Co-Founder
Life Extension Buyers Club

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New supporters often ask **Life Extension®** what the most important **nutrients** are.

Our typical reply is we have no idea if you don't have recent **blood test** results.

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Blood minerals: calcium, potassium, phosphorus, sodium, chloride, iron
Blood proteins: albumin, globulin, total protein, albumin/globulin ratio

CARDIAC MARKERS
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Homocysteine
C-Reactive Protein (high sensitivity)

LIPID PROFILE
Total Cholesterol
LDL (low-density lipoprotein)
HDL (high-density lipoprotein)
Triglycerides

COMPLETE BLOOD COUNT (CBC)
Red Blood Cell count including: hemoglobin, hematocrit, MCV, MCH, MCHC, RDW
White Blood Cell count including: lymphocytes, monocytes, eosinophils, neutrophils, basophils
Platelet count

CANCER MARKER
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DHEA-S
Estradiol (an estrogen)
TSH (thyroid function)
Vitamin D

FEMALE PANEL

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Glucose
Insulin
Hemoglobin A1c
NEW **Serum Magnesium**
Kidney function tests: creatinine, BUN, uric acid, BUN/creatinine ratio
Liver function tests: AST, ALT, LDH, GGT, bilirubin, alkaline phosphatase
Blood minerals: calcium, potassium, phosphorus, sodium, chloride, iron
Blood proteins: albumin, globulin, total protein, albumin/globulin ratio

CARDIAC MARKERS
Apolipoprotein B (ApoB)
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Triglycerides

COMPLETE BLOOD COUNT (CBC)
Red Blood Cell count including: hemoglobin, hematocrit, MCV, MCH, MCHC, RDW
White Blood Cell count including: lymphocytes, monocytes, eosinophils, neutrophils, basophils
Platelet count

HORMONES
Progesterone
Estradiol (an estrogen)
Free and Total Testosterone
DHEA-S
TSH (thyroid function)
Vitamin D

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Lab tests are available in the continental United States and Anchorage, AK, only. Not available in Maryland. Restrictions apply in MA, NY, NJ, and RI. Kits not available in PA.

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Reference

* *Br J Pharmacol.* 2004 Mar;141(5):825-30.

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CAUTION: If you are taking anti-coagulant or anti-platelet medications, or have a bleeding disorder, consult your healthcare provider before taking this product.

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FLORASSIST® Liver Restore™ contains **7 strains** of beneficial **probiotic** bacteria—plus a supporting **prebiotic**—to provide *targeted* liver support.

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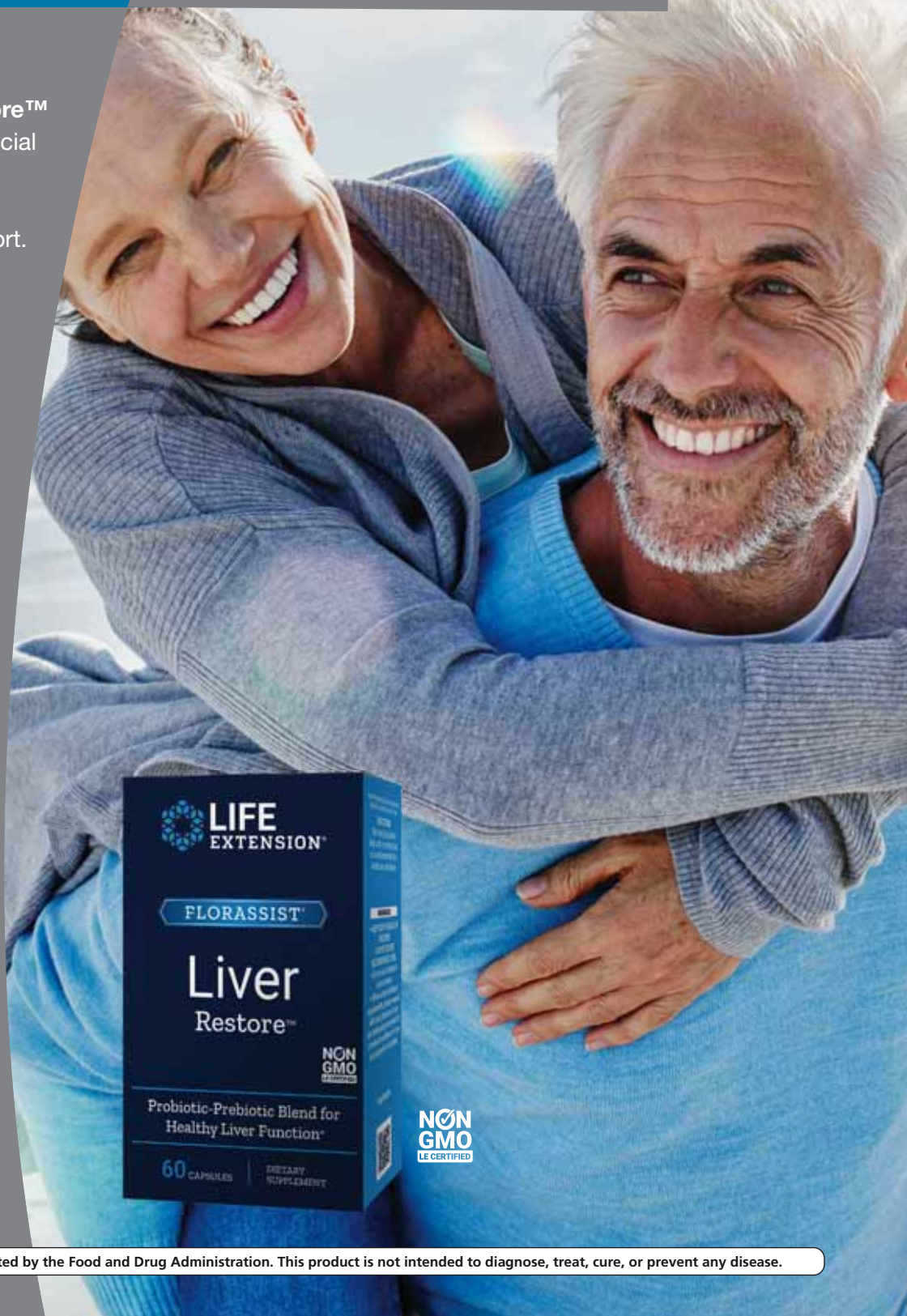
- Inhibit inflammatory factors to support liver health

Take **2** capsules daily, with or without food, or as recommended by a healthcare practitioner.



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In the News

Vitamin C Could Lower Ventilation Duration

Results of an analysis published in the *Journal of Intensive Care* revealed an association between the administration of **vitamin C** to critically ill patients and a reduction in the length of time that the use of a ventilator was required.*

Researchers pooled the results of eight controlled trials that compared the length of ventilation among patients who received intravenous or orally administered vitamin C, to the ventilation duration of control groups who did not receive the vitamin.

Upon having determined a **14%** reduction in time spent using a ventilator among subjects who received vitamin C infusions, they subsequently limited the analysis to five trials that involved longer ventilation times of 10 hours or more, which suggests more severe disease.

The results in these critically ill patients found an average reduction in **ventilator** time of **25%** among patients who received **1-6 grams** of intravenous or oral **vitamin C** per day.

Editor's Note: The authors concluded that, "Given the strong evidence of benefit for more severely ill critical care patients along with the evidence of very low vitamin C levels in such patients, ICU patients may benefit from the administration of vitamin C. Further studies are needed to determine optimal protocols for its administration."

* *J Intensive Care.* 2020 Feb 7;8:15.

Supplementing with Glucosamine Linked with Reduced Risk of Type II Diabetes

A report published in the American Diabetes Association journal *Diabetes Care* revealed a significant association between the use of **glucosamine** and a *lower* risk of developing type II diabetes.*

The study included 404,508 men and women enrolled in UK Biobank, a population-based prospective study that was established to facilitate investigations of genetic and nongenetic determinants of diseases of middle and older age.

Questionnaires completed upon enrollment in UK Biobank reported the regular use of various supplements, while blood samples collected at the time provided information concerning levels of C-reactive protein.

Participants were free of cancer, cardiovascular disease and diabetes at the beginning of the study. Type II diabetes was diagnosed among 7,228 subjects during a median follow-up of 8.1 years. Glucosamine supplementation in men and women was associated with a **17%** lower risk of developing diabetes during follow-up.

Editor's Note: C-reactive protein levels at the beginning of the study were significantly lower in glucosamine users than nonusers. Among participants whose blood levels of CRP placed them among the top **25%** of subjects, the use of glucosamine was associated with an **18.8%** lower risk of diabetes compared to nonusers. Glucosamine has long been used by people with cartilage degenerative disorders in their joints.

* *Diabetes Care.* 2020 Jan 27.

Iron Interferes with the Benefits of Lycopene

Lycopene is a carotenoid found in tomatoes and other red fruits that gives them their bright color. It also provides numerous health benefits and has been associated with a lower risk of prostate[1] and lung[2] cancers.

Unfortunately, those benefits could be reduced if tomatoes are consumed with iron-rich foods, like meat.

According to a recent study published in *Molecular Nutrition & Food Research*, iron interferes with the body's ability to absorb lycopene.[3]

For this study, researchers had a small group of people consume a tomato-extract-based shake, either with or without iron.

Numerous blood draws and digestive samples revealed that lycopene levels in the blood and in the stomach were significantly **lower** when lycopene was consumed with iron.

"When people had iron with their meal, we saw almost a *two-fold drop* in lycopene uptake over time," said the study's lead author, Dr. Rachel Kopec.

This means that less lycopene is available for the body to utilize.

Editor's Note: This study highlights why iron is **not** included in **Life Extension®** supplements. Those with low iron levels should supplement with **iron** at a different time of the day from when they take **lycopene**. Note that **calcium** and **green tea** block iron absorption. It is best to take iron with **vitamin C**, which enhances iron absorption.

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Specific Nutrients May Improve the Body's Immune Response to RNA Viruses

An article published in *Progress in Cardiovascular Diseases* proposes the use of nutritional supplements to enhance the body's **type 1 interferon immune response** to influenza and coronaviruses. These viruses have **RNA**, rather than **DNA**, as their genetic material.*

"Activation of toll-like receptor 7 (TLR7) by single-stranded viral RNA trapped within endosomes provides a key stimulus to type 1 interferon induction by RNA viruses," authors Mark F. McCarty and James J. DiNicolantonio wrote.

Based on this and other research findings, the researchers identified the antioxidant compounds **lipoic acid**, **ferulic acid** and **sulforaphane** as nutrients that may enhance TLR7-mediated induction of type 1 interferon.

Spirulina or a protein in spirulina extracts known as phycocyanobilin may also improve this response to RNA viruses.

N-acetylcysteine (NAC) increases the production of glutathione and could help protect TLR7 from damage due to oxidation.

The provisional daily dosage suggestions for nutraceuticals that might aid control of RNA viruses including influenza and coronavirus were as follows:

Ferulic acid	500 mg-1,000 mg
Lipoic acid	1,200 mg-1,800 mg (in place of ferulic acid)
Spirulina	15 grams (or 100 mg of phycocyanobilin or PCB)
N-Acetylcysteine	1,200 mg–1,800 mg
Selenium	50 mcg-100 mcg
Glucosamine	3,000 mg or more
Zinc	30 mg-50 mg
Yeast Beta-Glucan	250 mg-500 mg
Elderberry	600 mg–1,500 mg

In an interview, Dr. DiNicolantonio told *Thailand Medical News*, "Therefore, it is clear that certain **nutraceuticals** have antiviral effects in both human and animal studies. Considering that there is no treatment for the new **coronavirus**…we welcome further studies to test these **nutraceuticals** as a strategy to help provide relief in those infected with encapsulated RNA viruses."

Editor's Note: Another mechanism of type 1 interferon response, activation of mitochondrial antiviral-signaling protein (MAVS), can be upregulated by a high dose of **glucosamine**.

* *Prog Cardiovasc Dis*. 2020 Feb 12.

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

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

ZiNC

SUPPORTS YOUR FIRST LINE OF DEFENSE

Research shows zinc deficiency is common in aging populations—and may contribute to the decline of **immune function**.[1]

Zinc supports and activates:

- **Natural killer** cell function[2]
- A healthy inflammatory response[3]
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Life Extension® combines the superior bioavailability of ***zinc monomethionine***[4] with **zinc citrate** to provide 50 mg of these ***absorbable*** zincs in a single capsule.

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OptiZinc® is a registered trademark of InterHealth Nutritionals, Inc.

CAUTION: Supplemental zinc can inhibit the absorption and availability of copper. If more than **50 mg** of supplemental zinc is to be taken daily for more than four weeks, **2 mg** of supplemental copper should also be taken to reduce the risk of copper deficiency.

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Suppress Toxic Secretions *from* SENESCENT CELLS

BY JASON FITZGERALD

When **aged cells** lose healthy functionality they're supposed to die off and their remnants expunged from the body.

Senescent cells do not follow this rule.

They instead **linger** in a highly activated (toxic) state that **damages** healthy cells.

Cellular senescence is a major contributor to **degenerative** disorders and systemic **aging**.[1-8]

Senescent cells can be partially *removed* from the body using compounds known as **senolytics**.

Researchers have made another advance in **senolytic** strategy. They've identified that **apigenin** (a plant extract) reduces harmful compounds that **senescent cells** emit.

Senolytics Remove Senescent Cells

A few years ago, researchers showed that it was possible to selectively remove **senescent cells** using drugs and other compounds known as **senolytics**.[9]

Initial studies relied on synthetic anti-cancer drugs as part of the senolytic regimen. **Navitoclax** and **dasatinib** are two cancer drugs that have been successfully used to eliminate senescent cells.[10,11]

One of the most studied **senolytic** treatments combines **dasatinib** with a nutrient found in many fruits and vegetables called **quercetin**. Each compound targets senescent cells in different ways.

In cell culture and animal studies, senolytics remove senescent cells and reduce disease, leading to longer lives for the animals.[8,9,12-14]

Last year a study confirmed that senolytics can eliminate senescent cells in ***human subjects!***[15]

In this trial, a daily dose of **100 mg** of **dasatinib** and **1,000 mg** of **quercetin** for three days resulted in a significant reduction in senescent cells.

The results were seen in fat tissue, opening the door to potential senolytic treatments for those suffering from obesity, metabolic disease, and more.

Plant-Based Senolytics

Using cancer drugs even in very low doses concerns many natural-health enthusiasts.

Scientists have been searching for **senolytic** agents that do *not* rely on these drugs. They've recently made discoveries showing functional efficacy of ***plant-based*** senolytics.

In late **2019**, a study was published indicating that the nutrient **quercetin** is successful as a senolytic agent *on its own*, without combining it with the cancer drug dasatinib.[16]

In this study, quercetin removed senescent cells in the kidneys of mice. This led to improved function and a decrease in the **fibrosis** (scarring) that causes deterioration and **kidney failure**.

Quercetin has also been shown to inhibit the proteins that block **apoptosis**, or programmed cell death, in senescent cells. This makes it easier for other senolytic compounds to eliminate damaged cells from tissues.[17]

The data still show that *combining* **quercetin** with **dasatinib** works better than quercetin alone. This led to a search for a *plant-based* compound that acts like **dasatinib**, without the side effects.

Scientists have discovered that **theaflavins** from black tea may act as a senolytic agent by inhibiting cellular receptors **Eph**, **BRC-ABL**, and **BLC-2**[18-21] to clear senescent cells from the body.

Increased activity by a signaling protein called **ephrin** has been linked to senescence, and dasatinib works in part by stopping ephrin **(Eph)** receptors from activating.[9]

Theaflavins block **ephrin** receptor activation and can prevent cell senescence.[18,22]

Research shows that theaflavins also inhibit **BCL-2** proteins that make it easier to induce death in senescent cells.[21]

Toxic Secretions Emitted by Senescent Cells

Researchers realized that it's not enough just to *remove* **senescent cells** from the body.

When cells become **senescent**, they don't just sit there, as if inert. They undergo a series of transformations that result in their **secreting** high levels of **toxic compounds** collectively referred to as **SASP** or senescence-associated secretory phenotype.

SASP consists of **protein-degrading** *enzymes* that damage and destroy surrounding healthy cells and initiate **chronic inflammation**.[23]

This low-level inflammation silently damages tissues and organs, leading to disease, dysfunction, and accelerated aging.[24]

Persistent inflammation also contributes to weight gain and obesity, which increases risk for type II diabetes and metabolic syndrome, along with cardiovascular disease, cancer, and dementia.[1-4,8,23-28]

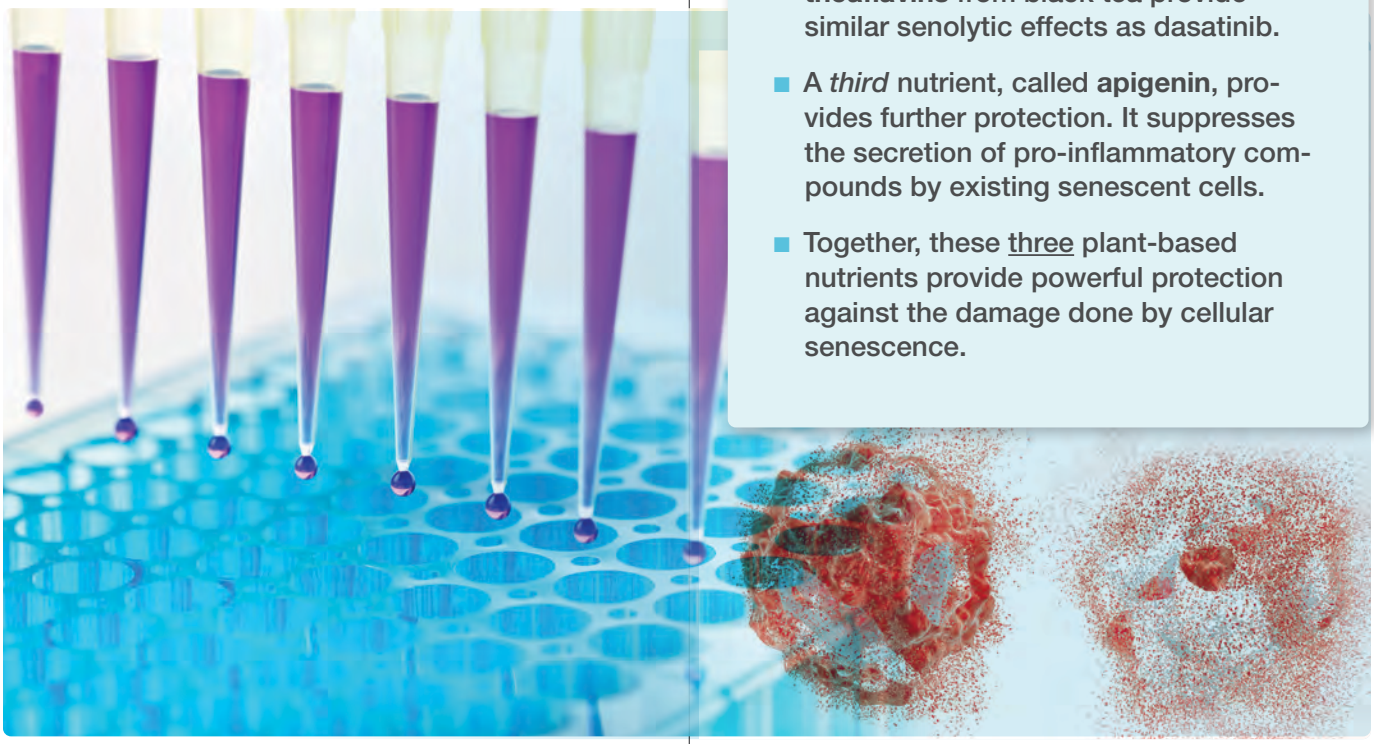
Why Senescent Cell Removal is not Enough

It is not yet possible to remove all **senescent cells** that accumulate in our aging bodies. The best we can do is reduce what's known as the "**senescent cell burden.**"

WHAT YOU NEED TO KNOW

A New Senolytic Triple Therapy

- As cells age, some of them become **senescent.** This means they are dysfunctional, but don't die off like most damaged cells.
- Senescent cells rob their tissues of function. They also secrete compounds that incite **chronic inflammation,** causing damage and dysfunction to surrounding tissues.
- Cellular senescence is linked to rapid aging and increased risk for chronic disease.
- **Senolytics** are compounds capable of *removing* senescent cells. The most common senolytic therapy studied so far is a combination of the plant nutrient **quercetin** and a cancer drug, **dasatinib.**
- Recent research has found that **theaflavins** from black tea provide similar senolytic effects as dasatinib.
- A *third* nutrient, called **apigenin,** provides further protection. It suppresses the secretion of pro-inflammatory compounds by existing senescent cells.
- Together, these three plant-based nutrients provide powerful protection against the damage done by cellular senescence.



Remaining senescent cells continue secreting **SASP** that slowly destroys healthy surrounding tissues by **degrading proteins** and igniting **inflammatory** fires.

To put this into perspective, scientists calculated that if only **one** in **7,000** to **15,000** cells is **senescent**, then **age-related** problems in physical function started to appear in mice.

To protect against the **senescent cell burden**, more needs to be done to reduce the emission of toxic **SASP**.

A Triple-Action Senolytic Approach

Apigenin is a flavonoid found in certain herbs, fruits, and vegetables.

In two recent studies, **apigenin** was found to ***inhibit*** the **SASP**. This resulted in a reduction in **pro-inflammatory** compounds produced by senescent cells.[29,30]

Reducing **inflammation** caused by **SASP** while diminishing the **senescent cell burden** is crucial for healthy longevity.

Quercetin and **theaflavins** (from black tea) function via separate and complementary mechanisms to purge the body of **senescent cells**.

A strawberry flavonoid called **fisetin** may become one of the most effective **senolytics**, but it is not yet **bioavailable** enough to induce a systemic benefit.

A triple approach utilizing highly absorbable **quercetin**, **theaflavins**, and **apigenin** can attack **cellular senescence** from multiple angles, helping to rid the body of the damage it causes.

Summary

Cellular senescence is a major contributor to rapid aging and risk for degenerative illnesses.

Senolytic therapies remove **senescent cells** from the body, rejuvenating tissues and preventing the chronic damage that senescent cells do.

Major advances have been made in senolytic treatments in the last few years, including demonstrating that these interventions can remove senescent cells in ***human*** subjects.

Some of the earliest senolytic compounds used were chemotherapy drugs. Recent research has shown that **plant-derived** nutrients function via similar **senolytic** mechanisms.

Los Angeles Times Reports on Senolytics

"This drug cocktail reduced signs of age-related diseases and extended life in mice and human cells"

"Compared with mice that aged normally, those that started the dasatinib-quercetin cocktail at an age equivalent to **75 to 90 years in humans** ended up living roughly **36%** longer, and withbetter **physical function**…"

"Aging…is beginning to look more and more like a disease—and a treatable one at that." — L.A. Times, July 10, 2018.

Quercetin + theaflavins mimic senescent-cell-removing actions of quercetin and dasatinib (the cancer drug).

Apigenin provides added protection by reducing the emissions (SASPs) from residual senescent cells that ignite **inflammatory** reactions in our aging bodies.

As we await the development of bioavailable **fisetin** (a plant flavonoid), combinations of **theaflavins**, **quercetin** and **apigenin** are options for people over age 35-45 to consider.

Healthy younger individuals are unlikely to need **senolytics** as they have not yet acquired a toxic "**senescent cell burden**". •

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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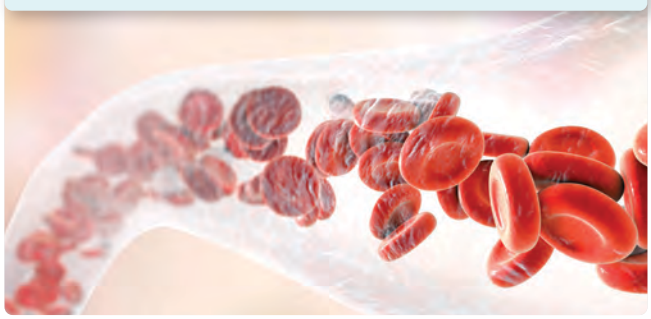
Enhancing Quercetin's Effects

A challenge to fully benefiting from **quercetin** is that it can have low oral bioavailability.[31]

To improve quercetin's absorbability so that the body can obtain higher benefits at lower doses, researchers integrated quercetin into a **phytosome.**

Phytosomes combine a natural compound (like quercetin) with a plant-based phospholipid carrier.[32] This enables much more quercetin to enter the bloodstream to exert its beneficial effects throughout the body.



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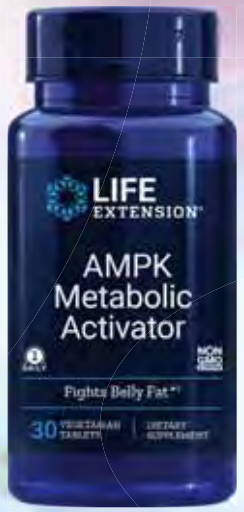

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Reference: **Gerontology.* 1996;42(3):170-80.

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

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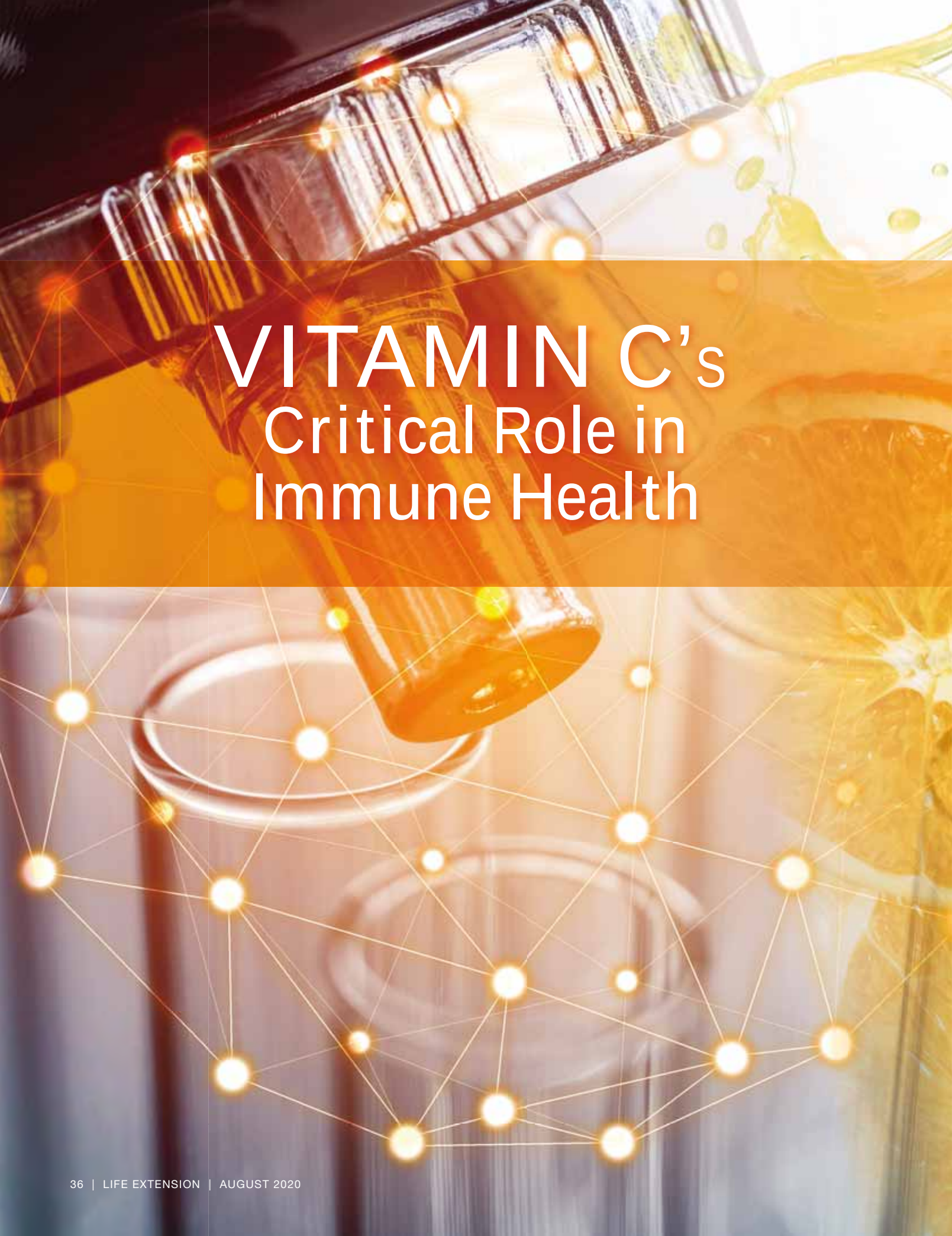

VITAMIN C's Critical Role in Immune Health

BY JASON STERLING

We've heard it all our lives:

Vitamin C fights colds.

That's partially true.

Some **human** studies show that taking vitamin C can lessen the severity *and* duration of the common cold.[1]

What's **irrefutable** is the role that **vitamin C** plays in maintaining **immune function**.[2-4]

The ABCs of Vitamin C

Vitamin C is an essential nutrient in humans.[2]

Without it we die.

Humans don't internally produce vitamin C like most animals. It must be obtained from diet or other external sources.

Severe vitamin C deficiency—medically known as **scurvy**[2]—causes major health problems, including **increased susceptibility** to **infections**.[5]

Low vitamin C levels are relatively common in the United States.[2,6,7]

Diets lacking in fruits and vegetables fail to provide enough vitamin C.

Vitamin C is further depleted by smoking, illness, exposure to pollutants, and stress.[2]

As a **water-soluble** nutrient, vitamin C can't be readily stored in the body.

Impact on Infections

In the process of fighting infection, immune cells rapidly use up vitamin C.[2]

Some studies show that in common infectious illnesses, such as colds, supplemental vitamin C lessens the severity and duration of symptoms.[1]

In people with **acute respiratory infections**, like bronchitis or pneumonia, increasing oral dosages of vitamin C can reduce the severity of respiratory symptoms.[8]

The results can be dramatic. Some studies report rapid clearance on chest x-rays of patients with lung infections, following *intravenous* vitamin C treatment.[9,10]

In **pneumonia** and other serious infections, vitamin C has been shown to reduce symptoms, shorten hospital stay, and lead to more rapid normalization of markers of disease.[8,11]

Barrier Against Disease

Before viruses, bacteria, and other infectious agents can make us ill, they must invade the body, breaching **biological barriers** meant to prevent their entry.

Our skin and the linings of our respiratory and digestive tracts are protective barriers.

Vitamin C is important for the creation and maintenance of these protective-barrier tissues. It's required for the synthesis of **collagen**, a structural protein that provides strength and durability to barrier and connective tissues.[2]

Vitamin C also affects the linings of the airways in lungs, which are prone to infection. In animals with **acute lung infection**, treatment with vitamin C has been shown to restore barrier function, repairing junctions between cells in the lining of the respiratory tract.[12]

Helping Immune Cells

Vitamin C supports cells of the **immune system**, including those most directly involved in response to infections.

Neutrophils are the "first responder" immune cells against infections. They are called to infected tissues early in the course of disease. Research has shown that they play important roles in response to viral as well as bacterial infections.[13,14]

Vitamin C supports **neutrophil function** by:

- **Helping neutrophils reach an infection**. Early in an infection, neutrophils migrate to the infected tissues. Insufficient vitamin C impedes this process, making it difficult for neutrophils to find the infection.[15-17] In a study of participants with inadequate vitamin C status, daily supplementation with vitamin C resulted in a **20%** increase in neutrophil migration.[18]

- **Helping neutrophils destroy microbes**. Once neutrophils encounter an infection, they *consume and kill* infectious organisms. With vitamin C deficiency, that ability is severely impaired.[2] One study showed that increased vitamin C intake, in combination with vitamin E, enhances the ability of neutrophils to devour and kill infectious agents.[19]

After neutrophils destroy pathogens, they die off and are removed by other cells. This helps *resolve inflammation* and start the healing process. But a lack of vitamin C can cause neutrophils to die in a way that releases potentially toxic compounds, causing new inflammation and tissue damage that make disease even worse.[20,21] Preclinical studies show that adequate vitamin C inhibits this harmful process.[22]

Lymphocytes are the second most common form of immune cells. They include **B cells**, **T cells**, and **natural killer cells** (**NK cells**).

These cells are an integral part of the immune system's ability to recognize foreign invaders and mount an attack on them.

Vitamin C promotes growth, maturation, antibody production, and survival of **lymphocytes**.[23-26]

Reducing Inflammation

Excessive **inflammation** initiated by infection causes damage to tissues. Preclinical studies show that vitamin C *reduces* excessive amounts of pro-inflammatory compounds.[22,27,28]

Studies in animal models and in humans have demonstrated that oral intake of vitamin C leads to lower levels of **histamine**, a pro-inflammatory compound which causes symptoms of both infection and allergy.[17,29-31]

Fighting excessive inflammation is important in **wound healing** and recovery of tissues following injury.

By decreasing **pro-inflammatory** compounds, vitamin C helps initiate tissue-healing processes.[32]

WHAT YOU NEED TO KNOW

Vitamin C Helps Fight Infections

- **Vitamin C** strengthens **immunity** by promoting healthy barrier function to keep out pathogens and supporting optimal function of immune-system cells.
- Inadequate levels of **vitamin C** are not uncommon and can impair immune response. Requirements for vitamin C are increased when the body is fighting infection.
- ***Daily oral intake*** of vitamin C restores bodily levels and has been shown to improve the function of immune cells, supporting a healthy response to viral and other infections.
- Health-conscious people supplement with **500 mg** and sometimes much *higher* doses of vitamin C each day.

Summary

Vitamin C is an essential nutrient that supports healthy **immune function**.

Inadequate levels of vitamin C in the body impair the ability to ward off infectious disease and respond to an infection.

Increasing intake of vitamin C corrects some of these impairments. This helps strengthen barrier functions that repel infectious agents and support optimal immune-cell function.

The need for vitamin C increases with acute illness. In animal models and human clinical studies, vitamin C has been shown to reduce incidence and severity of various forms of infectious disease.

In **1970**, two-time Nobel Prize Laureate **Linus Pauling** claimed that vitamin C prevents and alleviates the episodes of the common cold.[33] Ever since, most health-conscious Americans have supplemented with **500 mg** a day (and far *higher*) of low-cost **vitamin C**.

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

WHEY'S
Longevity Benefits

BY MICHAEL DOWNEY

For years, **whey protein** has been taken by athletes seeking to increase muscle mass and performance.

Evolving research shows that **whey** does much more.

Whey helps protect against **muscle-wasting** and **weight gain**, while lowering certain **cardiovascular risk** factors.[1-11]

Glutathione levels drop with age, and this could play a role in **neurodegeneration**, reduced **immunity**, and other **age-related** conditions.[16-20]

Whey protein enhances **glutathione** production.[12,13]

The ability of whey to increase **glutathione** levels comes from its unique combinations of small **peptides**.

Whey protein is increasingly seen as a superfood for healthy longevity.

Dangers of Low Protein

About **45%** of older people in the U.S., and more than **84%** in residential care facilities, are *not* adequately nourished.[21,22] This results from reduced appetite and food intake, impaired nutrient absorption, and other age-related changes.[22-24]

Insufficient intake of quality protein can lead to **loss of muscle mass**,[25] especially in older individuals. After age 70, muscle mass decreases by about **15%** per decade.

However, this process begins as early as age 40, with an estimated **8%** loss of muscle mass per decade.[24]

Approximately **5%-13%** of people aged 60 or over experience age-related muscle-wasting so severe, it increases the risk of falls and disability.[26-28]

Inadequate protein consumption is associated with increased risk of age-related conditions like loss of bone strength and poor immunity.[29]

In fact, low protein intake is associated with **frailty**,[30] when the body is so weak it becomes unable to cope with stress or injury. Frailty is a strong predictor of mortality in aging people.[21,31]

Whey is a potential solution.

Whey Inhibits Muscle-Wasting

Made from the liquid part of milk that separates during cheese production, whey is a **high-quality protein source** for aging people.

It is also a great source of **branched-chain amino acids**, essential nutrients that reduce muscle breakdown and stimulate the creation of *new* protein in muscle.[32]

The most metabolically active branched-chain amino acid in whey is **leucine**. It activates signals in muscle that boost the body's anabolic (growth-promoting) drive, spurring muscle synthesis. [2,33-36]

In one study, hospitalized, frail, elderly men and women were given whey daily during their hospital stay. Compared to patients who didn't take whey, those who did had significant improvements in grip strength and knee extensor force, and improved rehabilitation outcomes.[6]

Boosting Muscle Mass

Whey doesn't just help *prevent* muscle loss. Two studies show that it also significantly ***increases*** **lean muscle mass**, perhaps especially when combined with exercise.

In a randomized, controlled trial, researchers divided 81 healthy, older women, aged 65-80, into three groups. Over 24 weeks, one group exercised twice weekly, another took **whey protein** but didn't exercise, and the third took the same amount of whey protein *after* exercising.[4]

WHAT YOU NEED TO KNOW

The Benefits of Whey

- **Whey protein** has long helped athletes build muscle mass, but it does much more.
- Staying active and healthy with aging requires strong, healthy muscles. Unfortunately, aging adults are increasingly susceptible to losing muscle mass as they grow older.
- Whey is documented to help prevent the loss of muscle mass, inhibit weight gain, and reduce multiple risk factors for cardiovascular disease.
- Whey protein helps enhance the muscle-building effects of exercise while boosting glutathione levels.

The increase in muscle mass was significantly *higher* for the **whey + exercise group** than the other two groups. There was also a significant increase in grip strength and gait speed.[4]

Researchers also conducted a study to assess whey's effects on muscle loss following periods of *inactivity*.

In a controlled trial, men and women in their late 60s consumed a diet in which **45%** of their protein came from either whey or animal peptides. After two weeks of habitual activity, participants spent two weeks being **inactive**, then returned to normal activity for one more week (recovery).[1]

During the inactive periods, lean leg mass was reduced in both groups. During the recovery week, lean leg mass increased ***only in the whey protein group***.[1]

Preventing Weight Gain

Our metabolism naturally slows as we age, causing many to **gain weight**.

Whey has been shown to help **prevent weight gain**. Scientists have even considered it as a potential application for the **treatment of obesity**.[37]

In a host of studies, researchers discovered that the proteins, amino acids, and minerals in whey boost **satiety** (the feeling of fullness), benefit **glucose homeostasis** (the regulation of blood sugar levels), and optimize lean body mass.[38-42]

Scientists conducted one recent study on 100 men aged 70 or older with **sarcopenic obesity**, characterized by low lean mass and high fat mass.[10]

They divided the subjects into three groups. One received no treatment, another received **whey protein** *only*, and the third received **whey protein** and underwent whole-body **electrical muscle stimulation** (which "exercises" the muscles). In addition, all subjects received **800 IU/day** of vitamin D.[10]

Total body fat, trunk body fat, and waist circumference were significantly reduced in *both* intervention groups (**whey protein** alone or combined with **electrical muscle stimulation**) after 16 weeks, but not in the untreated group.[10]

Another analysis of randomized, controlled trials on overweight and obese people concluded that there was a significant decrease in **body weight** *and* total **fat mass** in those who took **whey protein**.[11]

Fighting Cardiovascular Disease

Cardiovascular disease is the leading cause of death in the U.S.

Hypertension is one of the main factors contributing to cardiovascular disease.[43] Research shows that whey-based peptides may help reduce this risk factor.[44,45] (Peptides are chains of amino acids that are smaller than proteins.) And food-derived peptides like the kind found in whey are far safer than anti-hypertension drugs.

In a study, researchers asked 27 adults with mild **hypertension** (high blood pressure) to eat a high-fat breakfast and lunch along with **28 grams** of whey protein. This was later repeated with **28 grams** of **calcium caseinate**, a protein derived from casein (non-whey protein) in milk, and **27 grams** of the carbohydrate **maltodextrin**.[5]

Whey was found to reduce **systolic blood pressure** (the pressure on vessels when the heart contracts), by an average of **15.2 mmHg** compared to calcium caseinate, and **23.4 mmHg** compared to maltodextrin, for up to five hours after ingestion.

Whey also **reduced arterial stiffness** compared to maltodextrin. All these actions show whey's potential to improve cardiovascular risk factors.[5]

Scientists examining previous trials on **overweight and obese** patients also found that whey protein reduced body weight and significantly lowered blood pressure, glucose levels, and cholesterol, reducing the risk of cardiovascular disease.[11]

Summary

Whey protein is often viewed as just a protein source for bodybuilders.

Whey has also been shown to stop muscle-wasting in the elderly, boost lean muscle mass, prevent weight gain, and lower risks of cardiovascular disease and other illnesses.

It's increasingly recognized as a food to protect against degenerative aging and prevent muscle loss.

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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What Type of Whey is Right for You?

Whey protein is commonly available in three forms:

- **Concentrate,**
- **Isolate,** and
- **Isolate with added creatine and glutamine.**

Whey concentrate is simply whey with the water removed. That leaves a powder that mixes easily for a protein shake. Most whey concentrates contain about **80%** protein, and may be the most economical form of protein for the human body to digest and use.

Whey isolate is put through a filtration process that reduces the amount of carbohydrate, lactose, and fat, providing a purer protein in the end. Whey isolate contains about **98%** protein. Those who are lactose intolerant should note that, like whey concentrate, whey isolate contains lactose.

Whey isolate with added creatine and glutamine is a premium isolate option for those seeking *greater* strength and exercise performance.

Creatine is found naturally in muscle cells. It supports energy production by increasing levels of cells' energy currency, ATP, and helps maintain healthy muscle mass.[46-48] Studies show that creatine helps build muscle and strength in explosive, short-duration activities like resistance-exercise training.[49,50]

Glutamine is abundant in muscles, but levels are reduced after prolonged and high-intensity exercise.[51-54] Glutamine encourages recovery after intense exercise, increases synthesis of energy-storing glycogen, and helps inhibit protein breakdown in muscle tissue.[55-57] It can also inhibit blood ammonia accumulation during exercise, preventing physical fatigue.[58-60]

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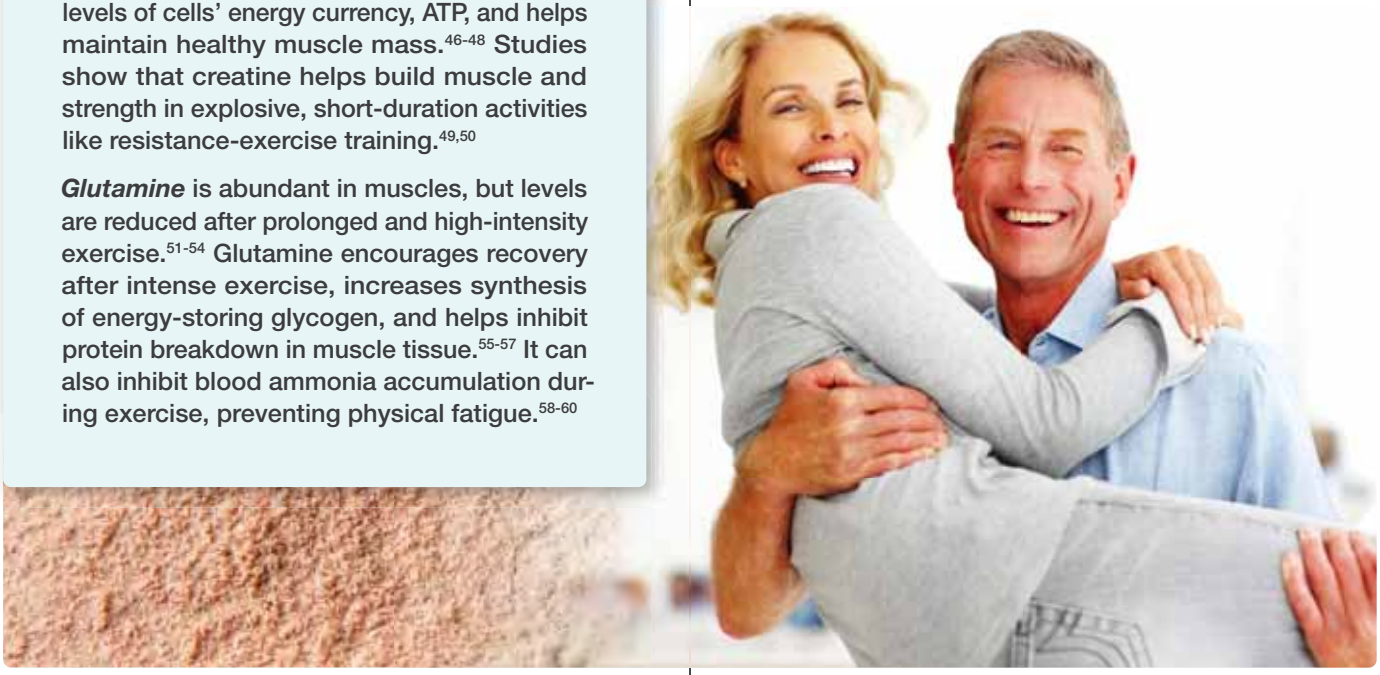

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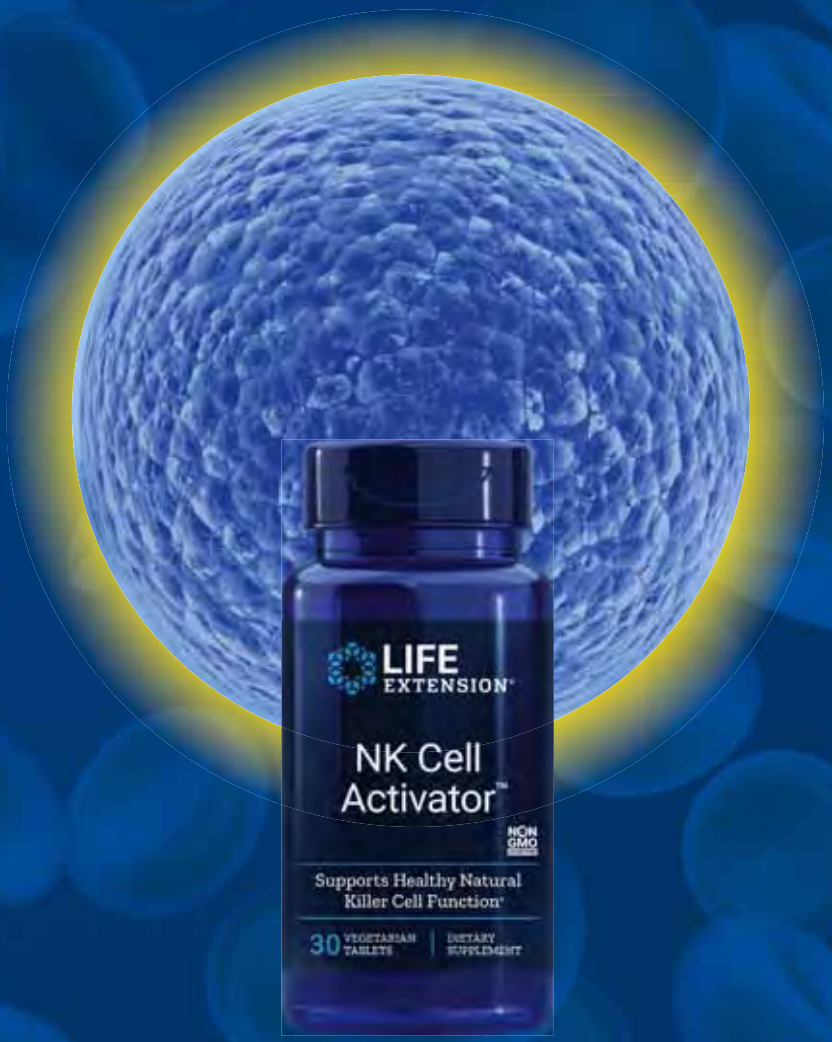

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Reducing Cancer Risk *with* Cruciferous VEGETABLES

BY KIRK STOKEL

Roughly **1.8 million** Americans are diagnosed with **cancer** each year.

More than **600,000** people in the United States die from it annually.[1,2]

It doesn't have to be this way.

Many cancers are preventable.

Improving diet, increasing exercise, and changing unhealthy behaviors can significantly reduce risk.[3]

Studies show that *higher* intake of **cruciferous vegetables** is associated with a reduced risk for cancers.[4,5]

Ongoing research points to **anti-cancer** effects of compounds found in broccoli and other **cruciferous vegetables**.

One clinical trial showed that a specific cruciferous vegetable nutrient triggered a complete resolution of **pre-cancerous cervical lesions** in ***100%*** of women, *removing* the risk that the lesions could develop into cancer.[6]

Until recently, it was difficult to deliver these **cruciferous** nutrients into the bloodstream at high enough levels to be effective.

Scientists have found a way to maximize the **activity** of **cruciferous** compounds so that they can reach tissues throughout the body.

Cruciferous Vegetable Compounds

Cruciferous vegetables are a group of edible plants that include **broccoli**, **kale**, **green** and **red cabbage**, **cauliflower**, and **Brussels sprouts**.

They are loaded with nutrients shown to help prevent a wide variety of common disorders.

In particular, **cruciferous vegetables** have demonstrated the ability to protect cells from several processes that result in malignant transformations.[4,5]

Two cruciferous nutrients are especially well validated for their cancer-fighting properties:

1) **Sulforaphane**

2) **DIM** (3,3'-diindolylmethane).[6-8]

Findings from Johns Hopkins

In a seminal 1994 study from Johns Hopkins, rats were split into two groups. One was treated with **sulforaphane**, and one was not.[9]

All the animals were then exposed to a powerful cancer-*inducing* chemical.

The sulforaphane-treated rats developed ***39% fewer tumors*** than the untreated group. And the tumors that *did* develop progressed at a slower rate.

Other studies have produced similar findings, showing that **sulforaphane** kills cancer stem cells, slows the growth of tumors, and promotes the death of cancer cells.[10-12]

In lab and animal studies, **sulforaphane** has been associated with diminished growth of cancer cells and a reduced risk of many types of cancer including:

- Breast,[10-12]
- Bladder,[13]
- Lung,[14]
- Prostate,[15,16]
- Cervix,[17-19]
- Blood (leukemia),[20-22]
- Mouth,[23] and
- Brain.[24,25]

The other active compound in broccoli, **DIM**, also shows the ability to slow or even *stop* cancer cells from growing.

In one remarkable study, women with **cervical intraepithelial neoplasia**, a cervical cancer precursor, were treated with DIM.

After three to six months, ***100%*** of women receiving **200 mg** of **DIM** daily had their neoplasia ***completely resolved***, compared to **61%** of women in a placebo group.[6]

What's most striking about these cruciferous compounds is that they have shown these effects on cancer in virtually *every tissue* studied.

How Plants Create Sulforaphane

You can't get these benefits by simply popping a pill containing **sulforaphane**.

The reason is that while **DIM** is stable, **sulforaphane** is not. It degrades rapidly into **inactive** substances if it isn't quickly **absorbed**.[26]

Nature has found a way around this problem.

Sulforaphane isn't contained in cruciferous vegetables. Instead, cruciferous plants store a **sulforaphane** *precursor* called **glucoraphanin** in their cells.

In a *separate* cellular compartment, plants store an *enzyme* called **myrosinase**, that converts **glucoraphanin** into **sulforaphane**.

Only when the vegetables have been eaten and partially digested do the **glucoraphanin** and **myrosinase** mix, to form **sulforaphane**, the cancer-fighting compound.

Sulforaphane can then be absorbed through the **small intestine** before it degrades.

Science imitates Nature

The trick for researchers was to find a similar way to deliver **sulforaphane** to the small intestine before it breaks down.

One group of scientists came up with an ingenious solution: imitate nature.

They developed a delivery system that keeps stable **glucoraphanin** and active **myrosinase** in separate compartments, just the way plants do.

WHAT YOU NEED TO KNOW

The Cancer-Fighting Power of Cruciferous Veggies

- **Cruciferous vegetables** include broccoli, cabbage, cauliflower, Brussels sprouts, and kale.
- Two cruciferous nutrients are especially well validated for their cancer-fighting properties: **sulforaphane** and **3,3'-diindolylmethane** (DIM).
- Unlike DIM, sulforaphane is unstable. It degrades rapidly if it's not absorbed.
- Scientists have found a way to package a sulforaphane **precursor** with an **enzyme** that converts it into sulforaphane ***in the small intestine***, where it's absorbed into the bloodstream right away.
- Together, sulforaphane and DIM can prevent changes that lead to cancer, stop tumors from developing and spreading, and even cause cancer cells to die off.

Taken orally, these two components meet and mix *only* in the small intestine.

That means higher levels of cancer-fighting **sulforaphane** can be achieved.

The results are striking. Scientists at Johns Hopkins found that **sulforaphane** levels from this **glucoraphanin-myrosinase** mix are **three to four times** more bioavailable (absorbable) than those created by glucoraphanin alone.[27]

How Sulforaphane and DIM Work

Sulforaphane and **DIM** have shown the ability to reduce cancer risk and malignant changes in four important ways:

- Stop deleterious **epigenetic** gene expression changes from occurring,
- Reduce or minimize cancer-promoting **chronic inflammation**,
- Fight **estrogen-driven** stimuli that encourage cancer cell replication and spread and
- Impede **pre-cancerous cells** from developing into tumors.

Stopping Epigenetic Changes

Cancer can be caused by **epigenetic** changes, the ability to "turn genes on and off."

Epigenetic changes can be described as changing gene expression via one's behavior or inadvertent exposure to outside toxins like air pollution.

By way of example, smoking cigarettes causes deleterious **epigenetic** changes that make the smoker more vulnerable to certain cancers.

Fish oil and **vitamin D**, on the other hand, have been shown to induce beneficial epigenetic changes.

These changes don't alter the DNA, but they change **expression patterns** of genes.

Research has shown that **sulforaphane** and **DIM** can reverse some of these cancer-associated changes.[16]

One example of this is that sulforaphane reverses alterations in **histone proteins** involved in the regulation of **genes**, an **epigenetic** change that can help prevent cancer formation.[28,29] This mechanism is so important, it's a target of many new cancer drugs under development.[30-32]

Suppressing Inflammation

Chronic inflammation contributes to practically *every* age-related disease—including cancer.

Our bodies have a "master switch" that regulates the signaling molecules that drive inflammation. It's called **nuclear factor-kappa B** (**NF-kB**).

Studies show that **sulforaphane** *blocks* **NF-kB**, reducing inflammation throughout the body. Along the way, sulforaphane kills **cancer stem cells** that can trigger tumor recurrence.[11,33]

Fighting Estrogen-Driven Stimuli

Certain estrogens stimulate proliferation of some existing breast and prostate cancers.[34-36]

Sulforaphane combats the potential DNA-damaging effects of estrogen, preventing the early DNA damage that leads to cancers.[37-39]

DIM helps shift the balance between two different forms of estrogen metabolites, *away* from one that promotes cancer and *toward* one that inhibits it.[40]

In women who have had **breast cancer**, human studies show that daily **DIM** shifts estrogen metabolites toward a preponderance of the healthier form.[40,41]

In men, *higher* estrogen levels are associated with prostate enlargement and cancers. Studies show DIM can prevent estrogen-induced stimulation of prostate cancer cells.[42,43]

Stop Developing Tumors in their Tracks

Sulforaphane has demonstrated the ability to *suppress* signals and enzymes that spur growth of tumors, and to *reduce* formation of blood vessels that feed them.[44-49]

DIM has also been shown to reduce new blood vessel formation in tumors and to inhibit the spread of cancer.[50]

And both compounds spur cancer cells to die off, while leaving normal, healthy cells unharmed.[51,52]

These actions prevent **pre-cancerous** cells from developing into cancer and slow the growth of existing cancer.

Summary

Cruciferous vegetables like broccoli have proven capable of slowing and even reversing the development of many types of cancer.

Research shows that many of the anti-cancer effects are due to two compounds derived from these vegetables: **sulforaphane** and **DIM**.

While **DIM** is stable and easily absorbed when taken orally, **sulforaphane** is rapidly converted to inactive compounds.

To solve this problem, scientists developed a delivery system (glucoraphanin plus myrosinase) that maximizes the amount of sulforaphane available for absorption into the bloodstream.

By separating these precursor **plant compounds**, much more **sulforaphane** becomes **bioavailable** in the small intestine. There, it can be rapidly **absorbed**, delivering higher blood levels of this beneficial (sulforaphane) compound. •

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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Retinol Blend Repairs Aging Skin

BY ROBERT GOLDFADEN AND GARY GOLDFADEN, MD

Many skin creams and serums have temporary effects.

But **retinol** can initiate changes in the skin that turn back the clock on **skin aging**.

Once applied to the skin, retinol converts into **retinoic acid**,[1] a compound that sends signals to skin cells that stop and even repair skin aging.

Researchers have found that retinoic acid:

- Stimulates **collagen** and **elastin synthesis**,[2,3]
- Boosts **moisture**,[4]
- Promotes **tissue repair**,[5] and
- Combats solar **radiation**.[6]

Many topical creams contain **retinol**. But retinol is just one of a group of compounds called **retinoids**, which have slightly different effects.

These **retinol compounds** have been shown to:[7,8]

- Reduce crow's feet by **44%**,
- Decrease mottled pigmentation by **84%**,
- Prevent and even *repair* sun damage, and
- Reduce fine lines and wrinkles in ***just 14 days***.

A **lipid-soluble** delivery system allows **retinol** to be gradually released in the skin to restore a smoother, more youthful appearance, with fewer side effects.

How Skin Ages

Skin naturally ages over time,[9,10] but there are ways to partially rebel.

The **epidermis**, the outer layer of the skin, becomes thinner, which weakens the barrier function. That leads to increased moisture loss and vulnerability to environmental threats.[11,12]

In the second layer of skin, the **dermis**, there is reduced function and number of the specialized cells known as **fibroblasts**.[13,14] This diminishes the output of the structural proteins **collagen** and **elastin**, which give skin its firmness and elasticity, and of **hyaluronic acid**, responsible for keeping skin hydrated.

All these changes make skin appear dry, pale, and blemished, and lead to fine wrinkles.

Skin aging is *accelerated* by environmental factors, especially prolonged sun exposure.

Ultraviolet radiation activates *enzymes* that break down dermal structural proteins and cause **DNA damage** that slows the production of new skin cells.[15-17]

Sun-damaged skin is characterized by rough texture, deep wrinkles, age spots, and dark patches.

There's a way to repair skin damage.

Retinol, **retinyl palmitate**, and **hydroxypinacolone retinoate** are vitamin A derivatives that belong to a group known as **retinoids**.

These retinoids enhance the ability of aged, damaged skin to restore itself.

Retinol Enhances Skin Renewal

When retinol is topically applied to normal, aged skin, it increases the number of epidermal **keratinocytes** by ***12-fold*** (Keratinocytes produce the key structural protein **keratin**).[18]

That boosts the thickness of the **epidermis**, strengthening the skin-barrier function crucial for keeping skin hydrated, soft, and youthful.

Topical **retinol** regenerates the **dermis** by *increasing* the number of **protein-synthesizing** fibroblasts and *reducing* secretion of **protein-degrading** enzymes.[19]

It also stimulates the synthesis of **collagen**, **elastin**, and **fibronectin**, proteins that make up the dermal matrix, which can be thought of as the skin's scaffolding.

These **retinol-induced** effects can be seen in people after as little as ***seven days***.[19]

All these changes lead to a visible impact.

One randomized, double-blind clinical trial showed that **topical retinol** significantly reduces fine wrinkles, roughness, and severity of changes in naturally aged skin after 24 weeks, compared to a **placebo**.[20]

These benefits were later confirmed in another controlled, clinical trial that found significant increases in **collagen** and water-binding **hyaluronic acid** in response to topical **retinol**, leaving participants with rehydrated, smooth, and rejuvenated skin.[21]

Numerous human studies have confirmed that topical retinol also breathes new life into **photodamaged skin**.[21-23] In one study, 62 participants applied either retinol or a placebo to their face for one year. Compared to the untreated group, retinol decreased crow's feet by **44%** and reduced mottled pigmentation by **84%**.[7]

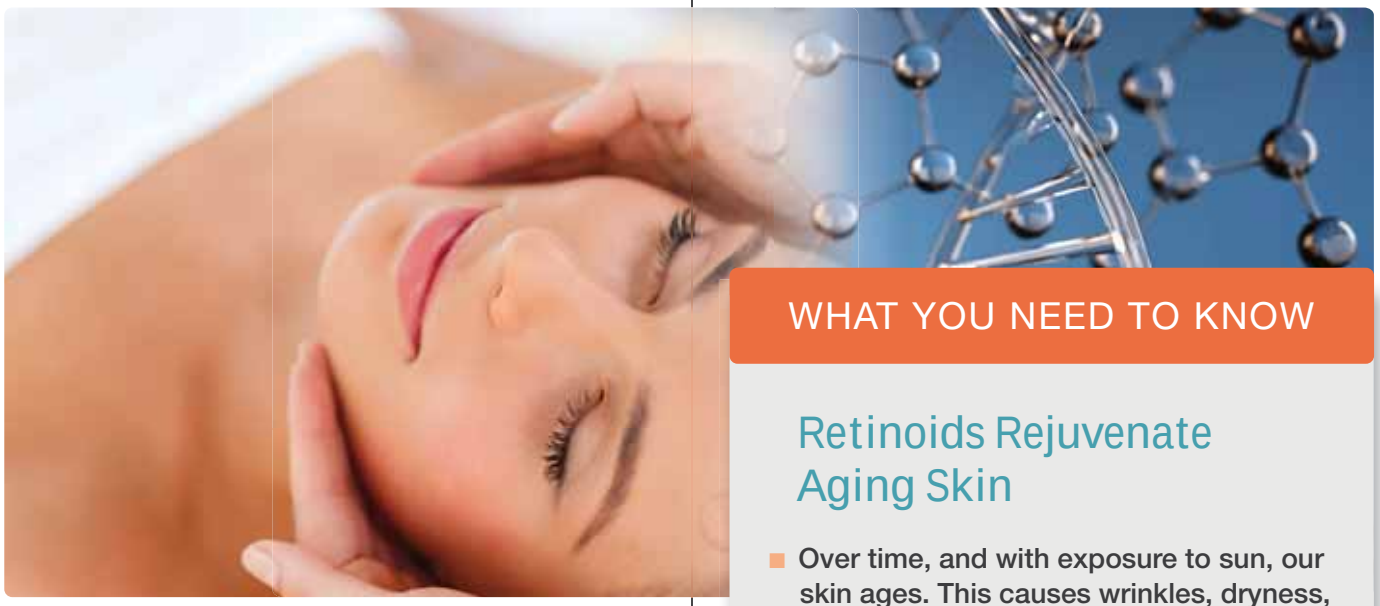
Retinyl Palmitate Protects Against Sun Damage

Retinyl palmitate is the main retinoid in the **epidermis**.[24]

There, it absorbs harmful ultraviolet rays and blocks inflammation, lipid peroxidation, and DNA damage associated with premature aging and skin cancer.[25,26]

In people, topical application of retinyl palmitate *before* UV exposure was ***as effective as sunscreen*** in preventing erythema (skin reddening and inflammation) and **thymine dimers**, a marker of DNA damage.[25] Another study confirmed its photoprotective effects on DNA.[27]

Additional research indicates that retinyl palmitate not only prevents but *repairs* the sun's damaging effects on the skin.



In one randomized, clinical trial, people applied topical **retinyl palmitate** (combined with vitamin E and moisturizers) to their face, neck, décolletage, arms, and lower body for 12 weeks.[28]

At the study's end, the face and neck areas of the treatment group had significant **improvements** in roughness, mottled pigmentation, coarse wrinkles, fine lines, and uneven skin tone compared to baseline and non-treatment groups.

The décolletage, arms, and lower legs also showed improvements in dryness, scaling, and crepey skin texture.[28]

Hydroxypinacolone Retinoate Repairs Skin

Retinol and retinyl palmitate each undergo several steps to be converted into **retinoic acid**.

A related compound, **hydroxypinacolone retinoate**, binds *directly* to retinoid receptors on skin cells, without needing to go through a conversion process.[29]

This allows hydroxypinacolone retinoate to provide similar benefits to prescription-only retinoic acid, but *without* its side effects (like peeling, redness, and hypersensitivity to the sun).

A topical formulation containing hydroxypinacolone retinoate was shown in humans to boost epidermal thickness by **26.3%**, while significantly increasing the production of collagen, elastin, and fibronectin in the dermis to repair sun-damaged skin.[30]

In a separate human study, topical **hydroxypinacolone retinoate** reduced fine lines and wrinkles after **14 days**—without skin irritation.[8]

WHAT YOU NEED TO KNOW

Retinoids Rejuvenate Aging Skin

- Over time, and with exposure to sun, our skin ages. This causes wrinkles, dryness, age spots, rough texture, and other visible signs of damage.
- Applied topically, three related compounds called **retinoids** exert anti-aging effects.
- **Retinol** renews the outer layers of the skin, reversing damage caused by time and UV radiation. It reduces wrinkles and crow's feet, roughness, and mottled pigmentation.
- **Retinyl palmitate** protects against photoaging by *absorbing* ultraviolet rays and inhibiting DNA damage. Applied before UV exposure, it's shown to be *as effective as sunscreen* in preventing skin reddening and inflammation.
- **Hydroxypinacolone retinoate** repairs damage and reduces fine lines and wrinkles similarly to prescription retinoic acid, but *without* irritation.
- All three compounds are available in one topical formula.
- A novel **lipid-soluble** delivery system allows retinol to be easily **absorbed** in the skin and released in a controlled manner, safely restoring hydrated, soft, and youthful skin.

Advanced Delivery System

Most topical products use a conventional delivery system that releases retinol all at once in the skin. This leads to the side effects people associate with retinol, such as redness and irritation.

A new delivery system **encapsulates** retinol in a solid matrix lipid structure. This enables it to be easily absorbed into the skin, then released in a *controlled* manner that minimizes side effects.[31]

Gradually releasing retinol into the skin maximizes its benefits and keeps skin smooth, hydrated, and youthful.

Summary

Three topical vitamin A derivatives—**retinol**, **retinyl palmitate**, and **hydroxypinacolone retinoate**—have been shown in human studies to protect and repair naturally aged and photodamaged skin.

A unique delivery system has been developed that ensures a gradual release of retinol in the skin to safely restore smooth, youthful, hydrated skin, without irritation. •

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

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.

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Colchicine Dramatically Reduces Stroke Risk in Heart Attack Patients

BY EDWARD SANFORD

Most people don't know that 30 days *after* a **heart attack**, there is a high risk of suffering a **stroke**.

These post-heart-attack **strokes** are more **lethal** than seen in typical stroke patients.

During the first **three years** after suffering a heart attack, the stroke risk remains **2-3 times** *higher* than expected before dropping back to normal.[1]

A major, placebo-controlled study published in the ***New England Journal of Medicine*** evaluated patients who had a recent **heart attack** and were then given **0.5 mg** of **colchicine** daily.

The first data set showed that **colchicine** reduced risk of having *another* major **cardiovascular event** by **23%**.[2]

The most significant data showed that **heart attack** patients receiving **colchicine** cut their **stroke** incidence by an astonishing **74%**.[2]

People who have heart disease or who have suffered a heart attack should discuss **colchicine** with their doctor.

Underlying Cause of Vascular Disease

Atherosclerosis, the hardening and narrowing of the arteries, is the underlying cause of most heart attacks and strokes.

Chronic inflammation plays an important role in the development of **atherosclerosis**.[3]

Scientists conducted research on an established prescription drug, ***colchicine***, an anti-inflammatory medication commonly used to treat **gout** and **pericarditis**.

Studies have demonstrated that in ***low doses***, it may reduce the risk of cardiovascular events like stroke and heart attack.[2,4]

Testing Colchicine

Colchicine is a compound originally extracted from the autumn crocus and the flame lily plants.

It has been used for centuries to reduce soreness and swelling and was approved as a **prescription medication** in the U.S. in **1961**.[5]

Scientists have been studying its **anti-inflammatory** properties to see if it could help treat atherosclerosis and resulting heart disease.

Researchers at Canada's **Montreal Heart Institute** recently conducted a major trial and published the results in the *New England Journal of Medicine*.

The patients studied had suffered a heart attack within the previous 30 days (13.5 days, on average, between heart attack and the initiation of colchicine treatment).[2]

All the patients had been treated according to standard guidelines (including intensive use of cholesterol-lowering **statin** drugs) and had already completed any invasive procedures, like cardiac stents.[2]

Patients from 167 medical centers in 12 countries were enrolled in the trial.

They were randomly assigned to receive either **0.5 mg/day** of colchicine or a placebo. Neither the subjects nor the doctors knew whether the patients were taking active medication or placebo.

When the trial began, **2,366** patients were assigned to the colchicine group, and **2,379** to the placebo group.

After starting treatment, patients were followed for a median of 22.6 months.

A Clear Benefit

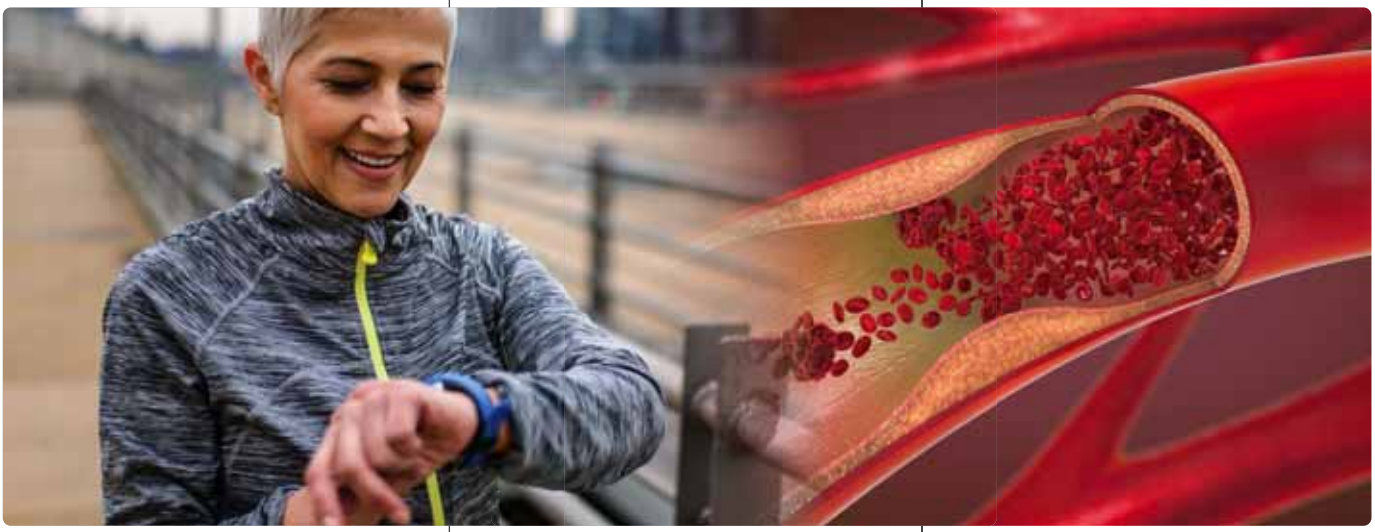
Researchers were studying colchicine's impact on major **cardiovascular events**, which they defined as any of the following:[2]

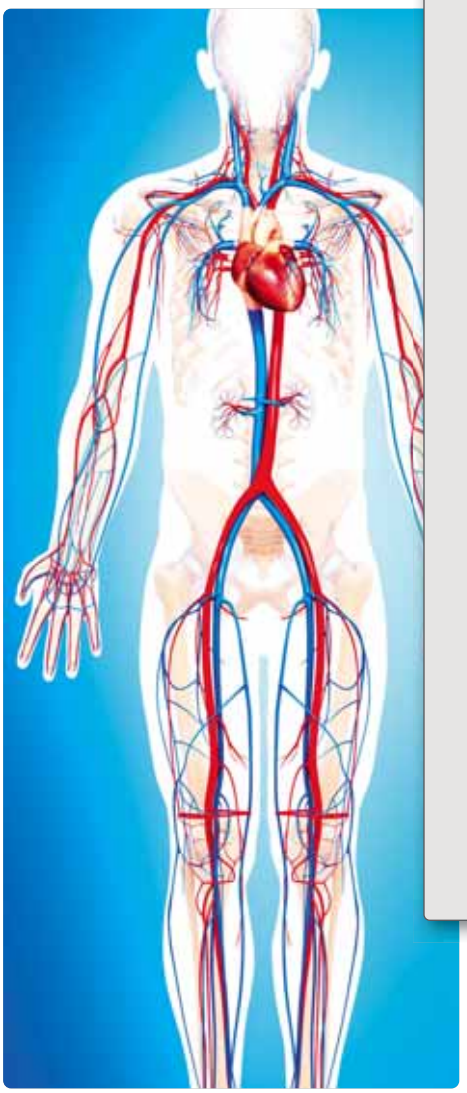
- Death from cardiovascular causes,
- Resuscitation after cardiac arrest,
- A new heart attack,
- Stroke, or
- Urgent hospitalization for chest pain leading to stent placement or bypass surgery.

In the placebo group, a major cardiovascular event occurred in **7.1%** of patients. In the colchicine group, such an event occurred in **5.5%** of subjects.[2]

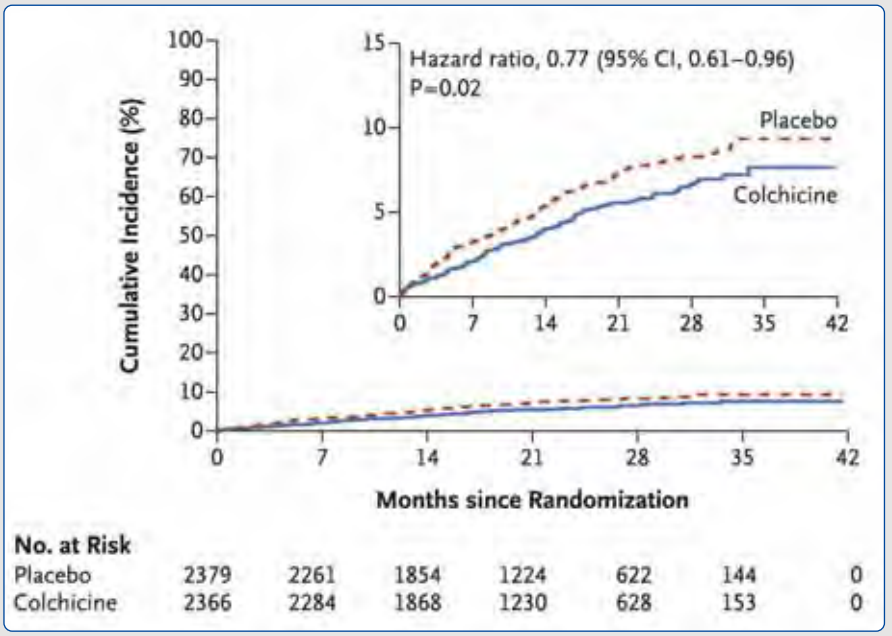
This means that colchicine recipients were **23%** ***less likely*** to have a major event compared with placebo recipients.

Most dramatically, colchicine recipients had a **74% lower risk of stroke**, and a **50%** reduction in the risk of chest pain leading to hospitalization.[2]





Reduction of Major Cardiovascular Events by Colchicine



Cumulative incidence of **cardiovascular events** (death from cardiovascular causes, resuscitated cardiac arrest, heart attack, stroke, or urgent hospitalization for chest pain leading to coronary artery procedure) over the course of the study. Colchicine recipients were **23%** ***less likely*** to suffer a major cardiovascular event compared with placebo recipients (hazard ratio = 0.77).[2]

Side Effects

Colchicine is a powerful prescription drug and it isn't for everyone.

Overall, side effects were reported in **16%** of colchicine recipients and **15.8%** of placebo subjects, an insignificant difference.[2]

Diarrhea and flatulence side effects occurred in more colchicine recipients than in those receiving a placebo.[2]

Pneumonia was a rare side effect, though the risk was slightly more than doubled with colchicine compared to a placebo.[2]

What Other Studies Showed

Previous studies have demonstrated similar benefits in people with **pre-existing heart disease**. Among them:

- A **2007** study in patients with stable coronary artery disease showed that **0.5 mg** of colchicine taken twice daily significantly decreased the inflammatory marker **C-reactive protein**, showing how colchicine lowers the inflammation that contributes to heart disease.[6]
- A 2015 study on a similar group of patients revealed that **1 mg** of colchicine followed by another **0.5 mg** dose one hour later significantly reduced levels of highly inflammatory cytokines (signaling proteins) produced in the heart during cardiac catheterization.[7]
- A **2015** analysis of five randomized, controlled trlals involving 1,301 patients showed that **0.5 mg/day** to **1 mg/day** of colchicine reduced the risk of coronary artery disease, stroke, or acute coronary syndrome by **56%** compared with a placebo.[8]

All these studies, including the recent paper published in the *New England Journal of Medicine*, provide evidence that colchicine's **anti-inflammatory** properties protect the heart and lower the risk of cardiovascular events.

Summary

Scientists have turned to **colchicine** as a possible treatment for people with atherosclerosis and heart disease.

A new study has confirmed that colchicine is effective in preventing cardiovascular events—including stroke, new heart attack, and angina (chest pain)—in patients who have recently suffered a **heart attack**.

This comes on the heels of other studies that suggest a similar benefit.

Colchicine is a potent prescription medication. Most studies suggest that low doses of **0.5 mg/day** are safe and effective, though a small number of people may experience side effects.

People with heart disease or at risk for a heart attack or stroke may wish to discuss low-dose colchicine with their doctors. •

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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The History of Colchicine

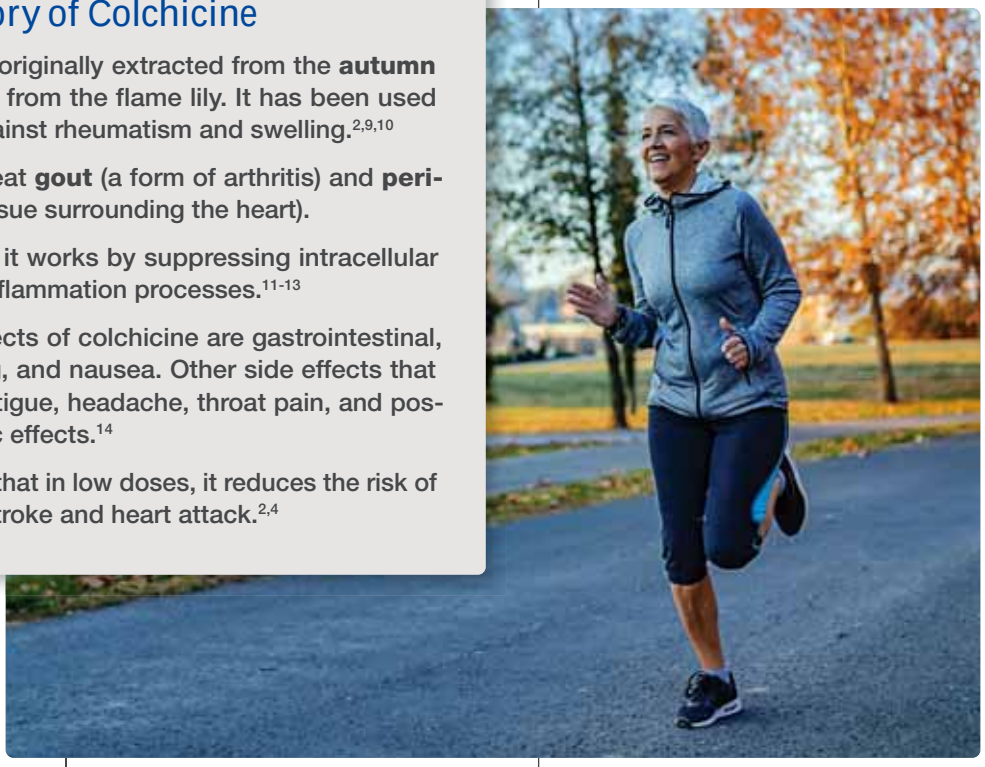
Colchicine is a compound originally extracted from the **autumn crocus** but also obtainable from the flame lily. It has been used since at least 1,500 BCE against rheumatism and swelling.[2,9,10]

It is widely prescribed to treat **gout** (a form of arthritis) and **pericarditis** (inflammation of tissue surrounding the heart).

A potent anti-inflammatory, it works by suppressing intracellular machinery involved in the inflammation processes.[11-13]

The most common side effects of colchicine are gastrointestinal, including diarrhea, vomiting, and nausea. Other side effects that occur less commonly are fatigue, headache, throat pain, and possible endocrine or metabolic effects.[14]

Studies have demonstrated that in low doses, it reduces the risk of cardiovascular events like stroke and heart attack.[2,4]



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Life Without Diabetes

Managing Type 2 Diabetes with Calorie Restriction

BY ROY TAYLOR, M.D.

Type 2 diabetes is a devastating condition that is associated with serious complications like heart disease, blindness, kidney failure, lower-limb amputations, cancer, and more.

Generally, it has been considered an irreversible, progressive disease.

Research by Dr. Roy Taylor, an expert on diabetes, and author of more than 300 scientific papers, asserts a workable strategy for type 2 diabetes is found in something **Life Extension®** has been promoting for years: **calorie restriction**.

After treating people with type 2 diabetes for four decades, Dr. Taylor launched his own important research on the prevention and reversal of type 2 diabetes.

In his new book, *Life Without Diabetes: The Definitive Guide to Understanding and Reversing Type 2 Diabetes*, Dr. Taylor explains the exciting results. He also outlines a surprisingly simple and effective plan that has helped thousands of diabetics to improve their metabolic status.

In this interview with ***Life Extension®*** Dr. Taylor discusses the key research that led him to these discoveries.

—LAURIE MATHENA

LE: A few years ago, you had an insight that showed you diabetes could be reversed in certain individuals. Can you tell us more about that?

Dr. Taylor: For centuries, doctors have regarded type 2 diabetes as a lifelong disease. It is a disease that can cause great misery—threats to eyesight, to limbs, to the heart—and one that just gets worse and worse, needing more and more tablets and eventually, insulin.

Reading scientific journals and keeping up with the latest information about diabetes is part of my job, and I had just turned over a page in one of the leading diabetes publications. The graph hit me between the eyes.

It showed what happened to blood sugar in the days immediately after bariatric surgery in people with type 2 diabetes. The graph line plunged from the usual high level on the day before surgery all the way down to absolutely normal by day seven.

Normal blood sugar levels? In seven days?

That had never been seen before. No other treatment could achieve this dramatic normalization. All the research of the previous few decades seemed to come together in a flash.

LE: You ended up conducting a series of studies that showed that diabetes was reversible in a certain population—but also showed how and why. It all started with what you call the Twin Cycle Hypothesis. Can you explain that?

Dr. Taylor: Ask someone what type 2 diabetes is and they are likely to tell you that the disease is something to do with too much sugar.

It is true that diabetes occurs when there is excess glucose in the bloodstream—with devastating effects on the eyes, feet, heart and brain.

In the normal functioning of the body, the pancreas produces insulin to help the liver [and cells throughout the body] control the supply of glucose to the rest of the body.

When there is excess fat in the liver, however, it responds poorly to insulin, produces too much glucose, and passes on excess fat to the pancreas. As a result of that, the insulin-producing cells of the pancreas cease to function properly.

Once established, these two vicious cycles will interact and reinforce each other. Too much fat from the liver will drive the pancreas cycle, and high glucose levels will eventually force up the insulin levels, driving the liver cycle.

LE: How did you use calorie restriction to test this hypothesis?

Dr. Taylor: The chase was on to find out whether the Twin Cycle Hypothesis was wrong—or right. We would do this by asking people with type 2 diabetes to lose a lot of weight. This meant that a sudden drop in food intake would be the only change, with no other complicating factors such as surgery.

If their blood glucose stayed high, we would have shown the hypothesis to be wrong and we could go back to the drawing board. If their blood glucose normalized, type 2 diabetes would have been shown to be reversible.

LE: Enter the Counterpoint study.

Dr. Taylor: In a working life of testing hypotheses, nothing had paved the way for the starkly clear results of the Counterpoint study.

A group of people with very ordinary type 2 diabetes switched to a low-calorie diet, a simple liquid formula diet with non-starchy vegetables that I designed merely as a tool to find out if the twin cycles

could be reversed.

Within seven days, their levels of early-morning blood glucose had dropped to normal—just like after bariatric surgery. Special tests on liver and pancreas confirmed what the hypothesis had predicted—the fat levels inside these organs decreased.

We had shown that in people who had been diagnosed with type 2 diabetes no more than four years previously, the imagined twin cycles within the liver and pancreas could be reversed.

LE: As the next step, you conducted a follow-up study called Counterbalance to see if blood glucose levels could continue to be controlled after the period of rapid weight loss.

Dr. Taylor: In Counterbalance, rapid weight loss was first achieved in eight weeks using exactly the same diet as Counterpoint; and then we reintroduced normal foods in a stepwise fashion over two weeks.

Over the following six months, our research participants kept their average weight rock steady. At the end of this, everyone who had got rid of their diabetes after the initial weight loss remained non-diabetic.

Just like in Counterpoint, the pancreas woke up after weight loss and started to produce insulin normally again, this time for nine months after the start of the study.

Important for understanding how this happened, liver fat remained really low, at **2%**, and their pancreas fat fell to even safer levels.

LE: Have you seen these results in the real world as well?

Dr. Taylor: When the newspapers, radio, and TV reported on the results of Counterpoint, those affected by type 2 diabetes were extremely enthusiastic; they really wanted to find out for themselves whether or not they could escape from the disease.

We received a huge number of emails from people asking how they could reverse their own diabetes. To cope, we set up a website containing all the practical information and explaining what they could do to try to improve their condition.

A second wave of emails then told amazing stories of individuals who had achieved normal blood sugar levels. Young and old, men and women, rich and poor, living in India, the U.S., South America, Europe, or elsewhere—there was a rich variety of personal stories.

The average weight loss achieved by people armed with the basic information was the same as in Counterpoint—33 pounds.

LE: In your study, you used a liquid diet to achieve rapid weight loss. Could calorie restriction be utilized instead?

Dr. Taylor: If you can't bear the idea of going on liquid formula drinks for several weeks with or without vegetables, you can of course use ordinary foods. You would have to make up meals containing around **200** calories, with no more than **800** calories a day.

LE: Why is rapid weight loss so important?

Dr. Taylor: In the first week of a **700-800** calorie diet, the average weight loss is eight pounds. During the whole eight weeks it is just over 33 pounds.

This might sound rather alarming: is it healthy to cut back so much on eating?

But the hard evidence is that for anyone who has increased their weight during adult life, or has always been overweight, losing the extra weight and then eating

less long-term is of huge benefit to health. In our overfed society, fasting is not usually dangerous, but eating is.

You don't have to lose weight fast to reverse your diabetes, but for most people it's the easiest way of losing the requisite number of pounds.

LE: Does the length of time a person has had diabetes make a difference in being able to successfully reverse it?

Dr. Taylor: Yes. The longer the duration of type 2 diabetes, the lower the likelihood was of getting back to normal glucose control.

The important message is that it's never too late to attempt to reverse your diabetes, although success is not guaranteed. •

EDITOR'S NOTE: For years **Life Extension®** has educated customers about the dangers of elevated blood sugar and the importance of diet. The use of supplements and/or medications is a major factor in the prevention of the damage that elevated blood sugar levels has on tissues, including blood vessels and nerves. For additional information please visit **www.lifeextension.com/diabetes** to read our Diabetes and Glucose Control protocol.

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

ABOUT THE AUTHOR:
Dr. Roy Taylor has been treating people with type 2 diabetes for four decades. He is director of the Magnetic Resonance Centre and an honorary and consultant physician at Newcastle upon Tyne Hospitals NHS Foundation Trust. He is the author of over 300 scientific papers.

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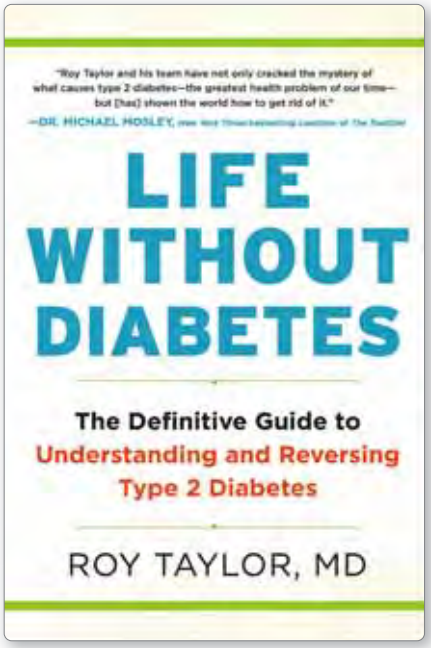

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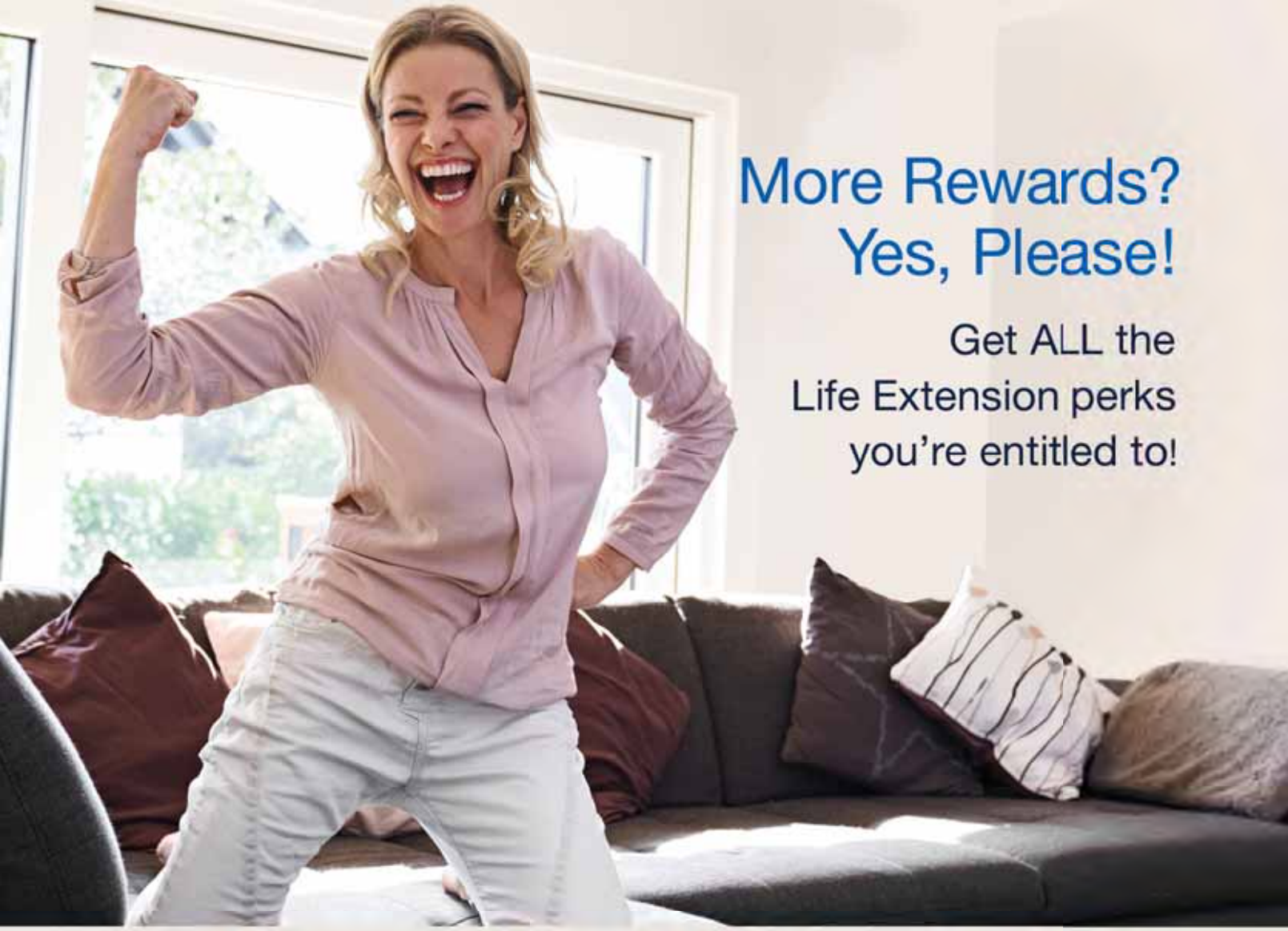

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The Vegetarian Silver Spoon

Originally published in 1950, *The Silver Spoon* cookbook soon became a global best-seller, featuring traditional, home-cooked, Italian dishes.

Numerous offshoots have been published since then, but the recently published *The Vegetarian Silver Spoon* is the first collection of strictly vegetarian dishes.

With more than 200 recipes for healthy, meat-free Italian dishes, *The Vegetarian Silver Spoon* includes ingredients that have come to define Italian cuisine, plus contemporary additions like spelt and buckwheat.

Each recipe is conveniently labeled as being vegetarian, vegan, gluten-free, dairy-free, 30 minutes or less, and five ingredients or less.

Here, ***Life Extension***® features four recipes from *The Vegetarian Silver Spoon* that showcase both the variety and simplicity of traditional Italian, home-style cooking.

—LAURIE MATHENA

Roasted Vegetable Salad

Preparation Time: 20 minutes plus resting time

Cooking Time: 30 minutes

Serves: 4

2 round eggplants (aubergines), sliced ¼ inch (0.5 cm) thick

2 yellow bell peppers

1 red bell pepper

4 tomatoes on the vine

¼ cup (60 ml) extra virgin olive oil, plus more as needed

Leaves from 1 sprig oregano

Salt

Preheat the broiler.

In a very hot grill pan, cook the eggplant (aubergine) slices for 30 seconds per side. Transfer them to a cutting board, cut them into small strips, and place them in a large bowl.

Brush the bell peppers with a little oil and place them on a sheet pan. Broil, turning them to ensure they cook evenly, until charred and softened, 4 to 5 minutes. Remove from the oven (keep the broiler on), transfer to a bowl, cover with plastic wrap (cling film), and let cool. Peel and seed the peppers, then thinly slice the flesh and add it to the bowl with the eggplant.

Lightly oil the tomatoes and place them on a sheet pan. Broil for 5 minutes, turning them over from time to time, until their skin cracks and begins to peel off. Remove from the oven and let cool.

Peel the tomatoes, transfer the flesh to a bowl, and mash with a fork until puréed. Sprinkle with a pinch of salt and drizzle with the olive oil, then add the tomato to the bowl with the eggplant and peppers.

Serve the salad sprinkled with the oregano.

Broccoli, Kale, and Cauliflower Gratin

Preparation Time: 20 minutes

Cooking Time: 45 minutes

Serves: 4

1 medium cauliflower, cut into florets

14 oz (400 g) broccoli, cut into florets

1 bunch Tuscan kale (cavolo nero), leaves stemmed

6 tablespoons (90 ml) extra virgin olive oil, plus more for greasing

3 tablespoons rice flour

1 ⅔ ups (400 ml) unsweetened rice milk

Pinch of freshly grated nutmeg

⅓ cup (50 g) coarsely chopped raw almonds

Scant ⅓ cup (30 g) breadcrumbs

Salt and black pepper

Preheat the oven to 350°F (180°C). Lightly oil a baking dish. Bring a large pot of salted water to a boil. Add the cauliflower and cook for 5 minutes, then use a spider (skimmer) to transfer it to a colander to drain and cool. Repeat with the broccoli, transferring it to a separate colander to drain. Add the kale leaves to the boiling water and cook for 6 to 7 minutes, then drain and run under cold running water to cool. Squeeze out any excess water and chop the kale.

In a small saucepan, heat 3 tablespoons of the olive oil over medium heat. Add the rice flour and toast, stirring continuously, for a few seconds. While whisking, slowly drizzle in the rice milk and whisk until combined. Reduce the heat to low and cook the béchamel sauce for 7 to 8 minutes.

Season with the nutmeg and some salt, then pour the béchamel sauce into a bowl. Add the cauliflower to the béchamel and purée with a hand blender until smooth. Add the kale and almonds, season with salt and pepper, and stir to combine.

In a small bowl, mix the breadcrumbs with the remaining 3 tablespoons oil. Pour the cauliflower-béchamel mixture into the prepared baking dish. Arrange the broccoli on top and sprinkle with the breadcrumbs, then bake for about 30 minutes, until golden brown.

Stuffed Cabbage with Buckwheat and Pumpkin

Preparation Time: 20 minutes

Cooking Time: 1 hour

Serves: 4

½ cup (120 ml) extra virgin olive oil

1½ cups (250 g) buckwheat, rinsed

7 oz (200 g) peeled pumpkin, cut into small cubes

1 clove garlic, finely chopped

Handful of parsley leaves, chopped

⅔ cup (80 g) chopped walnuts

Scant 1 cup (200 mL) vegetable stock

1 small savoy cabbage

1 small red onion, very thinly sliced

Salt and black pepper

In a medium saucepan, heat 2 tablespoons of the olive oil over medium heat. Add the buckwheat and toast, stirring continuously, for 2 to 3 minutes. Add 2½ cups (600 mL) boiling water, reduce the heat to low, and cook for 20 minutes.

In a large frying pan, heat 2 tablespoons of the oil over medium heat. Add the pumpkin, garlic, a pinch of salt, and a scant ½ cup (100 mL) boiling water. Cook until the pumpkin is tender, then transfer it to a medium bowl. Mash the pumpkin with a fork and add the buckwheat, parsley, walnuts, a pinch of salt, and some pepper. Stir well to combine.

In a small saucepan, bring the stock to a boil.

Bring a large pot of salted water to a boil. Discard the outer leaves from the cabbage. Pull off 12 leaves, put them in the boiling water, and blanch for 2 minutes, then drain them and cut out the tough central ribs.

Spread the cabbage leaves out on your work surface (work in batches, if necessary). Divide the buckwheat mixture among the cabbage leaves, placing it in the center of the leaves and folding the leaves over the filling to make small parcels.

In a large nonstick frying pan, heat the remaining ¼ cup (60 mL) oil. Add the onion and 2 tablespoons of the hot stock. Arrange the stuffed cabbage leaves in the saucepan, then add the remaining stock. Cover and cook for 25 minutes, until the cabbage leaves are translucent and the filling is heated through, then serve.

Summer Vegetable Soup

Preparation Time: 30 minutes

Cooking Time: 1 hour 30 minutes

Serves: 4

4 plum tomatoes

1¾ cups (300 g) shelled fresh borlotti beans

3 spring onions, thinly sliced into rounds

¾ cup (150 g) brown rice

10½ oz (300 g) potatoes, peeled and cut into small cubes

10½ oz (300 g) green beans, sliced

1 bunch Swiss chard, coarsely chopped

Leaves from 2 sprigs marjoram

Leaves from 2 sprigs thyme

Leaves from 1 bunch parsley

Leaves from 2 sprigs mint

3 tablespoons wild fennel or fennel fronds

4 to 5 tablespoons (60 to 75 ml) extra virgin olive oil

Salt

Bring a large pot of water to a boil. Add the tomatoes and blanch for 1 to 2 minutes, then drain them and let cool slightly. Peel and seed the tomatoes, then chop the flesh.

In a large saucepan, combine the borlotti beans and 8 cups (2 l) water. Bring to a simmer over medium-high heat, then reduce the heat to low and cook for about 40 minutes. Add a pinch of salt, the spring onions, and the rice and cook for 30 minutes. Add the potatoes, tomatoes, green beans, and chard and cook for about 20 minutes more, until the vegetables are tender.

In the meantime, in a food processor, combine the marjoram, thyme, parsley, mint, fennel, olive oil, and a pinch of salt. Process until well combined.

Let the soup cool slightly and serve warm or let cool completely and serve at room temperature. Top each serving with a spoonful of the herb pesto.

Reprinted from *The Vegetarian Silver Spoon* (Phaidon 2020).

Photo credit: Simon Bajada

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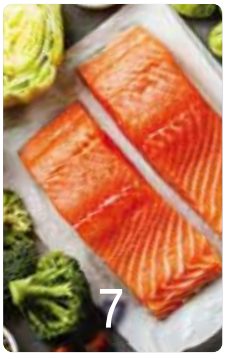

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