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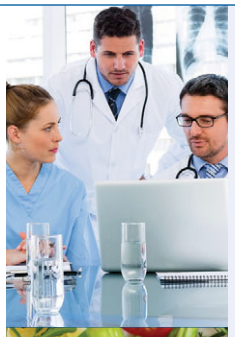

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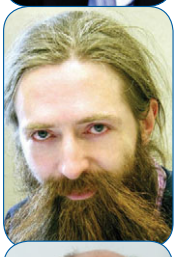
John Boik, PhD, is the author of two books on cancer therapy, *Cancer and Natural Medicine* (1996) and *Natural Compounds in Cancer Therapy* (2001). He obtained his doctorate at the University of Texas Graduate School of Biomedical Sciences with research at the MD Anderson Cancer Center, focusing on screening models to identify promising new anti-cancer drugs. He conducted his postdoctoral training at Stanford University Department of Statistics.



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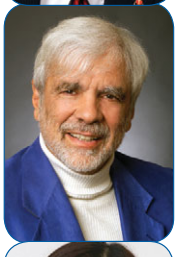

Jonathan V. Wright, MD, is medical director of the Tahoma Clinic in Tukwila, WA. He received his MD from the University of Michigan and has taught natural biochemical medical treatments since 1983. Dr. Wright pioneered the use of bioidentical estrogens and DHEA in daily medical practice. He has authored or co-authored 14 books, selling over 1.5 million copies.

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How **Artificial Intelligence** Can Keep You *Alive and Healthy*

BY WILLIAM FALOON

In **2005** I attended a high-level symposium that sought a solution for an obstacle that was delaying the discovery of cures for human illnesses.

The obstacle is "**information overload.**" Stated simply, there is too much data being published for any single person to read, analyze, and connect it with over **ten million** existing biomedical papers.

The presenters at the 2005 symposium declared there to be enough published data to cure lethal diseases, but no efficient way to tie it together in a meaningful way.

I immediately understood what these computer experts were seeking. The reason was that we at **Life Extension**® had been manually reviewing thousands of published medical studies for decades, and finding ways to circumvent diseases that physicians often diagnosed as "terminal."

For example, prior to this symposium we developed an individual protocol that cured a patient whose oncologists said only had months to live.

Two years after we cured this patient's cancer, a treatment-related side effect manifested. Once again, the doctors said the patient was "terminal." We went back to the **medical library** and used the published literature to identify two existing drugs (pentoxifylline and cabergoline) that cured the **radiation necrosis** that had developed in this patient's brain.

Our staff spent hundreds of hours reviewing thousands of published studies to save this one patient (who has remained alive for the past 17 years).

What if instead of manually trying to connect every scientific paper that relates to a disease, an **artificial intelligence (AI)** system read ***every*** new **biomedical** study and then connected those findings with the **10 million** existing published studies?

From our nearly 40 years of experience, we believe this kind of **AI** technology will generate cures for many diseases via creative use of existing therapies.

I'm pleased to announce that **Life Extension** has partnered with a group called **Insilico Medicine** to develop nutrient formulas (using proprietary AI) to target and neutralize specific pathologies that contribute to degenerative aging.

As We See It

Each year, about 500,000 new papers are published that relate to medicine. While this represents an information renaissance, it also creates a serious dilemma.

What human could read even a fraction of these new studies and then tie them together with more than **10 million** existing biomedical published papers?

An example of challenges in translating a scientific discovery into medical practice can be seen with the drug **metformin**.

Metformin was first described in the scientific literature in **1922**.[1]

Its **sugar-lowering** action was demonstrated in rabbits in **1929**.[2] Metformin was then **forgotten**, as doctors focused on other diabetic treatments such as insulin.

Interest in **metformin** resumed at the end of the **1940s**. After many published reports, it was approved as an antidiabetic drug in **England** in **1958**.[3,4]

Metformin became available to **American** diabetic patients in **March 1995**,[5] which is the identical time when ***Life Extension Magazine®*** added it to a list of drugs to slow **aging**.

We've since published dozens of articles advocating that non-diabetics consider using metformin to prevent and treat cancer, to prevent type II diabetes, and to slow aging processes by activating an enzyme called **AMPK**.[6-19]

If you enter "**metformin and cancer**" into the **National Library of Medicine** database, you will find thousands of published studies talking about its potential use as an adjuvant cancer preventive and treatment.

So from its time of discovery, it took **75 years** for metformin to be approved by the FDA as an antidiabetic drug, with many more years of human research needed to fully validate its ability to protect against other illnesses.

How many *other* drugs already exist that, like **metformin**, have lifesaving mechanisms beyond their "approved" use? We've identified dozens since our inception, including low-dose **aspirin** to protect against cancer and occlusive arterial disease.[20-29]

Taking it a step further, how many other compounds might be combined with **metformin** and **aspirin** to make them work better?[30-32]

An exclusive report from biomedical conferences on **aging** held in **2016** appears in this month's issue.

Urgent Need for Deep-Learning AI

Readers of this magazine cannot wait decades for serendipitous discoveries to transform into routine medical practice.

The solution to finding lifesaving nuggets lies with deep-learning **artificial intelligence** that works around the clock reviewing every published scientific paper using precise analytical tools that enable it to develop effective therapeutic protocols for human review and implementation.

We know this works because we've been doing it manually for nearly 40 years.

A pioneering group called **Insilico Medicine** has developed a way to dramatically speed up our ability to identify nutrients and drugs that not only attack human aging, but also can be used to treat illnesses like heart disease, cancer, diabetes, and others.

The First AI Project

In last month's special issue, I described a drug called **dasatinib** that demonstrated remarkable **age-reversal** properties in a landmark study published in August **2015**.[33]

Dasatinib works by selectively removing **senescent cells** from older bodies. The **2015** study used older mice and found the following benefits when dasatinib was given for just a short period:

- **Frailty symptoms alleviated**
- **Cardiac/arterial function improved**
- **Osteoporosis reduced**
- **Exercise endurance increased**
- **Healthy lifespans extended**

As we age and our immune function declines, we accumulate dysfunctional senile cells that:

- Impede **organ function**[33-39]
- Create chronic **inflammation**[40-42]
- Increase **cancer** risk with age[43-46]
- Shorten healthy **lifespan**[47,48]

There is no value in retaining ***dysfunctional*** senile cells. You want them purged from your body, yet your senescent immune system fails to rid you of them as it did in youth.

We at **Life Extension** (and others including researchers at **Mayo Clinic**) want to rapidly initiate a study to see if **dasatinib** works in elderly people as it did in older mice.

While we wait, over **5,000** Americans perish each day from degenerative diseases,[49] many that involve the accumulation of **senescent cells** in vital tissues. This is where **Insilico Medicine** comes to the rescue.

Using AI to Develop a Natural "Senolytic"

A "senolytic" compound destroys **senescent** cells.

Dasatinib is a drug that has demonstrated powerful **senolytic** properties in the animal model with remarkable **rejuvenation** benefits.[33]

We expect a human study on **dasatinib** to commence soon that should provide quick results since the dosage period may only be three weeks.

In the meantime, it is critical that we do something to safely purge our bodies of **senescent cells** while delaying the conversion of healthy cells to a senescent state so we don't prematurely lose our health.

So we asked the scientists at **Insilico Medicine** to use their proprietary software to analyze what **gene expression** and **cell signaling** pathways can be "triggered" to induce **senescent cells** to self-destruct. Additionally, to prevent our bodies from accumulating more senescent cells over time, Insilico Medicine also looked for pathways that combat cellular stress, a leading cause of senescence.

Insilico Medicine programmed in our specifications and then looked at the "senolytic" effect of hundreds of different **plant extracts**. Over a multi-month period, Insilico Medicine was able to identify the **plant extracts** most likely to provide the greatest benefits.

In this month's issue, you will learn about **Insilico Medicine's** remarkable **AI technology** and a novel botanical formula they developed in collaboration with our scientists.

A Symbiotic Relationship

I've personally interacted with the **Insilico Medicine** scientists over the past year. Their dedication to eradicating pathological aging is nothing short of exhilarating.

The scientists at **Insilico** have long-standing personal commitments to defeating aging. Like many of us at **Life Extension**, they live relatively austere lives and reinvest earned surplus funding into biomedical research.

Insilico Medicine has published papers in prestigious journals with scientists from Harvard, Johns Hopkins, Albert Einstein College of Medicine, Wake Forest Institute for Regenerative Medicine, University of Oxford, University of Basel and other institutions.

Insilico Medicine participates in and organizes many conferences on aging and artificial intelligence including the annual **Practical Applications of Aging Research to Drug Discovery** in Basel, Switzerland, which is sponsored by the Swiss government and attracts only elite scientists.

The chief executive officer at Insilico Medicine, Alex Zhavoronkov, PhD, generously donates his time and expertise to help us identify human **age-reversal** research projects.

While **Insilico Medicine** partners with a host of institutions seeking to develop anti-aging **drugs**, the ***only*** nutritional supplement organization they work with is **Life Extension**. One reason is consistent information exchange that occurs as both organizations seek to rapidly develop validated methods to slow and reverse degenerative processes.

We expect our symbiotic relationship with Insilico Medicine will accelerate the development of novel technologies to circumvent many underlying mechanisms of aging. This was predicted to happen at the **artificial intelligence** symposium I attended back in **2005.**

We are pleased to announce on page **37** of this month's issue, the first nutritional formula designed to help rid our aging bodies of ***dysfunctional*** cells and delay healthy cells from becoming **senescent**.

For longer life,

William Faloon

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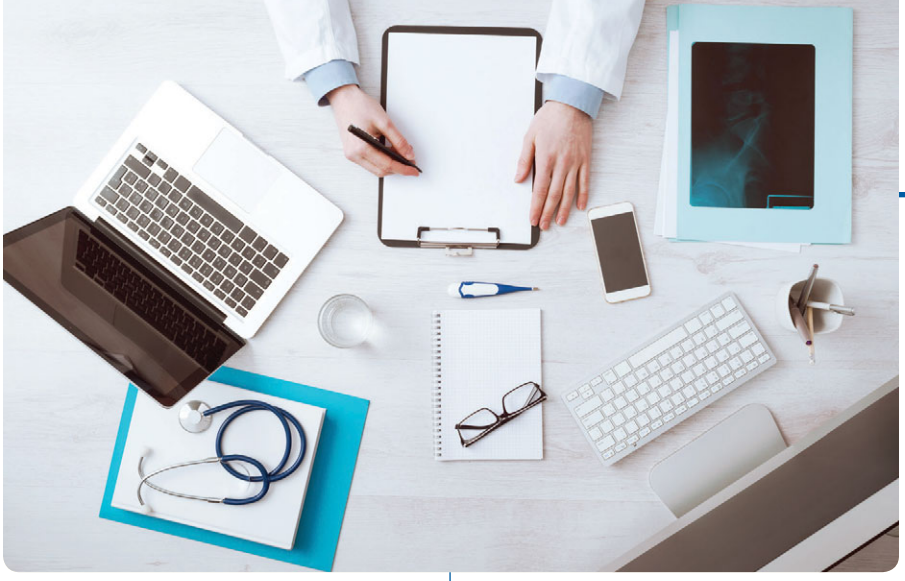

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Reference

* Available at: https://www.ars.usda.gov/ARSUserFiles/80400530/pdf/0506/usual_nutrient_intake_vitD_ca_phos_mg_2005-06.pdf. Accessed September 6, 2016.

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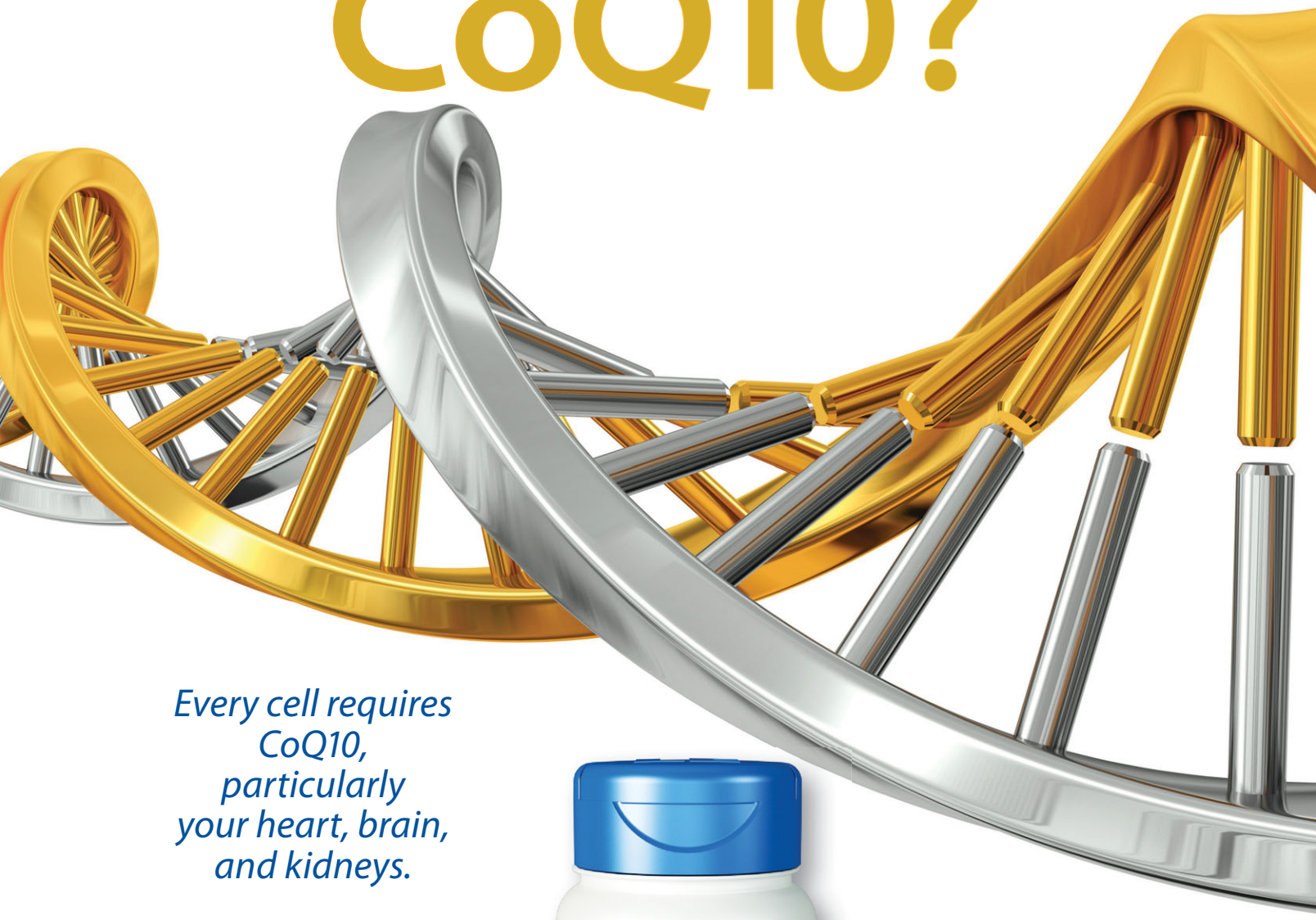

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4 bottles		**$19.50 each**

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Non-GMO
Contains soybeans.

Vitamin K Found to Reduce Arterial Stiffness

A new study has gone a long way in helping to confirm the observed link between **vitamin K** intake and heart health.*

The research, published in the journal *Thrombosis and Haemostasis*, found that a daily **180 mcg** dose of the MK-7 version of K2 reduced arterial stiffness in healthy postmenopausal women over the course of the three-year study. An association was also found with improved vascular elasticity.

Lead researcher Cees Vermeer of the Netherlands' Maastricht University Holding remarked that the study is the first of its kind. "Our data demonstrated that a nutritional dose of vitamin K in fact improves cardiovascular outcomes," he said.

Vermeer and his colleagues employed 244 subjects, roughly half of which were given MK-7 for three years, while the other half took a placebo. Advanced ultrasound technology was used to assess arterial thickness and stiffness. Women who had higher stiffness measures at baseline were seen to have improved carotid artery elasticity over time.

Vitamin K2 protects against soft tissue **calcification**, which is a factor involved in tissue "stiffening" that occurs with normal aging. This may be the first study to show a reversal of these clinical measures of **arterial stiffness** using this long-acting form of **vitamin K2**.

Editor's Note: Cardiologist Dr. Dennis Goodman, director of Integrative Medicine at NYU Langone Medical Center, believes this study could potentially have a dramatic impact on the way we currently view prevention in regard to cardiovascular health. "Further clinical studies will be important to confirm these exciting findings," he says.

* *Thromb Haemost.* 2015 May:113(5):1135-44

Surprising Risk of Hospital Patients Given **Antibiotics**

A study published online by *JAMA Internal Medicine* has found that hospital patients have an increased risk of infection by *Clostridium difficile* if the previous occupant of the bed they're in was given antibiotics.[1]

C. difficile is a bacterium that commonly causes diarrhea in hospital patients, and is responsible for about 27,000 deaths a year in the US. The bacterium's spores can stubbornly survive for months in a hospital setting, and antibiotics can increase patients' susceptibility.

Researchers looked at patients of four New York City hospitals from 2010 to 2015. They zeroed in on patients who had spent at least 48 hours in the first bed they were assigned to after being admitted. The immediately previous patients in those beds had to have spent at least 24 hours there, and had to have left less than a week before the new occupants. It was found that risk of *C. difficile* infection was **0.72%** if the previous bed occupant received antibiotics, compared to **0.43%** if the prior occupant had not been given antibiotics.

Editor's Note: Life Extension® has long recognized the link between poor hospital hygiene practices and in-patient transmission of potentially deadly microorganisms in the healthcare setting. Transmission of microorganisms to hospitalized patients can occur through direct contact with contaminated equipment or as a result of poor nursing technique. For example, despite routine cleaning practices, potentially deadly methicillin-resistant Staphylococcus aureus (MRSA) and other dangerous pathogens have been recovered from a range of surfaces in hospitals, including door handles, computer keyboards, soap dispensers, and sink faucets.[2,3]

Routine cleaning methods may not reliably disinfect the contaminated hospital environment. Although use of disinfectants has been recommended, the available data suggest inconsistent evidence of benefit, likely as a consequence of contamination of detergent and/or inadequate strength of disinfectant.[4] Consistent decontamination in the hospital setting should include aggressive hand-washing by nurses and other patient caregivers, and the use of concentrated solutions of hypochlorite (i.e., bleach) as well as full-strength detergent in the hospital environment.

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Boosting **Glutathione** May Reduce Age-Related Diseases

Aging causes a decline in **glutathione** that leaves people more susceptible to common health problems.

New research shows **N-acetyl-cysteine** could be effective in helping maintain healthy levels of **glutathione**.*

High doses of **N-acetyl-cysteine (NAC)** are often used in medical emergencies to detoxify patients who have ingested poisonous substances. Researchers believe **NAC** could also be used at low doses to block the age-related loss of **glutathione**, which fights commonly encountered toxins.

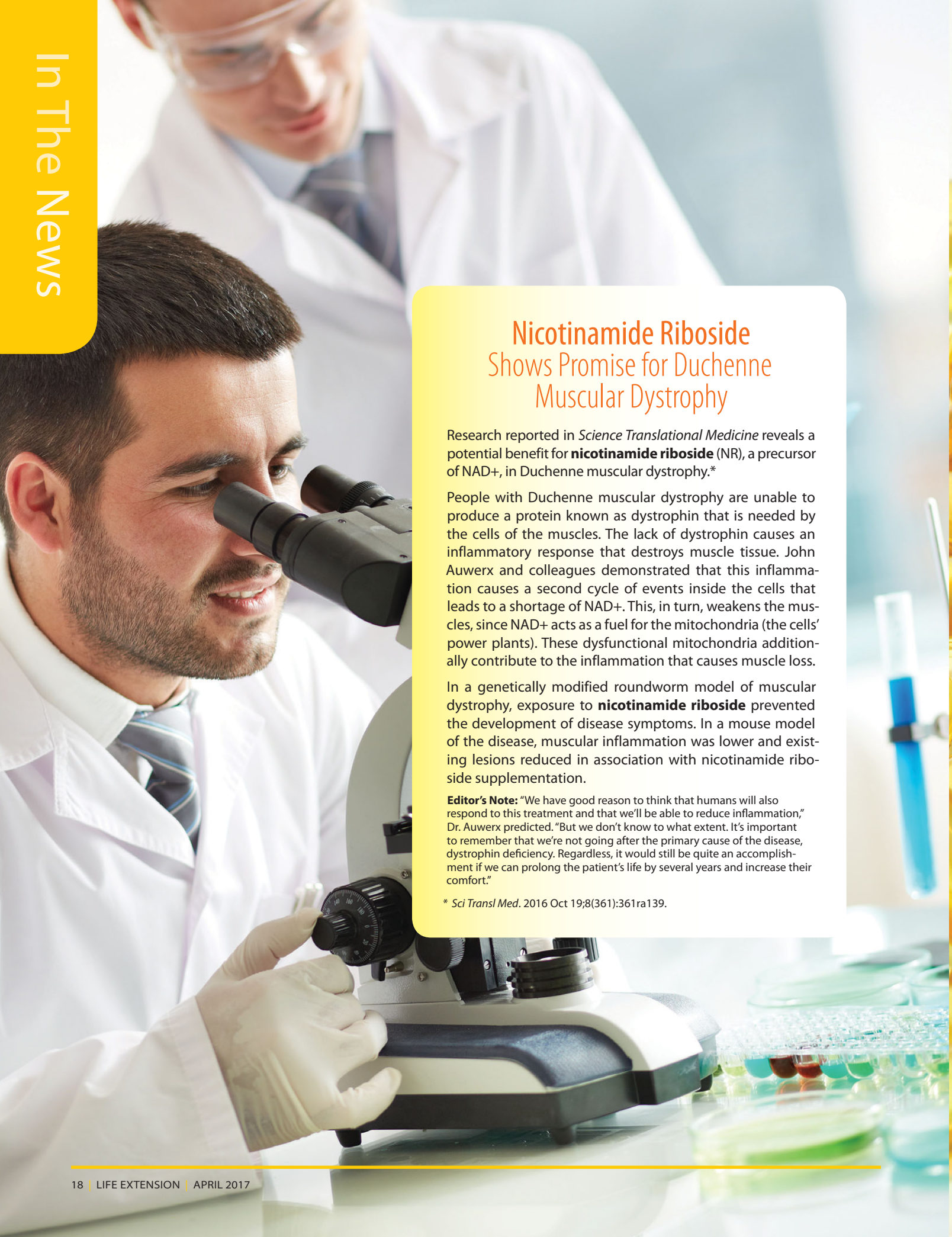
As it relates to detoxification, insufficient glutathione is linked to common causes of death: cancer, diabetes, and cardiovascular disease.

Tory Hagen, lead researcher of the study conducted at Oregon State University, commented, "We've known for some time of the importance of glutathione as a strong antioxidant. What this study pointed out was the way cells from younger animals are far more resistant to stress than older animals. In young animal cells, stress doesn't cause such a rapid loss of glutathione. The cells from older animals, on the other hand, were quickly depleted of glutathione and died twice as fast when subjected to stress."

The study found that pretreatment with NAC raised glutathione in older cells and helped offset cell death.

Editor's Note: "I'm optimistic there could be a role for this compound in preventing the increased toxicity we face with aging, as our abilities to deal with toxins decline," Hagen elaborated. "We might be able to improve the metabolic resilience that we're naturally losing with age."

* *Redox Biol.* 2016 Dec;10:45-52.



Nicotinamide Riboside Shows Promise for Duchenne Muscular Dystrophy

Research reported in *Science Translational Medicine* reveals a potential benefit for **nicotinamide riboside** (NR), a precursor of NAD+, in Duchenne muscular dystrophy.*

People with Duchenne muscular dystrophy are unable to produce a protein known as dystrophin that is needed by the cells of the muscles. The lack of dystrophin causes an inflammatory response that destroys muscle tissue. John Auwerx and colleagues demonstrated that this inflammation causes a second cycle of events inside the cells that leads to a shortage of NAD+. This, in turn, weakens the muscles, since NAD+ acts as a fuel for the mitochondria (the cells' power plants). These dysfunctional mitochondria additionally contribute to the inflammation that causes muscle loss.

In a genetically modified roundworm model of muscular dystrophy, exposure to **nicotinamide riboside** prevented the development of disease symptoms. In a mouse model of the disease, muscular inflammation was lower and existing lesions reduced in association with nicotinamide riboside supplementation.

Editor's Note: "We have good reason to think that humans will also respond to this treatment and that we'll be able to reduce inflammation," Dr. Auwerx predicted. "But we don't know to what extent. It's important to remember that we're not going after the primary cause of the disease, dystrophin deficiency. Regardless, it would still be quite an accomplishment if we can prolong the patient's life by several years and increase their comfort."

* *Sci Transl Med*. 2016 Oct 19;8(361):361ra139.

Vitamin E Could Help Protect Older Men from Pneumonia

An article in the journal *Clinical Interventions in Aging* reported a protective role for **vitamin E** against pneumonia in older men.*

Dr. Harri Hemilä analyzed data from the Alpha-Tocopherol, Beta-Carotene (ATBC) Cancer Prevention Study conducted in Finland from 1985-1993. The trial included 29,133 men between the ages of 50 to 69 years who smoked at least five cigarettes daily upon enrollment. Participants received vitamin E, beta carotene, both supplements, or a placebo for five to eight years.

The current study was limited to 7,469 ATBC participants who started smoking at age 21 or older. Among this group, supplementation with vitamin E was associated with a **35%** lower risk of developing pneumonia in comparison with those who did not receive the vitamin. Light smokers who engaged in exercise had a **69%** lower risk compared with unsupplemented members of this subgroup.

Editor's Note: Among the one-third of the current study's population who quit smoking for a median of two years, there was a **72%** lower risk of pneumonia in association with vitamin E supplementation. In this group, exercisers who received vitamin E experienced an **81%** lower pneumonia risk.

* *Clin Interv Aging*. 2016 Oct 3;11:1379-1385.

Surgeon Who Specializes Could be Best for the Job

A new retrospective analysis shows that the best surgeon for the job is one who specializes in that particular operation.*

More than 695,000 operations performed by 25,152 surgeons were analyzed for the study, published in the July 2016 issue of *The BMJ*. Researchers focused on eight complex cardiovascular and cancer surgical procedures, which, pre-study, had mortality rates of from **1%** to **7%**.

For six of the eight types of procedures, patients were found to have a lower risk of dying when that particular operation made up a large proportion of overall operations done by the surgeon.

The study authors, using the example of heart valve replacement, say their results suggest that a doctor who performs that procedure and no other 20 times may end up with better outcomes than a surgeon who does 40 heart valve replacements among a mix of 60 other types of procedures.

Editor's Note: The question of why mortality rates are lower for operations performed by more specialized surgeons was not considered by the study. Researcher and Harvard University fellow Nikhil Sahni said, "Doctors may be better able to keep abreast of evolving science and surgical techniques as they specialize. Or perhaps specialists avoid the distraction that comes from switching between multiple procedures."

* *BMJ*. 2016 Jul 21;354:i3571.

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BY MICHAEL CAMPBELL

Newly Discovered Longevity Benefits of Mediterranean Diet

A study published in the ***New England Journal of Medicine*** showed that following a **Mediterranean diet** contributed to a **30%** reduction in the combined risk of acute heart attack, stroke, or cardiovascular death.[1]

This study further validates that a Mediterranean diet is an effective **health intervention** capable of significantly lowering cardiovascular disease risk.

While it is now clear that following a Mediterranean diet leads to cardiovascular benefits, researchers continue to examine how the diet provides such strong protection.

New studies reveal that the high content of **polyphenols** found in the foods that comprise the **Mediterranean diet** is a key factor in its ability to reduce the risk of dying.[2-4]

The beneficial impact of a **healthy diet** on human physiology remains grossly underappreciated.

Virtually ***every*** degenerative disease can be favorably influenced by dietary intervention. Yet modern medicine relies almost exclusively on **prescription drugs** to treat chronic illnesses.

The challenge is that many people feel "addicted" to food groups that are highly toxic. The good news is that following a lifesaving **Mediterranean diet** does not require deprivation of delicious foods, and the healthy **polyphenols** can be obtained in dietary supplements.

In a recent study presented at the **European Society of Cardiology Congress 2016**, researchers looked at survival rates of **cardiovascular disease** patients who followed a **Mediterranean-style** diet.

The study tracked 1,197 people over seven years. It found that those who most closely followed a **Mediterranean diet** died **37%** less often than those with the least compliance with the diet.[5]

A separate analysis of 92 studies involving about 200,000 people found that **statin** (cholesterol-lowering) drugs reduce the risk of death by **18%** in those with cardiovascular disease.[6]

Although these are not directly comparable studies, they nevertheless suggest that a **healthier diet** is more effective in keeping those with pre-existing cardiovascular disease alive.

These findings were presented at the world's ***largest*** conference on cardiovascular disease. Scientists at this conference hailed the new findings as "***extraordinary,***" showing that adhering to a Mediterranean diet is "***more powerful than any drug.***"[7]

This is not the first report showing reductions in **mortality** in those who follow a **Mediterranean-style** diet. Food/drinks that comprise this diet provide plant **polyphenols** along with **olive oil** and **omega-3**s, all of which have been shown to confer longevity.

Another feature of a Mediterranean-style diet is that it's low in foods that are harmful, such as **meats**. A growing body of data implicates heavy meat eating with a host of degenerative illnesses such as **Alzheimer's dementia** and **chronic kidney disease**.[8]

Proving Cardiovascular Benefits of Mediterranean Diet

A study published in the *New England Journal of Medicine* utilized the preferential full, randomized, controlled study design.[1]

Called **PREDIMED** (PREvención con DIeta MEDiterránea), the study involved 7,447 women (aged 60 to 80) and men (aged 55 to 80) who were at a *high cardiovascular risk* but did not have cardiovascular disease when they enrolled in the study.

Subjects were randomly assigned to one of three groups:

- **Mediterranean diet** plus 4 tablespoons of extra virgin olive oil daily
- **Mediterranean diet** plus one ounce of nuts daily
- Control diet

By the end of the study, both Mediterranean diet groups experienced a significant **30% reduction** in the combined risk of acute heart attack, stroke, or cardiovascular death over the five-year period, compared with the control group.

What is compelling about these findings is that the people in the Mediterranean diet groups had fewer dietary restrictions compared with the control group, and none of the groups restricted their caloric intake or boosted their exercise at all. (See Table 1 on page 29 for more foods contained in Mediterranean-style diets.)

More importantly, this study validated the Mediterranean diet as a true health intervention that can significantly lower cardiovascular disease risk.

This is a **radical advance** over many previous studies, which could only show correlation between diet and heart disease risk.

Why the Mediterranean Diet is so Beneficial

While this study demonstrated the benefits of the diet itself, it did not evaluate how it conferred this protection.

The researchers believe, however, it was likely due to the high amounts of **polyphenols** found in the typical Mediterranean diet. Based on calculations from Phenol-Explorer, a comprehensive database on polyphenol content in foods, the diet used in the study delivered an approximate **1,500 mg** of total combined **polyphenols** daily.[9]

Plant **polyphenols** are complex biological molecules produced by natural processes. More than **8,000** different polyphenol compounds have been identified in plants, with several hundred readily available in edible plants.[2]

While best known for their ability to fight and protect against oxidative stress, polyphenols have numerous other properties. These include anti-inflammatory, anticarcinogenic, antidiabetic, antiobesity, and antiallergic properties, along with liver and stomach protective effects.[2]

Epidemiological studies compellingly demonstrate the clinical impact of these mechanisms in preventing cardiovascular and neurodegenerative diseases, as well as certain cancers.[2,10-20]

In order to determine if **polyphenols** were in fact the reason for the dramatic risk reductions in cardiovascular disease and death in those following a Mediterranean diet, the researchers conducted two sub-studies as part of the original PREDIMED randomized controlled trial. Each study evaluated the connection between polyphenols and a risk factor for cardiovascular disease.

Let's examine each study.

Polyphenols Reduce Blood Pressure

The first study evaluated a subgroup of 200 people from the PREDIMED study.[3] The researchers examined the impact of the two Mediterranean diets (one with extra virgin olive oil and one with nuts) on **blood pressure** at the start of the study, and after just one year of being on the diet.

Their goal was to determine if there was a connection between polyphenol levels and blood pressure.

They found that those patients on either of the two Mediterranean diets experienced significant reductions in both diastolic and systolic blood pressure compared with those on the control or non-Mediterranean diet.

What's more, these blood pressure reductions were associated with significant increases in total urinary **polyphenols** as well as plasma **nitric oxide** (NO) levels.[3] Endothelial *nitric oxide* is the body's natural blood-vessel relaxant, and is a biomarker of good cardiovascular function and healthy aging.[21]

This study gives us our first clue as to *how* the polyphenols in the Mediterranean diet promote healthy aging and protection against cardiovascular disease: by directly improving vascular function and reducing blood pressure.

An additional follow-up study provides insight into another key mechanism of action.

What You Need to Know

Mediterranean Diet Reduces Heart Disease Risk

- **Epidemiologic studies have long suggested that those who consume a Mediterranean diet have lower risks for cardiovascular disease and death.**
- **A large European study called PREDIMED has now demonstrated that the Mediterranean diet, when used as a true health intervention, reduces cardiovascular disease and death risks by 30% compared with a standard low-fat diet.**
- **Related studies show that polyphenol consumption is a major factor in reducing cardiovascular risk, and that the polyphenols in the Mediterranean diet directly produce reductions in cardiovascular risk factors.**
- **Supplementing with polyphenols helps ensure we are getting adequate amounts of these important nutrients.**

Polyphenols Reduce Inflammation

To learn more, researchers followed a subset of 1,139 subjects in the PREDIMED study in order to determine if polyphenol levels were connected with inflammatory markers.[4]

Chronic **inflammation** is a recognized fundamental contributor to cardiovascular disease, and **polyphenols** are known anti-inflammatory agents, so this was a sensible area of investigation.

At the end of one year, subjects with the greatest increases in urinary **polyphenols** had significantly lower levels of five important markers of **inflammation** that correlate with cardiovascular risk. These include:

- Vascular cell adhesion molecule-1 (VCAM-1),
- Intercellular adhesion molecule-1 (ICAM-1),
- Interleukin-6 (IL-6),
- Tumor necrosis factor alpha (TNF-alpha), and
- Monocyte chemotactic protein-1 (MCP-1).

In addition, subjects with the greatest rise in **polyphenol** levels had significantly lower systolic and diastolic blood pressure, and significantly *increased* levels of beneficial HDL cholesterol, compared with those with the lowest polyphenol elevations.

It is clear from these studies that the **polyphenols** in the Mediterranean diet account for a large proportion of its value in preventing catastrophic heart disease, stroke, and cardiovascular deaths.

Polyphenols Reduce Risk of Dying

One of the most compelling studies on polyphenols was one published in the *Journal of Nutrition* showing that polyphenol intake reduces the overall risk of dying.

This study examined the natural intakes of polyphenols in 807 men and women aged 65 years and older using a measurement of **total urinary polyphenols**.[2]

Mediterranean Diet Reduces Brain Shrinkage

It's a sad fact of biology that our brains shrink as we age. But a new study published in the journal *Neurology* has shown that those who followed the Mediterranean diet—primarily composed of fruits, vegetables, beans, olive oil and moderate amounts of fish and red wine—experienced reduced brain shrinkage.[50] This finding implies longer enhanced cognitive health and adds a new item to the long list of health benefits achieved by those who follow the diet.

Researchers from Scotland's University of Edinburgh, led by Michelle Luciano, PhD, investigated the effects of the Mediterranean diet on brain volume. They found that subjects who stuck the closest to the diet had just half the brain shrinkage suffered by their less diet-faithful counterparts over the course of the three-year study.

"As we age, the brain shrinks and we lose brain cells, which can affect learning and memory," remarked Dr. Luciano. "***This study adds to the body of evidence that suggests the Mediterranean diet has a positive impact on brain health***."[51]

Remarkably, the diet-faithful subjects, ages 73 to 76, gained the cognitive benefits regardless of their original level of intellect or education.

The study didn't find that greater fish consumption vs. lesser meat consumption correlated with reduced brain shrinkage, as has been suggested by some past research. Rather, the authors are in agreement with many other researchers who suggest it's specifically the **plant-based** foods which make up the majority of the Mediterranean diet that are collectively responsible for the improved brain health.

The subjects provided 24-hour urine specimens at baseline, and were then followed up for **12 years**.

By the end of the study, it was clear that those who had begun the trial with the highest total urinary polyphenols (indicating the highest actual circulating levels of polyphenols in the blood) had lower **all-cause mortality**, compared with those with the lowest levels.

TABLE 1: Mediterranean and Control Diet Used in PREDIMED Study[1]

A. Mediterranean Diet – 37% lower mortality	
Recommended Foods	**Goal for Consumption**
Olive Oil	At least 4 tbsp./day*
Tree nuts and peanuts	At least 3 servings/week
Fresh Fruits	At least 3 servings/day
Vegetables	At least 2 servings/day
Fish (especially fatty fish) and seafood	At least 3 servings/week
Legumes (beans)	At least 3 servings/week
White meat	Instead of red meat
Wine with meals (optional)	At least seven glasses/week
Foods to Be Discouraged	**Goal for Restriction**
Soda drinks	Less than one/day
Commercial baked goods, sweets, pastries	Less than 3 servings/week
Spreadable fats (butter, etc.)	Less than one serving/day
Red and Processed meats	Less than one serving/day

B. Control Low-Fat Diet – Inferior to Mediterranean Diet	
Recommended Foods	**Goal for Consumption**
Low-fat dairy products	At least 3 servings/day
Bread, potatoes, rice, pasta	At least 3 servings/day
Fresh Fruits	At least 3 servings/day
Vegetables	At least 2 servings/day
Lean fish and seafood	At least 3 servings/week
Foods to Be Discouraged	**Goal for Restriction**
Vegetable oils	Not more than 2 tbsp./day
Commercial baked goods, sweets, pastries	Not more than one serving/week
Nuts and fried snacks	Not more than one serving/week
Red and Processed meats	Not more than one serving/week
Visible fat in meats and soups	Always remove
Fatty fish, seafood canned in oil	Not more than one serving/week
Spreadable fats (butter, etc.)	Not more than one serving/week

A) Mediterranean diet with added nuts or olive oil. B) Control, low-fat diet based on standard dietary guidelines. Note the greater restrictions of the control diet, and the more liberal parameters of the Mediterranean Diet.

*__Olive oil polyphenols__ can be obtained in supplements for those who don't want to eat this much extra-virgin olive oil.

Intriguingly, this worked out to an overall **30%** reduction in the risk of ***dying*** for those in the highest third of urinary polyphenols compared with those in the lowest third.

This study demonstrates that higher overall polyphenol intake is associated with a significantly lower ***risk of dying***.

Summary

A *New England Journal of Medicine* paper showed that the Mediterranean diet can reduce the risk of cardiovascular events—including death—by **30%**.

This was not an epidemiologic study showing simple correlation, but instead was a true intervention study, from which one can conclude that the **diet** produced the observed health benefits.

Follow-up studies showed that a large part of the cardiovascular protective effect of the Mediterranean diet comes from its high concentration of **polyphenols**.

Life Extension has long recommended that people make every attempt to follow a **Mediterranean**-style diet. Studies cited in this article provide startling validation that eating these healthy foods confers significant longevity benefits.

It can be challenging, however, to adhere constantly to the Mediterranean diet. By supplementing with specific **polyphenols**, we can be sure we're getting enough of these critical plant nutrients to benefit from their cardioprotective effects. ●

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

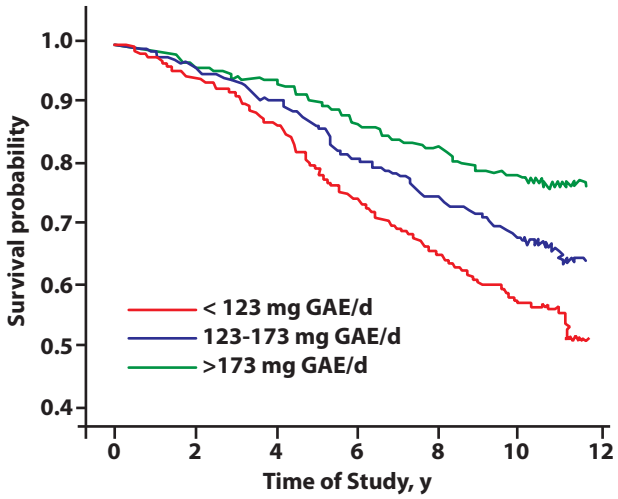

FIGURE: Higher Urinary Polyphenols Promote Longer Survival[2]

Survival graph showing the probability of survival at each year of the 12-year study, according to low (red line), middle (blue line) and high (green line) urinary polyphenol levels. GAE (gallic acid equivalents) are a standardized measure of polyphenol activity.

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(References continued on page 32.)

The studies described here clearly show the many benefits of consuming **polyphenols** as part of a typical **Mediterranean diet**.

The problem is that many of us find it difficult to adhere closely enough to the Mediterranean diet to get an optimal array of these essential plant compounds.

For example, a report from the Centers for Disease Control and Prevention (CDC) shows that Americans are not meeting their intake of fruits and vegetables.[22]

According to this report, during 2007-2010, **87%** of Americans did not meet vegetable intake recommendations and **76%** did not meet fruit intake recommendations.

In addition to these, other components of a Mediterranean diet (i.e., nuts and beans) are also known to be below the recommended intake by the American population,[23,24] making supplementation with polyphenols especially critical.

Many studies have now been published on the relationship between polyphenols common in the Mediterranean diet and cardiovascular protection.[3,4,25-28] These studies show a wide range of effects, depending on the specific food studied, and on the particular spectrum of polyphenols it contains.

Here is a brief summary of the polyphenols from each of the main foods found in typical Mediterranean diets, along with how they beneficially impact cardiovascular health.

Most Important Mediterranean Polyphenols

Artichoke Extracts

Artichokes are a staple of the Mediterranean diet. Artichoke extracts (made from the leaf, stem, and root of artichokes) have been found to have numerous cardioprotective effects. For example, they have been shown to inhibit cholesterol synthesis and LDL oxidation.[29,30]

Grape Seed Extract

Grape seed extracts are loaded with polyphenols, and numerous studies have testified to their ability to protect heart health on multiple levels.

For example, grape seed extracts reduce levels of oxidized low-density lipoprotein (OxLDL) cholesterol, which is one of the earliest triggers of atherosclerosis. They also prevent oxidized LDL from binding to its receptor on endothelial cells, a highly vascular-protective effect.[31,32]

Other studies have shown their ability to prevent the death of cardiac muscle cells,[33] activate eNOS (the enzyme responsible for producing nitric oxide),[34,35] and prevent the development of low-grade inflammation by inhibiting production of inflammatory signaling molecules (cytokines). This is significant since low-grade inflammation contributes to atherosclerosis and cardiovascular risk.[36]

Lentil Polyphenol Extract

Lentils comprise a large part of the Mediterranean diet and are a good source of fiber, B vitamins—and, of course, polyphenols. Extracts made from lentils have been found to prevent high blood pressure induced by the hormone angiotensin-II, a vessel-constricting signaling molecule. This action helps protect against arterial narrowing.[37]

Olive Leaf Extract

Olives are perhaps one of the most central components of the typical Mediterranean diet. Polyphenol extracts from the olive leaf have been shown to potently protect cultured heart muscle cells from destruction caused by an intense oxidant chemical challenge.[38] They also decrease tissue damage by such oxidative stress, while boosting intracellular resistance systems.[39]

In a rat model of metabolic syndrome, these extracts were shown to improve or normalize abdominal and liver fat accumulation, excessive collagen deposition in the heart and liver, cardiac stiffness, poor glucose tolerance, and abnormal lipid profiles.[40]

Pecans

Pecans have been associated with reductions in cardiovascular disease risk. This is in part because they play an important role in reducing LDL cholesterol.[41] Research also shows that they boost plasma antioxidant capacity in the critical after-meal period, which helps to decrease the dangerous oxidation of LDL cholesterol that leads to atherosclerosis.[42]

Pomegranate Peel Extracts

Pomegranates are known to be one of the healthiest fruits on earth. Extracts from pomegranate peel have a variety of anti-inflammatory effects that are especially beneficial for people at risk for cardiovascular disease.[43]

Studies show that pomegranate peel extracts increase resistance to oxidative stress in animals with high cholesterol levels.[44,45] They reduce the accumulation of oxidized LDL cholesterol in so-called "foam cells" that are found in the very early stages of atherosclerosis, shrinking plaque sizes by up to **39%**.[46]

They also powerfully promote the flow of cholesterol ***out of*** these cells by **147%**. This important action helps reduce the overall cholesterol burden.[45]

Walnut Extracts

Walnuts are one of the most important food sources of polyphenols.[47] Extracts from these flavorful nuts have been found to inhibit LDL oxidation in human plasma, an action that reduces the amount of this highly inflammatory compound.[48] Walnuts also induced a **55%** reduction in plaque development in the aorta of supplemented mice, while also lowering plasma triglycerides by **36%**, cholesterol by **23%**, and prothrombin (an enhancer of blood clot formation) by **21%**, compared to controls.[49]

Combined, all of these foods provide a broad spectrum of unique polyphenols that provide many of the key health benefits of the Mediterranean Diet. While it may be difficult to obtain all these food groups in a given day, there are now extracts that provide concentrated polyphenol benefits to induce the benefits of the Mediterranean diet.

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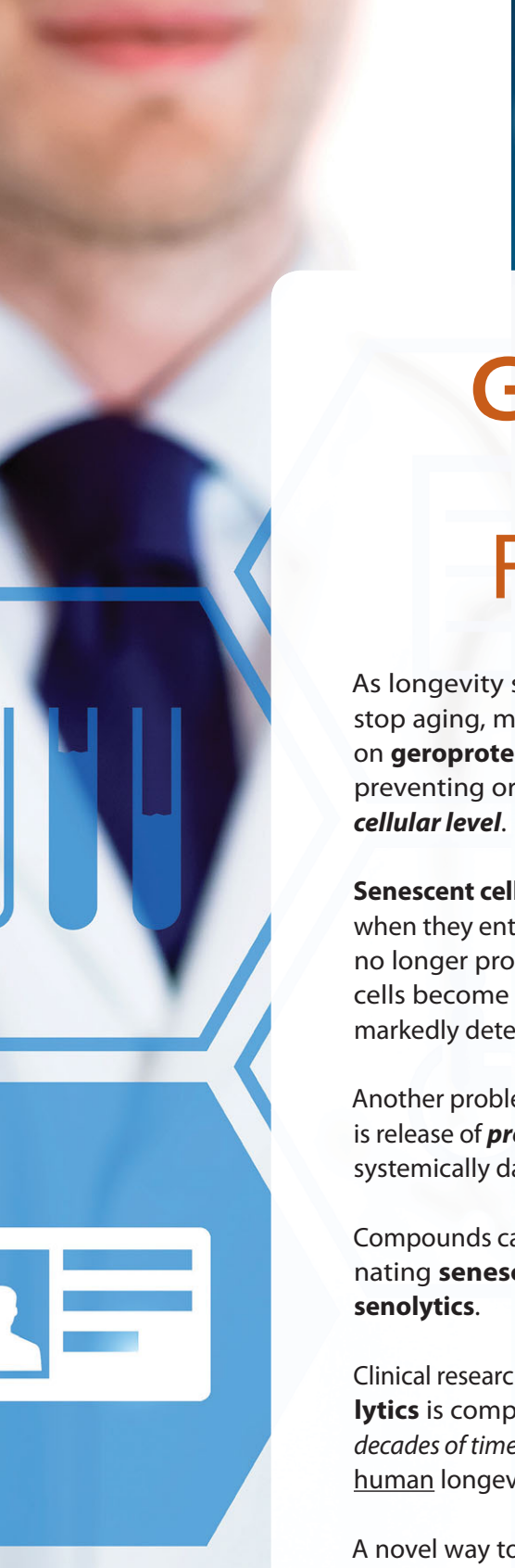


GEROPROTECTORS: *Next* Frontier in Fight Against Aging

As longevity scientists look to target and stop aging, many researchers are focusing on **geroprotectors**, compounds capable of preventing or even reversing aging ***at the cellular level***.

Senescent cells are particularly troublesome when they enter the stage in which they can no longer properly divide and function. As cells become ***dysfunctional***, organ health markedly deteriorates.

Another problem caused by **cell senescence** is release of ***proinflammatory cytokines*** that systemically damage tissues.

Compounds capable of identifying and eliminating **senescent cells** are categorized as **senolytics**.

Clinical research on **geroprotectors** and **senolytics** is complicated by the fact that *many decades of time* may be required to determine human longevity benefits.

A novel way to accelerate the research is via the strategic use of high-speed computer programs employing **artificial intelligence biomedical algorithms**. This technology has advanced to where it can *identify* natural compounds that activate *anti-aging pathways* throughout the body.

Seeing the enormous potential of this kind of deep-learning artificial intelligence, **Life Extension®** has partnered with **Insilico Medicine** to identify nutrient cocktails that function as **geroprotectors**. The objective is to develop better ways to potentially slow or even stop certain aspects of aging processes.

This scientific collaboration has resulted in the identification of a **geroprotector** formulation consisting of four nutrients with various complementary and reinforcing properties. These include effects on cell ***signaling*** pathways with the potential to *prevent* the degenerative progression of damaged cells to a senescent state—and *eliminate* those that have reached irreversible senescence.[1,2]

With the discovery of geroprotective compounds, there are now greater opportunities to more effectively intervene into cellular aging processes.

By harnessing **artificial intelligence** advances with existing scientific data, a powerful new weapon to combat degenerative aging has emerged.

Using Artificial Intelligence to Solve Aging

Life Extension and **Insilico Medicine** researchers ran computer simulations of more than 200 potential geroprotective compounds and narrowed the list down to four.[1,2] While most of these candidates were known natural nutrients, their full potential as geroprotectors remained elusive.

Scientists found that all four of these nutrients work together, but in very different ways, to beneficially influence key anti-aging pathways. Together, they combat numerous aging factors throughout the body.

These compounds all *modulate* specific biological pathways responsible for keeping us young and healthy.

When combined, these ingredients promote anti-aging mechanisms at the cellular level throughout the body, acting by multiple pathways, some unique, and some overlapping.

Together, these four natural compounds represent the beginning of the future: anti-aging cocktails identified using artificial intelligence under expert human supervision.

Geroprotectors and Senolytic Agents Extend Lifespan

The concept of ***geroprotection***, meaning prevention of cells from entering an aged, senescent, inflammation-promoting state, originated in Soviet-era Russia in the late 1970s.

Modern science has uncovered a variety of natural substances capable of extending healthy lifespan, and these agents have been called ***geroprotectors***.

Scientists then discovered that several of these nutrients function as ***senolytic*** agents.

The term ***senolytic*** means the removal of useless senescent cells from tissues.[3,4] **Cellular senescence** is characterized by the aged cell's inability to divide, yet the senescent cell continues to generate a variety of *proinflammatory compounds* as well as other harmful cellular mediators that can potentiate damage to healthy tissues.

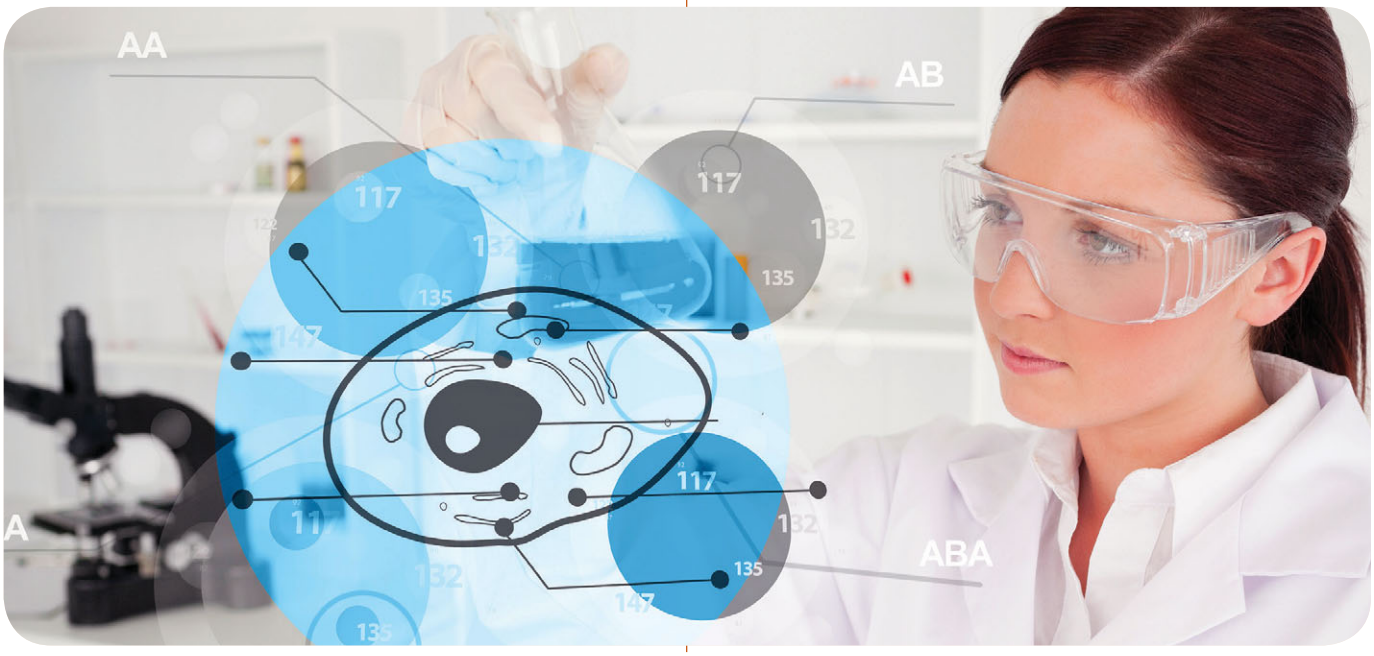
Cancer researchers were first intrigued by the idea of developing **senolytic** drugs that could selectively kill malignant cancer cells without damaging normal cells in the body.[5,6]

Based on this research, scientists have realized that **senolytics** can enhance healthspan by ***eliminating*** aging cells from our tissues, making room for newer, active cells that support youthful tissue, organ, and systems functioning. The result is a younger, healthier and better-functioning body.

Why should we care about getting rid of these senescent cells?

Because they contribute to virtually all known age-associated disorders: heart disease, stroke, cancer, diabetes, obesity, liver and kidney disease, osteoporosis, and neurodegeneration.[4,7-22] In fact, senescent cells have recently been labeled ***"…drivers of age-related pathologies."***[22]

There's already evidence that removing senescent cells from old animals through nutrients and drugs promotes longevity and improves the function of aging body systems.[4]



Overlap and Unique Pathway Activation

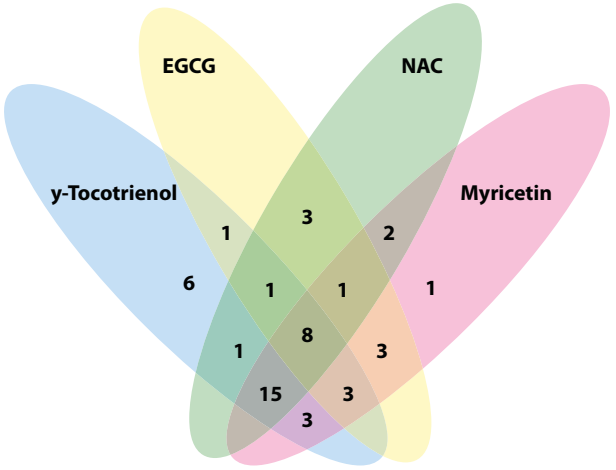


Figure 1. The numerals within the diagram indicate the number of pathways activated by the four short-listed nutrients.

Using sophisticated genetic engineering, scientists in **2011** showed they could identify and eliminate senescent cells in mice that naturally age rapidly.[23] After lifelong administration of this therapy, senescent cells were swept clean from fat, muscle, and eye tissues, resulting in delayed onset of age-related disorders in those areas. Furthermore, treating mice late in life slowed the progression of such disorders that had already appeared.

Following up on this initial research, the same group in **2016** showed that clearing senescent cells using this approach delayed cancer development and slowed age-related deterioration of kidney, heart, and fat tissues, and extended median lifespan in mice.[24]

Similar findings resulted from a **2015** study using existing drugs and nutrients, in this case the combination of **dasatinib** (a cancer drug) plus the polyphenol nutrient **quercetin**.[4] Lab studies showed that this combination reduced the numbers of senescent cells in normally aged mice and in age-accelerated mice, as well as in those exposed to radiation.[4]

This study showed that in the living animals, healthspans were also improved, as determined by scores of age and wellbeing and by individual symptom scores for common symptoms of aging. (Figure 2 on next page.)

What Are Signaling Pathways?

Researchers from Insilico Medicine identified nutrients based on their abilities to modulate certain biochemical ***signaling pathways*** that control development of cellular senescence.[1,2] To grasp the breakthrough nature of this approach, it's vital to understand what biologists mean by "***signaling pathways***."

Cells need to send and receive information about their environment, nutrient status, stress level, and

What You Need to Know

The Remarkable Potential of Geroprotectors

- **The discovery of ways to counteract *cellular senescence* is ushering in a new era in health promotion and disease prevention.**
- **Senescent cells are old cells that have lost the ability to replicate, but instead of dying, they hunker down in tissues and secrete proinflammatory substances that promote aging throughout the body.**
- **Many stimuli trigger cells to become senescent, including oxidative stress, DNA damage, mitochondrial dysfunction, elevated blood glucose, and others.**
- **Because the senescence-promoting stimuli are the same throughout the body, and because those stimuli operate via a number of known biochemical signaling pathways, it has now become possible to slow aging in all tissues of the body at once.**
- **This ability is especially pronounced in a handful of nutrients called *geroprotectors*.**
- **These geroprotective nutrients were characterized through a computer algorithm that compared senescence-promoting pathways with those modulated by each of hundreds of candidate compounds.**
- **The "final four" compounds, myricetin, NAC, gamma tocotrienol, and EGCG each modulate a different but overlapping set of signaling pathways.**
- **Separately and together, these compounds work to slow cellular aging in all tissues in the body.**
- **Supplementing with these nutrients in combination seems likely to reduce the body's burden of senescent cells, promoting youthful function and preventing not one or two, but literally all of the known age-related disorders that threaten human lifespan and healthspan.**

many other important factors. Without this constant communication, cells could not perform their various life-sustaining duties.

Cells communicate by producing and sending vast amounts of ***signaling molecules***, and receiving other molecules at specific receptors on their membranes and in their nuclei. This network of molecular events is called a ***signaling pathway***.[25] When beneficial pathways fail, or destructive ones prevail, cells are pushed toward the senescent state,[26] and degenerative aging processes begin to unfold.

By studying signaling pathways that influence development of cellular senescence, scientists can target specific pathways to slow progression of senescence and decrease the number of senescent cells. With the help of artificial intelligence and technology, we can determine which pathways are modulated by a single nutrient—and how nutrients can modulate multiple pathways.[1,2]

Attacking cellular senescence by modulating multiple independent and overlapping pathways is a broad-spectrum approach to ***geroprotection*** and the ***removal of senescent cells***.

Identifying Geroprotective Nutrients

The basic idea behind *geroprotector screening* is to compare large numbers of molecular profiles of human tissues of patients of all ages as well as tissues that contain various diseases to identify the changes implicated in degenerative aging.

Unlike studies done in the glass dishes of a laboratory (*in vitro* studies), or those done in living animals (*in vivo* studies), research done inside a computer exists purely in virtual form, in the silicon chips of the processor, and is referred to as an *"in silico"* study.

Searching for natural compounds that could work on many different levels to halt the aging process, researchers resorted to this innovative *"in silico"* type of study and identified four age-reversing substances.[1,2]

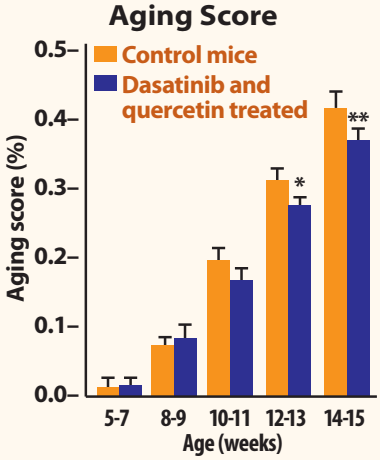
How the Selected Nutrients Perform as Geroprotectors

Each of the nutrients identified using *in silico* type of research showed an impressive record at ***geroprotection***.[1,2]

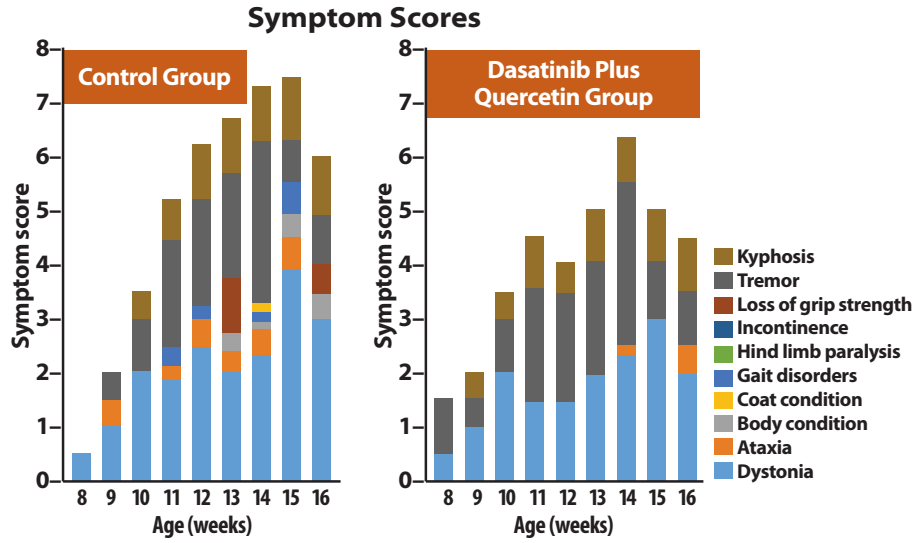
- **Myricetin**, a plant-derived polyphenol, is revealing a wide array of pathway modulation in age-related disorders.

  In particular, myricetin is known to regulate the ***p38 MAPK*** family of stress-responsive signaling molecules that are known to regulate aging in many tissues.[27,28]

Figure 2.
Effects of Senolytic Treatment on Mice



Aging scores of **control** mice vs. those of mice treated with **dasatinib+quercetin**. Significant reductions in score are seen at 12-13 and 14-15 weeks, indicated by "*."



Symptom scores for multiple signs of aging. Kyphosis = humped back; Ataxia = poor balance; Dystonia = loss of muscle tone.[4]

Myricetin also promotes cell differentiation and self-repair, and regulates pathways involved in metabolic processes.[29-32]

- **N-acetyl-cysteine (NAC)** is a natural sulfur-containing molecule best known for its free-radical scavenging capabilities.

  NAC is proving useful for its ability to upregulate signaling pathways that boost natural, cellular protections against oxidative stress that promotes cellular senescence.[33]

  In addition, NAC has shown powerful effects on reducing pathways that promote inflammation, adding further anti-aging benefits to this versatile molecule.[33,34]

- **Gamma tocotrienol** is now showing a wide range of signaling pathway modulation that produces health benefits that far exceed those of simple oxidant-reducing nutrients.[35-38]

  A unique pathway modulated by gamma tocotrienol is the ***mevalonate*** pathway that controls cholesterol production, cancer promotion, and bone formation.[35-37]

- **Epigallocatechin-gallate** (EGCG) is a polyphenol with known anti-inflammatory properties, but new studies are showing that EGCG also regulates multiple pathways that influence aging in a broad range of tissues.

  EGCG uniquely regulates the ***Wnt*** pathway, which is vital in determining developing cells' proper fate and preventing cancer.[39]

  EGCG also prevents sugar-induced damage to tissues throughout the body, helping to suppress their pro-aging effects.[40]

Scientists found that these compounds *reduced* cellular aging and various processes that contributed to aging by beneficially modulating a group of ***signaling pathways*** that led to the formation of senescent cells.[1,2]

Most of these pathways are known to contribute to, or protect against, development of senescent cells, and all have been shown to protect against aging at the cellular level.

Table 1 on the next two pages illustrates these pathways in context, showing both considerable overlap (e.g., antioxidant and anti-inflammatory pathways) as well as several pathways unique to each nutrient.

Table 1. How Geroprotective Nutrients Team Up to Slow Aging

Nutrients →	NAC		Myricetin	
↓ Body System or Condition ↓	Pathways Modulated	Health Impact	Pathways Modulated	
Bone (Target: Slowing Osteoporosis by ↑ Bone Formation and/or ↓ Bone Resorption)	↑Antioxidant ↓Inflammatory	↓Death of bone-producing cells ↓Birth of bone-resorbing cells	↑P38-MAPK[28] ↓MMP (Protein-melting enzymes)[53]	
Cancer (Target: Reduce Incidence and Severity)	↑Antioxidant ↓Inflammatory[57] ↓Cancer cell telomerase[58] ↓Growth factors[59] ↑ER-stress[60]	Sensitizes cancer to chemo[57] ↑Cancer cell death[58,60] ↓Cancer growth[59]	↑Antioxidant ↑P38-MAPK[61,62] ↓VEGF[63] ↓Akt[46]	
Cardiovascular (Target: Slow Atherosclerosis)	↑Antioxidant ↓Inflammatory[68]	↓Hypertension[69] ↓Arrhythmia[70]	↑Antioxidant ↑Self-repair[29,30,71] ↓Activity of calcium channels[72]	
Diabesity (Targets: ↓Weight, body fat, lipid, glucose, ↓tissue damage, inflammation)	↑Antioxidant ↓Inflammatory ↓PPAR-gamma ↑FXR ↑Adiponectin[43]	↓Obesity ↓Atherosclerosis ↓Blood sugar ↑Insulin sensitivity ↑Fat burning ↓Liver fat[43] ↓Cataracts ↑Wound healing[85,86]	↓Inflammatory[87,88] ↑IRS-1-associated PI3-kinase ↑GLUT4[31] ↓NFkB, STAT1, NrF2[89] ↓CCAAT/Enhancer-binding protein PPAR-gamma[42]	
Liver and pancreas (Targets: ↓Liver fat, ↓inflammation, ↑Liver function, ↓Cancer risk) ↓Fibrosis	↑Antioxidant[103] ↑Mitochondrial function[104]	↓Fatty liver disease, toxic damage[105-107] ↓Liver cancer formation[108]	↓Oxidation, inflammation[91] ↑Detox enzymes[109] ↓DNA damage, ↑DNA repair, ↓JAK1-STAT, CDK1, PAK1[45-47]	
Neuroprotection (Targets: Cognition, Memory, ↓Alzheimer's, Parkinson's) Stroke protection	↑Antioxidant, ↓Inflammatory ↓Toxic protein accumulation ↑Mitochondrial function[121-124] ↑Brain cell survival pathways[125,126]	↑Cognitive function[122-126]	↓Excitotoxicity by ↓calcium overload, ↓glutamate stimulation, ↓caspase-3[127] ↓Glutamate release[52] ↓Deposits of toxic beta-amyloid protein[128] ↑GABA protective pathways[129]	
Kidney (Targets: ↓kidney failure, stone formation, ↑kidney function)	↑Oxidant protection ↓Inflammation[33,138,139]	↓Urine protein loss[33] ↓Kidney stones[138] ↓Uremic anemia[139]	↑Antioxidant[140] ↓SREBP, VEGF ↑PPAR[141]	

Read the table ***across*** to see how each nutrient contributes uniquely and also shows overlap of functions for each body system or condition. Read it ***down*** for a summary of the multiple pathways and impacts of each nutrient in multiple systems.

	Myricetin	Gamma Tocotrienol		EGCG	
	Health Impact	**Pathways Modulated**	**Health Impact**	**Pathways Modulated**	**Health Impact**
	↑ Birth of bone-forming cells[28] ↓ Birth of bone-resorbing cells[53]	↓ Mevalonate[35,36]	↑ Activity of bone-forming cells[35,36] ↓ Activity of bone-resorbing cells[35,36,54] ↑ Bone quality[36]	↑ Wnt[39] ↓ HSP27 ↓ GSK-3beta ↓ Akt[55]	↑ Birth of bone-forming cells[56]
	↑Cancer cell death[61-63] ↓ Replication[61,62] ↓Malignant transformation[46] ↓New blood vessels[46,63]	↓Mevalonate[37,38] ↓Inflammatory[64]	↓Replication[37,38] ↓New blood vessels[37] ↑Cancer cell death[37,38]	↓Growth factors[65] ↓NFkB[66] ↑miRNA[67]	↓Cell division[65] ↑Cancer cell death[66] ↓Cancer growth[67]
	↓Vessel constriction[72,73]	↓Inflammatory[74] ↑Antioxidant[75] ↓Mevalonate[76] ↑Autophagy[50]	↓Plaque[75] ↓Cholesterol[76] ↓Ischemic damage[50]	↓Inflammatory ↑Antioxidant[77] ↑AMPK[49]	↓Lipids ↓DNA Damage ↑Fat burning ↓Fat storage ↑Endothelial function ↓BP[78-84]
	↑Insulin sensitivity ↑Glucose uptake ↓Insulin[87,88] ↓Fat cell maturation[42] ↓Body weight[90] ↓Fat storage[91]	↑Autophagy ↑AMPK ↓PPAR gamma[44] ↑Fat cell death[92] ↓NFkB[93-95]	↓Fat cell formation ↑Fat burning[44] ↓Body fat ↓Risk of diabetes ↓Impact on tissues[92]	↑AMPK[96] ↑Cellular antioxidants[97] ↓DNA Damage[97]	↓Fat accumulation ↑Fat burning ↓Blood sugar ↓Body weight, BMI, Waist circumference.[78,98-102]
	↓Fatty liver disease[91] ↓Fibrosis[110] ↓Liver cancer formation[45,46] ↑Cancer cell death[47]	↑Mitochondrial failure in senescent pancreas cells[111] ↓NFkB[112]	Improved NAFLD[113] **Senolytic** in pancreas[111]	↑AMPK, oxidant protection ↓Inflammation.[114-116]	↓Fibrosis ↑Markers of liver function ↑Liver regeneration after injury.[114,117-120]
	↓Cognitive deficits, ↓decrease depressive behavior[130,131] ↑Learning and memory[132]	↑Antioxidant, ↓Inflammatory[133]	Improved cell viability[133]	↓Inflammation ↓Oxidant stress ↑DNA damage repair[48,134] ↑Cleanup of toxic proteins[51]	↑Learning and memory in neurodegenerative disease, stroke, aging[135-137]
	↓Glomerular thickening (↑Kidney filtering function)[141] ↓Diabetic kidney damage[140]	↓TGF-beta[142] ↓Inflammation (↓NFkB)[94] ↓Oxidative stress[143] ↑Mitochondrial function[144]	↓Diabetic kidney damage[94] ↑Kidney function, filtering efficiency[143] ↓Structural damage from toxins[143]	↓Thromboxane[145] ↓RAGE, AGEs[40] ↓DNA damage[48] ↑Oxidative stress protection[146] ↓NFkB[147]	↑Lifespan in rats by ↑kidney function[147] ↑Kidney function[145] ↓Kidney stone formation[146] ↑Kidney structure, function[148] ↓Kidney fibrosis[149]

Some key points about the information presented in Table 1:

- All four nutrients excel at protecting cells against oxidative stress, as well as against inflammation. These processes are known to promote formation of **senescent** cells.[26,41]
- Myricetin, NAC, and gamma tocotrienol all prevent energy from being stored as fat through the PPAR-gamma pathway.[42-44]
- Myricetin and EGCG excel at preventing senescence-inducing DNA damage and promoting its repair.[45-48]
- Gamma tocotrienol and EGCG activate the AMPK pathway that promotes youthful cellular function, reduced fat storage, and improved entry of glucose into cells.[44,49]
- Gamma tocotrienol and EGCG both promote ***autophagy***, the removal of debris (junk proteins) that accumulates inside of aged cells.[50,51]
- Myricetin reduces the effects of glutamate, the ***excitatory*** neurotransmitter implicated in brain aging.[52]

These nutrients have also shown the potential to be ***senolytic*** agents, meaning that they not only prevent cellular senescence, but may contribute directly to removal of age-accelerating senescent cells from tissues.[1,6]

Combining Geroprotectors to Slow Aging

The discovery and characterization of ***geroprotective*** nutrients is changing the ways we think about aging. The new paradigm is to look at ***signaling pathways*** that effect aging at cellular, and indeed, subcellular levels.

By utilizing this technology, whether aging is occurring in the brain, the heart, the intestinal tract, the muscle, or anywhere else in the body is irrelevant. Instead, we can see how myriad biochemical ***signaling pathways*** are operating in every cell in the body, ultimately contributing to accumulation of ***senescent cells*** that produce symptoms of aging and degenerative illnesses.

These advances mean that we can begin to identify specific nutrients, the pathways that they modulate, and their long-term effects in cells. This data is then used to develop anti-aging mixtures capable of defeating **cellular senescence** wherever it occurs.

NAC, myricetin, gamma tocotrienol, and EGCG are demonstrating the ability, between them, to modulate more than a score of ***signaling pathways*** that prevent cells from deteriorating into age-promoting, ***senescent cells***, while also preventing those cells from taking the alternate route of becoming malignant.

As a result, these nutrients have been combined into the first-ever ***geroprotective formulation based on artificial intelligence*** with far-reaching effects on age-related disorders to which senescent cells contribute. This improves our ability to develop strategies aimed at preventing cellular aging throughout the body.

The real world upshot is an opportunity to lengthen healthy human lifespans.

Summary

Senescent cells lose the ability to contribute meaningfully to body function. Instead of dying they go into an abnormal secretory state, pumping out destructive pro-inflammatory molecules that contribute to destructive aging throughout the body.

In partnership with researchers at Insilico Medicine, **Life Extension** scientists reviewed the biochemical pathways that push aging cells into senescence, and then screened hundreds of drugs and nutrients capable of favorably modifying those pathways.

The result was a short-list of four specific nutrients, myricetin, NAC, gamma tocotrienol, and EGCG, all of which modify senescence-inducing pathways, slowing down the development of senescent cells and exhibiting characteristics of senolytics.

Each nutrient not only has its own unique set of pathways that it regulates, but also overlaps with similar pathways modulated by the others, providing comprehensive protection against aging at the cellular level.

That ability, now known as ***geroprotection***, makes it possible to better prevent or decelerate aging ***throughout the body***, rather than on an organ-by-organ, or disease-by-disease basis.

This work is only the beginning.

Future studies will no doubt identify other cocktails with geroprotective properties and will fine-tune our understanding of how manipulation of senescence-inducing pathways can operate.

In time, new studies will produce further evidence of the intriguing notion of ***senolytic*** compounds, those capable of sweeping the body clean of existing senescent cells – a possibility that could facilitate meaningful **age reversal**. ●

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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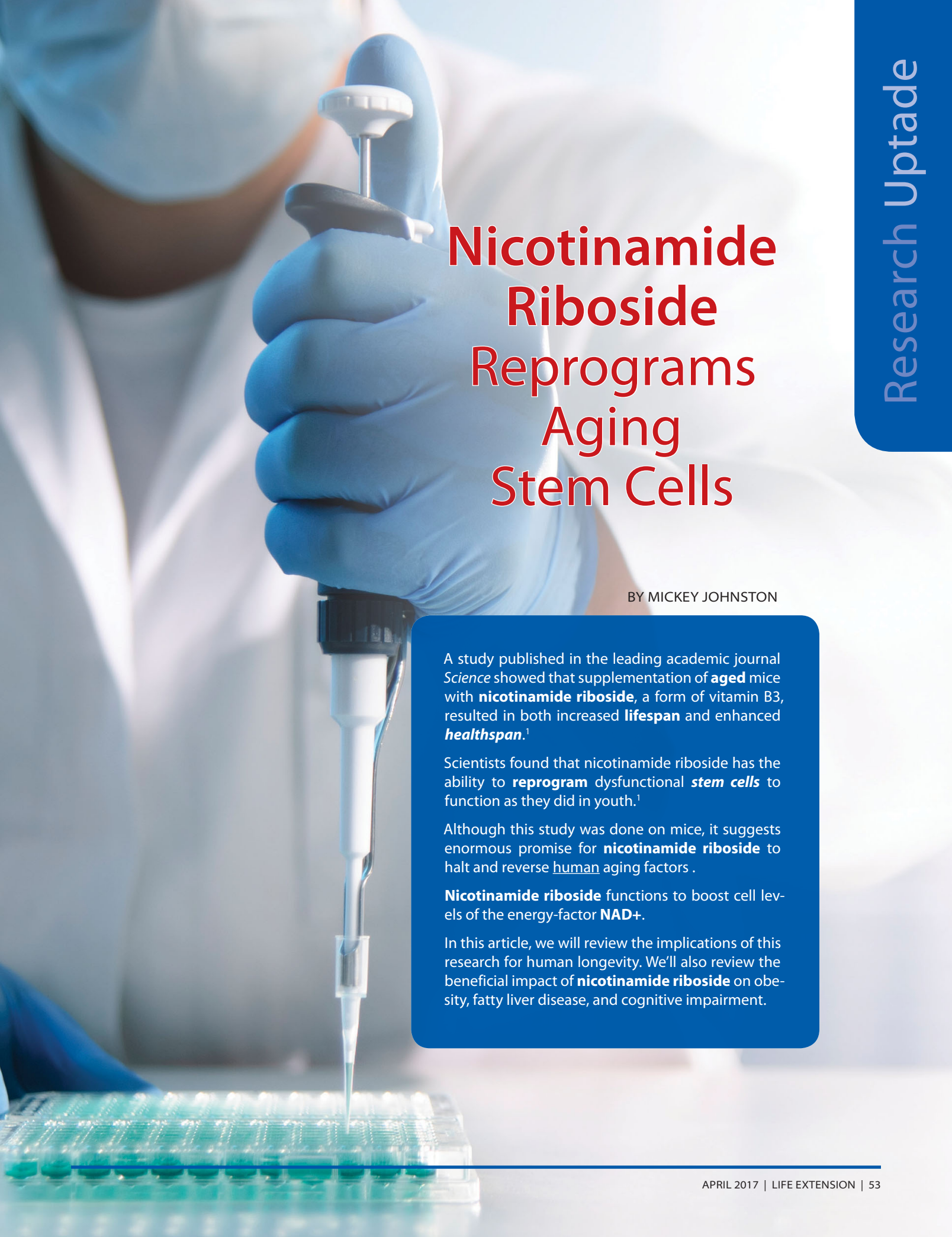


Nicotinamide Riboside Reprograms Aging Stem Cells

BY MICKEY JOHNSTON

A study published in the leading academic journal *Science* showed that supplementation of **aged** mice with **nicotinamide riboside**, a form of vitamin B3, resulted in both increased **lifespan** and enhanced ***healthspan***.[1]

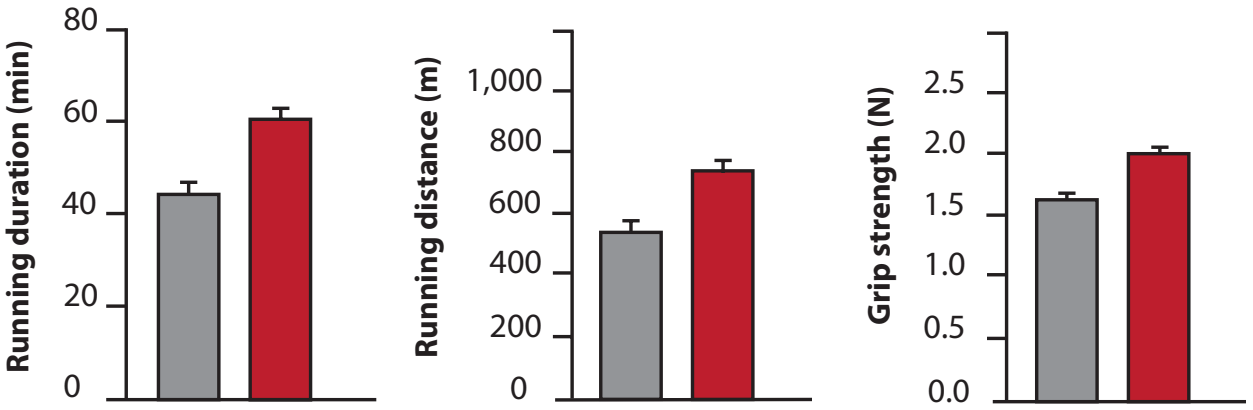
Scientists found that nicotinamide riboside has the ability to **reprogram** dysfunctional ***stem cells*** to function as they did in youth.[1]

Although this study was done on mice, it suggests enormous promise for **nicotinamide riboside** to halt and reverse human aging factors .

Nicotinamide riboside functions to boost cell levels of the energy-factor **NAD+**.

In this article, we will review the implications of this research for human longevity. We'll also review the beneficial impact of **nicotinamide riboside** on obesity, fatty liver disease, and cognitive impairment.

Improved Muscle Function in Supplemented Mice[1]



In old mice, supplementation with nicotinamide riboside produced significant increases in the duration and distance that mice could run, compared with those fed the control diet. There was also a highly significant increase in the supplemented animals' grip strength compared with control-fed mice.

Landmark Study

An international group of researchers investigated the impact of ***nicotinamide riboside*** on lifespan and functions related to overall health.[1] The results, published in mid-2016, were remarkable.

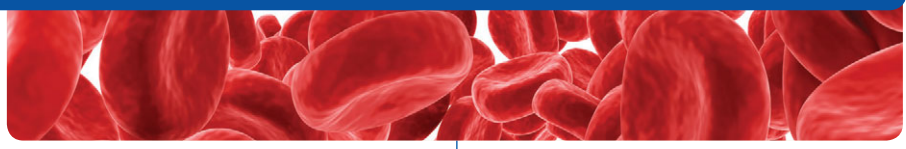
Aged mice (24 months old) treated with nicotinamide riboside for 6 weeks survived, on average, **5%** longer than control mice.[1]

While this may seem to be a fairly modest increase, consider two points.

First, the supplementation began when these mice were already fairly advanced in age.

Second, the average human life expectancy today is about **78.8 years**.[2] A **5%** increase in this figure would add nearly **4 years**, a significant increase if those years are healthy and rewarding ones.

Perhaps most importantly, this study suggests that the supplemented animals were **healthier** overall compared with controls.



Here are the highlights of those findings:[1]

- Aged mice supplemented with nicotinamide riboside demonstrated increases in maximal running times and distances, and in grip strength.
- Chemically damaged muscle tissue from supplemented mice was regenerated faster, and regenerated muscle was bulkier than in mice fed the control diet.
- Supplemented mice showed increased proliferation and development of new brain cells, especially in the memory-intensive hippocampus region of the brain, compared with control animals.

Reprogramming Dysfunctional Stem Cells

With aging, adult stem cell function declines (stem cell senescence), causing a loss in tissue homeostasis and regeneration.[1]

Researchers found that nicotinamide riboside increased strength, endurance, and recovery times in aged mice because it increased the number and function of **muscle stem cells**, providing the mice greater resources for maintaining strong, healthy muscles.[1]

This study showed that supplementation with **nicotinamide riboside** led to significant improvements in lifespan and factors influencing health. The fact that these changes occurred in aged mice gives hope to older individuals who are looking for viable ways to live longer, *healthier* lives.

How it Works

The reason why **nicotinamide riboside** is such a potent promoter of healthspan *and* lifespan is because once it enters the body, it converts to one of the most essential factors in energy *production* in cells, **nicotinamide adenine dinucleotide** (NAD+).

NAD+ has two key functions in the body that help combat aging. First, it enhances cellular energy by boosting the function of **mitochondria**, the body's cellular "power plants" that convert the food we eat into energy our bodies can use.[3] While age-related mitochondrial dysfunction can result in tissue and organ failure, studies show that restoring mitochondrial function slows aging and extends longevity.[1]

Second, NAD+ activates enzymes called **sirtuins** that control gene expression. SIRT enzymes "turn off" certain genes that promote aging, such as those involved in inflammation,[4,5] in fat synthesis and storage, and in blood-sugar management.[6,7]

By boosting the body's levels of NAD+, nicotinamide riboside helps protect the body against some of the most potent age-accelerating processes that threaten longevity. Three of these disorders include obesity, nonalcoholic fatty liver disease, and cognitive decline.

Let's look at nicotinamide riboside's impact on each one:

- **Obesity:** A 2012 paper showed that nicotinamide riboside supplementation in both cultured cells and tissues activates sirtuins, which boost fat-burning and prevent some of the metabolic changes induced by obesity.[8]
- **Nonalcoholic fatty liver disease:** NAFLD is the most common chronic liver disorder in industrialized nations and one closely related to our obesity epidemic.[9] Nicotinamide riboside was found to prevent—and even reverse—NAFLD in mice on a high-fat, high-sugar diet. This effect was due to its ability to increase sirtuin activity, which resulted in sharp increases in mitochondrial fat burning as well as increases in the energy storage molecule ATP, which all cells require to perform their functions.[9]
- **Alzheimer's disease:** Mitochondrial dysfunction and poor energy management in brain cells are closely associated with the development of Alzheimer's disease.[10] Nicotinamide riboside helps combat both of these factors. A recent study of a mouse model of Alzheimer's showed that supplementation with nicotinamide riboside for three months significantly slowed cognitive deterioration.[10] As expected, these results appeared to arise from the supplement's ability to improve energy production in brain cells.

Summary

The concept of radical life extension is steadily moving from science fiction to science reality.

Nicotinamide riboside shows evidence of enhancing the healthspan as well. This is vital, because added years of low-quality life do not represent, for most people, much of a gain.

This landmark study indicates that supplementing with **nicotinamide riboside** could help one live longer and healthier. More research is urgently needed to corroborate these remarkable findings. ●

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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BY RAEGAN LINTON

Will Metformin Become the First Anti-Aging Drug?

A committed group of scientists is seeking to validate **metformin** as the **first-ever** anti-aging medication.[1,2]

In this day of staggering drug prices, metformin is available as a **low-cost** generic.

One mechanism by which metformin works is by activating **AMPK**, an enzyme inside cells that lowers blood sugar by promoting energy utilization.

Activating **AMPK** has broad-ranging effects that extend *far beyond* blood sugar control. Studies show that boosting **AMPK activity** can prevent—and even reverse—the life-shortening effects of aging, such as cardiovascular disease, diabetes, neurodegenerative diseases, cancer, and more.[3]

In this article, we'll review data that persuaded the FDA to allow **metformin** to be studied in **humans** as the first **anti-aging** drug.[1]

Broad-Spectrum Effects

The most commonly prescribed antidiabetic drug is **metformin**. It has been in use in **England** since **1958** and in the **United States** since **1995**.

Derived from a compound found in the French Lilac, metformin has a track record of safety and effectiveness at routine doses of up to **2,000 mg** daily.[4-7]

So what evidence is there for the FDA to consider this drug as an **anti-aging medication**? The reason is simple:

Metformin can block or diminish many of the fundamental factors that accelerate aging.[8-12]

These include protecting against DNA damage glycation, poor mitochondrial function, and chronic inflammation. Metformin has been shown to facilitate **DNA repair**, which is critical for cancer prevention.

By attacking these fundamental degenerative processes, metformin can prevent the development of aging's most troubling ***diseases***.

Metformin has also been shown to increase the production of known longevity-promoting signaling molecules in cells, such as **mTOR** and **AMPK**—all of which reduce fat and sugar storage and increase youthful functioning at the cellular level.[11,13]

Studies have shown that by activating AMPK, metformin specifically impacts **lifespan**. For example, roundworms treated with metformin have higher **AMPK activity** and live about **20%** longer than untreated control animals.[14] Mice treated with metformin have been found to live nearly **6%** longer than controls.[11] And most impressively, diabetics taking metformin were shown to live **15%** longer than healthy individuals without diabetes![15]

AMPK activity declines with age,[16] making us more vulnerable to many of the diseases associated with aging. Fortunately, a wealth of recent studies show that by *activating* AMPK, metformin plays a major role in preventing age-related disorders including cancer, cardiovascular disease, obesity, and neurocognitive decline.

By combatting many of the underlying ***causes*** of aging—and by activating AMPK—metformin can be considered a broad-spectrum anti-aging drug.

Cancer Protective Effects of Metformin

Diabetics have an increased risk of cancer. In a study of head and neck cancers, researchers were surprised to find that diabetic patients had a **46%** reduction in risk of developing these cancers compared to non-diabetic patients.[17] What was the reason for this unexpected reduction? The diabetic patients were taking **metformin**.

Similar effects have been seen for the risk of gastric (stomach) cancers as well, with metformin users experiencing a **55%** decrease in the risk of stomach cancer compared with nonusers.[18] Important studies like these have helped to confirm a decade-long trend suggesting that metformin has anti-cancer properties.[17]

While these studies show that metformin has the potential to reduce the risk of *developing* cancer, others show its benefits for those who already have cancer.

A study encompassing 27 clinical trials representing more than 24,000 patients found that in people with early-stage cancers of the colon and rectum, metformin use improved ***recurrence-free survival*** by **37%**, ***overall survival*** by **31%**, and ***cancer-specific survival*** by **42%**.[19]

The same study reported similar results for men with early-stage **prostate cancer**, with metformin use increasing ***recurrence-free survival*** by **17%**, ***overall survival*** by **18%**, and ***cancer-free survival*** by **42%** compared with non-metformin users.[19]

By now, metformin has been studied in the context of total tumor incidence in 17 different target organs, 21 strains of mice, and four strains of rats. It has been studied in cancers that occur spontaneously, and in

those induced by 16 different chemical carcinogens from multiple classes, ionizing radiation, viruses, genetic modifications, and high-fat diets, using five different routes of administration.[20]

A whopping **86%** of such studies showed that metformin clearly inhibited cancer development and showed zero evidence of cancer stimulation by the drug.[20]

Indeed, as one expert recently put it, maybe it's time "to make this long story short" about metformin: It works to prevent cancer.[20]

Metformin Prevents Cardiovascular Disease

Despite billions of dollars spent on drugs such as Crestor and Lipitor, cardiovascular disease remains the single biggest killer in America. While there are multiple causes of cardiovascular disease, most boil down to the development of **atherosclerosis**, or "hardening of the arteries."

Atherosclerosis is promoted by factors such as oxidation of LDL cholesterol, accumulation of that oxidized fat in arterial walls, and damage to the endothelium, which is the thin layer of cells lining those arterial walls.[21]

What You Need to Know

Metformin as an Anti-Aging Drug

- **Metformin has been a staunch workhorse against diabetes for more than 50 years.**
- **Studies show that metformin acts by boosting the activity of AMPK, a master metabolic regulator that favors fat- and sugar-burning and prevents their accumulation.**
- **Because AMPK is relevant in all tissues, this makes metformin extremely important in reducing metabolic imbalances in the entire body.**
- **Strong evidence suggests that metformin, through its protective effects and AMPK-activating properties, can help prevent cancer, cardiovascular disease, obesity and its consequences, and even neurodegenerative disorders.**

Metformin is now known to prevent these early steps in atherosclerosis development.

One of the key ways it does this is by activating the metabolic regulator **AMPK**. By activating AMPK, metformin:

- Mitigates LDL oxidation and the resulting endothelial dysfunction, which slows the development of atherosclerosis.[21]
- Reduces the conversion of harmless immune system cells (***monocytes***) into fat-laden ***macrophages***, an action that reduces their accumulation in vessel walls.[22] It also increases cholesterol export ***out of those cells***, while also suppressing the inflammatory stimulus they normally produce.[23,24]
- Offers critical protection to endothelial cells that line coronary arteries, which supply blood to the heart muscle itself. Specifically, metformin enhances the resistance of endothelial cells to "fat poisoning," the death of endothelial cells in the presence of high fat concentrations.[25] This is highly protective against heart attacks, which occur when coronary arteries, blocked by atherosclerotic plaques laden with fat and inflammatory cells, fail to provide enough blood to the hard-working heart muscle.

Metformin has also been shown to prevent the fragmentation of mitochondria in endothelial cells.[26] Such fragmentation is closely associated with the dysfunction of endothelial cells and is now considered an important precursor of atherosclerosis.[26]

The results of these protective effects have been seen in numerous human studies. In one study, heart attack patients taking metformin had a significant **75%** reduction in the risk of dying after 30 days, and a **68%** reduction in their risk of dying 12 months after the attack.[27]

Several studies have also demonstrated that metformin reduces the risk of heart attack, and is associated with reduction in stroke, atrial fibrillation (an arrhythmia), and death from all causes.[28]

Finally, a 2016 study showed significant reductions in systolic (top number) blood pressure in nondiabetic people taking metformin. The largest reductions were seen in those having impaired glucose tolerance or obesity.[29]

Obesity itself appears ready to yield to metformin treatment, as we'll now see.

FDA Approves First Anti-Aging Study

The FDA has approved a study that will determine if metformin can do more than lower blood sugar—it will evaluate metformin's ability to **slow aging**. This is the first ever anti-aging study approved by the FDA.

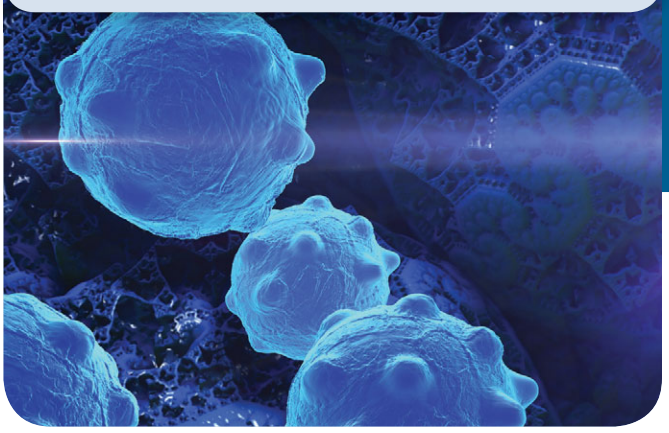
Studies have shown that metformin can block or diminish many of the underlying factors that accelerate aging, and it has also been shown to extend lifespan in animals. Dr. Nir Barzilai from the Albert Einstein College of Medicine, along with researchers from the American Federation for Aging Research (AFAR), want to find out if metformin can extend lifespan in humans as well.

The study, called **Targeting Aging with Metformin** (TAME), will evaluate 3,000 people over a course of six years. Half of the participants will receive metformin, and the other half will receive a placebo. Since aging is largely characterized by the development of disease, the success of the study will be determined by whether or not the drug delays the onset of typical age-related diseases, such as cardiovascular disease, cancer, and cognitive decline.

This groundbreaking study has the potential to change the future of how we treat disease. Developing a single drug designed to treat multiple conditions would dramatically reduce the number of drugs a typical person would need, which would reduce overall drug side effects, eliminate contraindications, and of course, save money.

None of this is good for Big Pharma's bottom line—which is likely why no company has agreed to fund the study. Until that happens, this important study is on hold.

But you can help. AFAR is seeking individual contributions to get the TAME study started. To learn more, and make a donation if you like, visit **www.afar.org/donate/**



Metformin Reduces Body Weight and Fat Mass

Metformin's ability to activate AMPK makes it especially beneficial in combatting **obesity**. This is because AMPK is a **metabolic regulator** that stimulates ***youthful*** cellular behaviors such as burning fat (instead of storing it), taking sugar out of the blood, and recycling cellular contents to eliminate toxic proteins.[30]

As a result, metformin can be expected to have important effects on body weight and fat deposits. And indeed, studies show that metformin fights obesity and reduces body fat mass, *even in non-diabetic patients*.

This is true in some of the most challenging populations, such as women with **polycystic ovary** syndrome, a major cause of obesity and endocrine problems in premenopausal women.

In one study, women with polycystic ovary syndrome were treated with **850 mg** of metformin or a placebo twice daily for 6 months. During that time, those in the placebo group experienced *increases* in weight and blood sugar, as expected. Those taking metformin, on the other hand, had significant *decreases* in weight and blood sugar—with metformin-treated women losing an average of **9.24 pounds**. The metformin group also had significant increases in beneficial HDL cholesterol.[31]

Metformin has been found to significantly reduce body weight, body mass index (BMI), and insulin resistance in patients taking modern **antipsychotic medications** such as olanzapine, aripiprazole, risperidone, and quetiapine.[32-35] These are impressive results, since major side effects of these drugs include rapid weight gain, loss of insulin sensitivity, and other features of metabolic syndrome.[36]

But by far, the largest group of people fighting obesity are simply aging individuals who are otherwise healthy (nondiabetic). Metformin shows promise for this population as well.

An important study in a group of such people—all women with midlife weight gain but normal blood sugars—showed that taking metformin for 12 months reduced mean body weight by **11.6 pounds**.[37] In addition, treated subjects had significant decreases in their **body fat percentage**, a favorable change that can reduce many of the long-term consequences of obesity.

Metformin is showing promise in obese but otherwise healthy **young** people as well. A group of 10-16- year-olds took **2,000 mg** of metformin per day or a placebo for 18 months. Those taking metformin lost nearly half a pound in fat mass. By contrast, the placebo group gained almost **4.5 pounds** in fat mass.[38]

Metformin as Neuroprotectant

There is rapidly growing literature on metformin's potential role in preventing neurodegenerative disorders such as Alzheimer's and Parkinson's diseases. Once again, much of this literature focuses on metformin's ability to activate **AMPK**, the youth-promoting energy regulator in all of our cells.

One major effect of AMPK activation is the cleanup of accumulated misfolded proteins in brain cells. The accumulation of proteins, such as ***tau*** and ***beta-amyloid***, contributes to brain cell death and dysfunction in neurodegenerative diseases.

Thus, it makes sense that metformin might be effective in preventing disorders associated with those proteins. Numerous animal and laboratory studies show that metformin does indeed have such effects. These studies demonstrate that metformin:

- Reduces levels of an enzyme that generates *beta-amyloid* proteins[32]
- Decreases the harmful effect of *beta-amyloid* on brain cell function[39-41]
- Reduces levels of *alpha synuclein*, another protein that accumulates and causes damage in Parkinson's disease[42]
- Prevents the loss of dopamine-producing brain cells in a model of Parkinson's disease[43,44]
- Improves motor coordination in a mouse model of Parkinson's[45]

Precautions and Useful Suggestions with Metformin Use

Although metformin has an outstanding track record in the fight against diabetes, cancer, obesity, neurodegenerative and cardiovascular diseases, there are some precautions to be aware of with its use.

Metformin is known to interfere with the absorption of B12, increasing the risk of **vitamin B12 deficiency**.[46,47] Low B12 levels contribute to higher concentrations of artery-clogging **homocysteine**—an independent risk factor for cardiovascular disease.[48,49] The tiny amounts of vitamin B12 and other B-vitamins found in commercial supplements is usually not enough to offset this problem. Individuals using metformin should ensure that they are taking higher doses of B-vitamins (at least **300 mcg** of **methylcobalamin**, the active form of **vitamin B12**) and checking their homocysteine levels to ensure proper protection.

Some studies have shown that metformin reduces **free** and **total testosterone** levels in men.[50] Testosterone is especially important in male diabetics as it enhances insulin sensitivity.[51] Life Extension has previously published clinical data on the importance of maintaining youthful testosterone levels in diabetic men to improve glucose utilization.[52]

If a **blood test** shows low testosterone, applying a topical testosterone cream can restore levels of this vital hormone to youthful ranges.

Side effects associated with metformin use include gastrointestinal distress or a slight taste disturbance, usually a metallic taste. Rarely, metformin may cause a potentially serious lactic acidosis, a buildup of lactic acid in the blood.[53]

If you use or are considering metformin, consult your physician, take your B-vitamins, and periodically check your kidney function, homocysteine levels, and in men, free and total testosterone.

In 2016, a human study showed that taking **1,000 mg** of metformin twice daily for 12 months improved memory recall in a group of older adults with a condition called amnestic mild cognitive impairment (a memory-stealing predecessor of Alzheimer's).[39]

Given the close connections between Alzheimer's and diabetes (it's been called "Type III diabetes"), there is every reason to believe that metformin, through its AMPK-activating properties, will help in the long fight to retain our minds and personalities as we age.

Summary

The world's first clinical trial of a true "anti-aging" drug may be about to begin. But while the study is new, the drug is more than half a century old.

Metformin has been used for more than 50 years to treat type II diabetes. A wealth of recent studies now supports a major role for metformin in preventing age-related disorders including cancer, cardiovascular disease, obesity, and neurocognitive decline.

The American Federation for Aging Research (AFAR) has a long uphill road to get this study (called TAME, or the Targeting Aging with Metformin trial) started. They face almost-certain opposition from Big Pharma companies for whom treating—not preventing—aging is a lucrative business.

The good news is that we don't have to wait for this new metformin study to get off the ground. Metformin is already available as a prescription medication. And many thoughtful physicians who are presented with the evidence will prescribe it based on its recognized benefits against specific age-related disorders.

There are also **nutrients** that have been shown to boost **AMPK activity** and function to lower blood glucose similar to metformin.[54-57]

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 promotion of healthy blood glucose and lipids already within normal range.[3]

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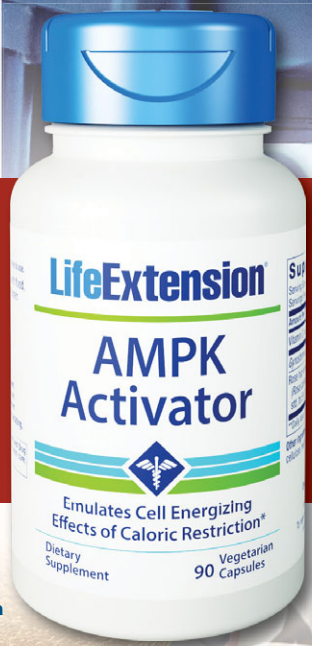

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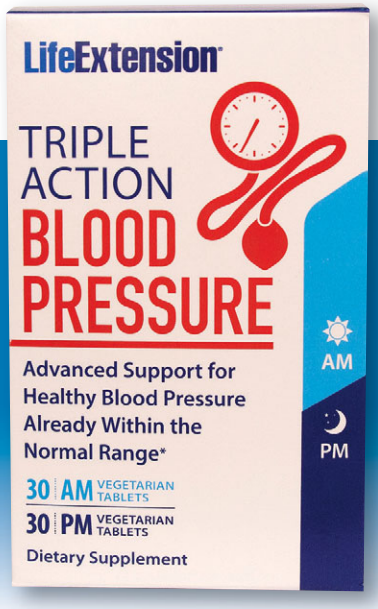

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BY ROBERT GOLDFADEN AND GARY GOLDFADEN, MD

FADE UNSIGHTLY SKIN PIGMENTATION

Age spots and brown-gray discolored patches contribute to the loss of youthful-looking skin.

Hyperpigmentation is a common dermatologic concern that arises from excessive production of the skin's main pigment, **melanin**.[1,2]

In this article, you'll learn about three compounds that successfully interfere with multiple stages of **melanin synthesis** to inhibit or reverse common **pigmentation** disorders.

A novel skin topical applicator has been designed to deliver these beneficial compounds in a safe, consistent, and uniform fashion to the target area, leaving behind a lighter and more luminous skin tone characteristic of a youthful appearance.

Targeting Multiple Stages of Melanogenesis

Your skin normally produces the pigment melanin in specialized cells called melanocytes to mitigate the skin aging effects of the sun.[3,4]

With chronic sun exposure, however, melanocytes become hyperactive and release too much melanin that manifests as unsightly age spots and dark patches on the skin.[5] Other factors such as heredity and hormonal changes can also lead to abnormal melanin output as we age, resulting in pigmentation disorders like melasma.[6]

While melanin formation (*melanogenesis*) at the cellular level is a highly complicated process characterized by numerous chemical reactions, it can be broken down to three major stages:

- **Stage 1**: Binding of **melanocyte-stimulating hormone** (α-MSH) to the receptor melanocortin 1 receptor (MC1R).[7]
- **Stage 2**: Conversion of L-tyrosine into dopaquinone by the key enzyme **tyrosinase.** Subsequent chemical reactions transform dopaquinone into melanin.[8]
- **Stage 3**: Transfer of melanin-filled melanosomes to keratinocytes located in the epidermis.[9]

Most commercial skin lighteners contain ingredients that only target one stage of the process, producing some improvements in skin discoloration.

Researchers have now identified three compounds that work together to inhibit multiple stages for a more profound skin lightening effect.

Nonapeptide-1

The binding of melanocyte-stimulating hormone to the melanocortin 1 receptor sets in motion melanogenesis by activating tyrosinase in melanocytes.[10]

A novel peptide called **nonapeptide-1** competes with α-MSH for binding to the melanocortin 1 receptor, which in turn prevents further activation of tyrosinase and thus the signal to turn on melanin output. This was confirmed in a lab study in which nonapeptide-1 reduced melanin synthesis in melanocytes by **33%** without affecting their normal functions.[11]

Rumex occidentalis Extract

Human studies indicate that *Rumex occidentalis*, a plant native to the northern Canadian Prairies region, slows down the activity of tyrosinase to treat different forms of hyperpigmentation. In one such study, topical application of *Rumex occidentalis* extract reduced age spots by **15%** after three weeks, and by **25%** after six weeks compared to baseline.[12,13]

Melasma is a difficult-to-treat pigmentation disorder that predominantly affects women.[14,15] In a randomized, double-blind, placebo-controlled trial, *Rumex occidentalis* extract was found to be as effective as the gold-standard skin-lightener hydroquinone in the treatment of melasma.[16] This is noteworthy, since *Rumex occidentalis* extract offers a viable alternative to hydroquinone without its numerous side effects.[17] Other research supports the efficacy and safety of *Rumex occidentalis* extract for lightening skin discoloration in melasma patients.[18]

Remarkable Skin Lightening Effects in Humans

The combination of nonapeptide-1 and *Rumex occidentalis* extract has shown a synergistic effect in clinical studies, leading to clearer skin than seen with either compound alone.

Scientists evaluated the impact of a topical cream containing these two compounds, along with niacin, shea butter, and vitamin E on 26 human volunteers with hyperpigmentation.[19] Participants applied the cream once daily for six weeks. Numerous skin parameters were measured at baseline, at three weeks, and again at six weeks.

At the study's end, researchers observed a **20%** decrease in melanin production in **96%** of subjects. This translated to a significant reduction in the number of UV-induced age spots and brown spots, as well as decreases in skin redness and ruggedness.

Significant improvements in skin moisture, elasticity, and smoothness were also documented, leaving participants with healthier and more radiant-looking skin. The topical formulation was well-tolerated and restored alignment of skin color in **92%** of participants.[19]

In a larger study involving 50 women, participants who applied a topical cream containing nonapeptide-1 and *Rumex occidentalis* extract twice daily for four weeks showed the following improvements:[11]

- Reduction in **dull complexion** by **92%**
- Reduction in **yellowish appearance** by **86%**
- Reduction in **age spots** by **78%**
- Increase in **evenness of skin tone** by **88%**
- Increase in **skin lightness** by **80%**
- Increase in **skin brightness** by **86%**

Alpha-Arbutin

Like *Rumex occidentalis*, alpha-arbutin possesses strong inhibitory effects on tyrosinase. When tested against other popular skin lighteners in a 4-week study, alpha-arbutin exhibited **20%** and **60%** higher depigmenting activity than kojic acid and hydroquinone, respectively. And in a three-month study, researchers found that alpha-arbutin diminished the appearance of age spots in **85%** of participants.[20]

What You Need to Know

Eliminate Hyperpigmented Areas of Skin

- **Chronic sun exposure and other factors increase the skin's output of melanin, leading to age spots, dark patches, and melasma.**
- **Most commercial skin lighteners only target one stage of melanin production (*melanogenesis*), resulting in only minor skin improvements.**
- **Researchers have found three compounds that inhibit melanogenesis at multiple stages of the process for more profound skin-lightening effects.**
- **Numerous human studies demonstrate that nonapeptide-1, *Rumex occidentalis* extract, and alpha-arbutin safely fade common forms of hyperpigmentation, often in only a few weeks.**
- **These beneficial compounds can now be delivered in a unique topical skin applicator to hyperpigmented skin, leaving behind a more uniform and lighter skin complexion.**

Development of an Innovative Skin Applicator

Nonapeptide-1, *Rumex occidentalis* extract, and alpha-arbutin have been combined into one formula that now can be delivered directly onto your skin by a novel topical applicator.

This easy-to-apply, no-waste skin applicator was designed to specifically target darkening areas of concern on the face, neck, décolleté, arms, and hands. It delivers a precise dosage of this new formula across the entire surface of the hyperpigmented area in a consistent and uniform manner to safely lighten skin tone.

Summary

The abnormal output of the skin's main pigment melanin over a prolonged period produces uneven pigmentation that robs you of a youthful appearance.

Solid scientific evidence shows that three compounds—**nonapeptide-1**, ***Rumex occidentalis*** extract, and **alpha-arbutin**—target multiple stages of melanogenesis to substantially slow down melanin output to inhibit or reverse common pigmentation disorders such as age spots, dark patches, and melasma.

These beneficial compounds can now be safely delivered directly onto your skin by a unique topical applicator for a clearer and more even complexion.

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 Life Extension's Medical Advisory Board.

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BY BEN BEST

2016 Conferences on AGING

Aging is damage to tissues and organs that accumulates with time.

There is no single cause of aging, because there are many sources of damage and many kinds of damage. There may be, however, ways to address many of these causes with perhaps one or more therapies.[1]

Inflammatory factors in the bloodstream increase with age. This chronic inflammation is a cause of cancer and damage to organs and tissues. A major source of this inflammation is cells that cease dividing, a condition known as **cellular senescence**. Senescent cells secrete inflammatory cytokines, cancer-inducing growth factors, and other harmful substances.

Cellular **senescence** is caused by DNA damage, shortened chromosome ends (**telomeres**), and other factors. Cellular senescence and inflammation can result in stem cells ceasing to function. Healthy stem cells heal injuries and replace worn-out cells in the intestines, the skin and the blood (including the white blood cells that provide immunity).[2]

In **2016,** I attended several conferences dealing with aging. In contrast to earlier conferences, I was impressed by how much researchers are now not only discovering new causes of aging or means to slow it, but are also finding ways to *reverse* aging and significantly extend mammalian life spans.

Interventions Testing Program

Randy Strong, PhD (professor of pharmacology, University of Texas Health Science Center, San Antonio) is one of the Directors of the National Institute on Aging's Interventions Testing Program (**ITP**). The ITP tests potential anti-aging substances on mice at three independent laboratories: the University of Texas, the University of Michigan, and the Jackson Laboratory in Maine.[3,4]

The ITP has been able to report lifespan benefits for a number of substances, but often these were effective only in male mice. Median (but not maximum) lifespan was increased for males by **12%** with the **antioxidant** (nordihydroguaiaretic acid),[5] by **8%** with **aspirin**,[5] and by **7%** using a proprietary blend of milk thistle, bacopa, ashwagandha, green tea, and turmeric extracts.[6]

Interestingly, an estrogen (17-alpha-estradiol) increased median lifespan by **19%** and maximum lifespan by **12%** in male mice.[6]

The antidiabetic drug **acarbose** increased male mouse median lifespan by **6%** and maximum lifespan by **12%**, most likely by reducing the amount of glucose absorbed into the bloodstream.[6]

For female mice, acarbose increased median lifespan by **2%** and maximum lifespan by **6%**.[6]

ITP showed rapamycin increased median and maximum lifespan in both male and female mice.[7] Insulin resistance and impaired glucose tolerance are associated with poor health and reduced lifespan. Rapamycin has these side effects.[8] The combination of **metformin** and rapamycin increased median lifespan by **23%** in both male and female mice.[6]

Rapamycin as an Anti-Aging Drug

Matt Kaeberlein, PhD (professor of pathology, University of Washington, Seattle) wants to validate **rapamycin** as an anti-aging drug. In 2009, rapamycin was shown to increase median and maximal lifespan of mice when given at 20 months of age (about equivalent to the age of a 60-year-old human).[7] No additional lifespan extension was seen by beginning the rapamycin at 9 months of age, and the earlier (more lengthy) dosing increased the incidence of cataracts and testicular degeneration.[9] A three-fold increase in the dose of rapamycin, however, approximately doubled the lifespan extension of 9-month-old mice.[10]

Rapamycin reduces inflammation, especially in the heart,[11,12] and inhibits cells from becoming senescent.[13] Rapamycin increases cognitive function in mice.[14] A rapamycin-like drug improved the response to influenza vaccination in elderly humans.[15]

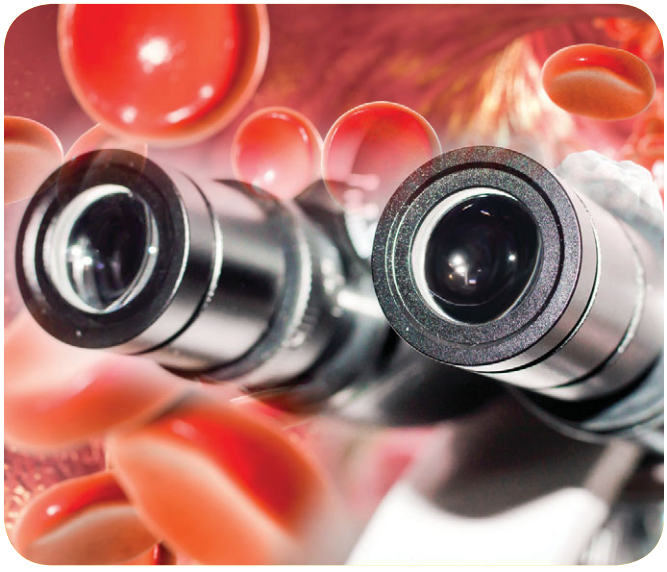
Dr. Kaeberlein's team showed that a 3-month rapamycin treatment of 20-month-old mice could increase life expectancy by at least **50%**.[16] Although this experiment indicates that brief exposure (in human time frame) to rapamycin in elderly mice could have substantial long-term benefit, the required dosing period for humans to show a comparable benefit would probably be considerably longer.[17]

Dr. Kaeberlein believes that substantial benefit without serious side effects can result from large doses of rapamycin given for brief periods.[18] He maintains that this prospect is best tested in middle-aged large companion-animal (pet) dogs, because these dogs age about seven times more rapidly than humans.[19] He has been actively recruiting owners of pet dogs for participation in this research using the website dogagingproject.com

Sirtuins and NAD+ for Rejuvenation

David Sinclair, PhD (professor in the Department of Genetics at Harvard Medical School and co-director of the Paul F. Glenn Center for the Biological Mechanisms of Aging, Boston, Massachusetts) has been a pioneer in studying the **sirtuin** anti-aging proteins, as well as substances that activate those proteins (such as resveratrol).[20]

Sirtuin activators that are hundreds of times more powerful than



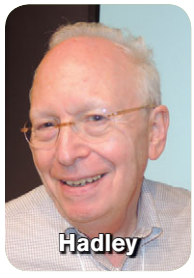
resveratrol increase insulin sensitivity, and have therefore been proposed as a treatment for type II diabetes.[21] Powerful sirtuin-activators have also been shown to improve the general health and lifespan of mice fed a normal diet.[22] Sirtuins can rejuvenate **cells** by stimulating the recycling of damaged cellular components (autophagy).[23]

Sirtuins require the substance **NAD+** to function. Sirtuins are important for DNA repair and for efficient function of the energy-producing cellular organelles, mitochondria.[24]

NAD+ declines with age because an enzyme in inflammatory cells that destroys NAD+ increases with age.[25] Reducing inflammation, inhibiting the inflammatory enzyme, and replacing NAD+ by supplementing with substances (such as **nicotinamide riboside**) that lead to NAD+ formation, can restore the benefits of sirtuin and NAD+ (improved insulin sensitivity, mitochondrial function, and DNA repair).[25] Moreover, NAD+ restoration rejuvenates stem cells, improving the regenerative capacity of organs and tissues.[26]

Two-Year Study of Calorie Restriction in Normal Humans

Evan Hadley, MD (Director of the Division of Geriatrics and Clinical Gerontology, National Institute on Aging, Bethesda, Maryland) reported on the two-year clinical trial conducted by the National Institute on Aging to determine the effects of calorie restriction on healthy, non-obese adults between the ages of 21 to 50.



Calorie restriction with adequate nutrition (**CR**) has been shown to increase health and lifespan in a wide variety of organisms, but the benefits have been difficult to prove for humans.[27]

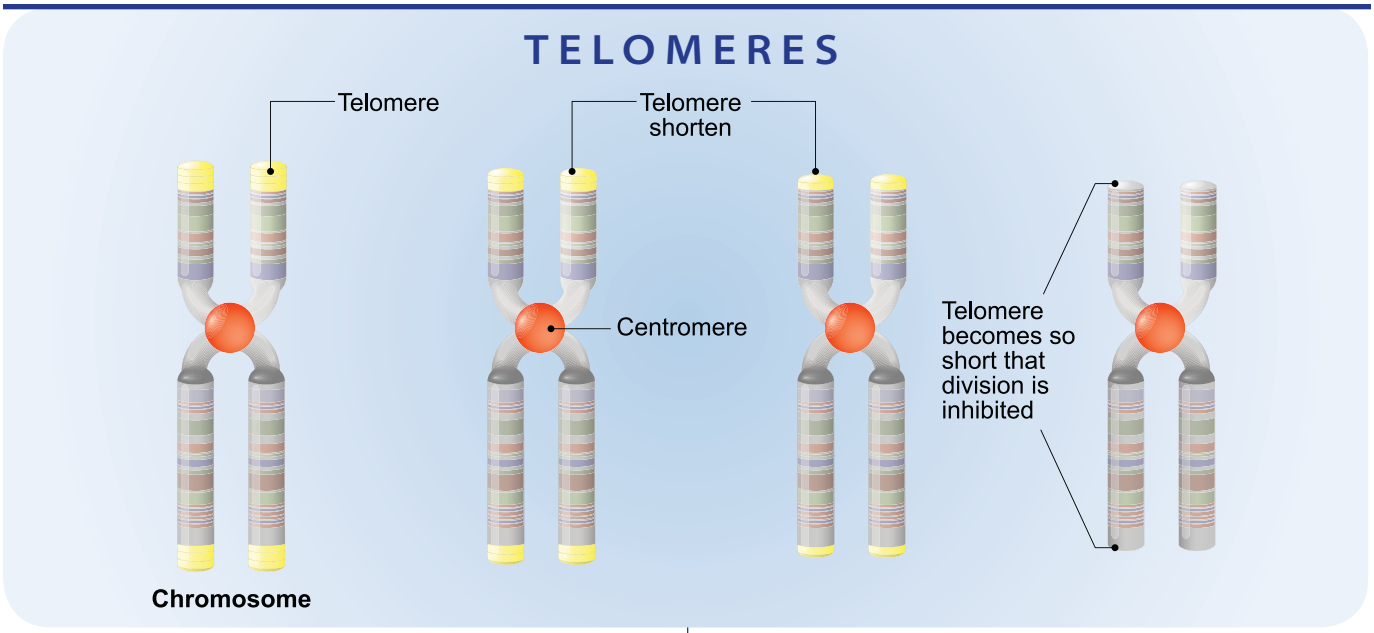
Subjects in the clinical trial were volunteers randomized to either eat normally or restrict calories by **25%**. Average body mass index (BMI) for the subject was 25.1 (on the border between normal and overweight). 218 volunteers began the study, with **82%** of the CR group and **95%** of the normally eating group completing the two-year study.[28]

The CR group was able to reduce calories by **19.5%** during the first six months, but only by an average of **9.1%** for the following 18 months.[28] The CR group showed significant reduction of blood cholesterol, triglycerides, and TNF-alpha (an inflammatory protein).[28] The stress hormone cortisol was only elevated for the first year.[29] The study showed improved quality of life and no harmful outcomes for those in the CR group.[30,31]

Elimination of Senescent Cells for Rejuvenation

Norman Sharpless, MD (professor of medicine & genetics, University of North Carolina) is concerned with how senescent cells contribute to aging, and with means to eliminate senescent cells. Senescent cells cease dividing due to various defects, including short telomeres. Senescent cells produce inflammatory factors which can trigger their removal by the immune system.[2]

With age, the immune system becomes increasingly incapable of removing senescent cells, which become a major source of chronic inflammation.[32] Chronic inflammation can lead to cancer.[33] Senescent cells impair the function of the tissues and organs in which they occur.[34] These cells have been shown to accelerate aging in mice (reducing health and shortening lifespan).[35]



To eliminate senescent cells requires differentiating them from healthy cells in tissues. Unfortunately, there are no markings that are consistently specific to senescent cells as opposed to healthy ones.[36]

Dr. Sharpless has focused his attention on a protein called **p16**, which is often seen on senescent cells. He has found that p16 in human body cells increases tenfold over 60 years of adult aging.[37] He has found that increased p16 is seen in many aging-associated diseases, including atherosclerosis, diabetes, neurodegeneration, frailty, cancer, and cataracts,[38] and that p16 indicates reduced stem cell function.[39]

Dr. Sharpless has shown increased p16 in smokers[40] and patients receiving chemotherapy.[41]

Injecting mice with a drug that eliminates cells having p16 has been shown to improve function of many organs, including kidney and heart, while increasing lifespan.[34] Upregulation of anti-apoptotic proteins is often seen in senescent cells. Targeting cells by inhibiting anti-apoptotic proteins has also been shown to eliminate senescent cells in mice.[42]

Using the herbal product **quercetin** and the anticancer drug **dasatinib** for targeting yet other (non-p16) features of senescent cells has been shown to eliminate senescent cells in mice, improving function in the heart and blood vessels.[43]

Telomere Lengthening for Rejuvenation

Maria Blasco, PhD (director, Spanish National Centre for Cancer Research, Madrid, Spain) is one of the world's foremost authorities on the role of telomeres in cancer and aging. Her pro-life extension attitude can be seen in her recent Spanish-language book for laypeople: *Dying Young at 140*.

Telomeres are repeating DNA sequences that protect the ends of chromosomes the way the caps of shoelaces prevent the laces from fraying. Telomeres shorten each time a cell divides. When telomeres have become too short, the cell usually dies or becomes senescent. Longer telomeres can indicate good health.[44]

People with short telomeres or high rates of telomere shortening have **triple** the rate of death from cardiovascular disease.[45] People over age 100 with longer telomeres have better cognitive function and fewer age-related diseases.[46]

Telomeres are lengthened by the enzyme **telomerase**, which is very active early in fetal development, but absent in most adult cells, the exception being stem cells, where some telomerase is present. But even in stem cells, telomerase activity is inadequate to maintain telomere length.[44]

Short stem cell telomeres result in insufficient replacement of blood cells,[47] brain cells,[48] and many other tissues.

Dr. Blasco believes that telomere shortening is a major cause of aging,[49] because of loss of stem cell function, loss of cells, increased numbers of senescent cells, and the inflammation produced by senescent cells.[50] But she also believes that aging due to telomere loss is **reversible**.[51]

Most cancer cells become immortal (prevent themselves from aging) by activating telomerase, and the severity of the cancer often corresponds to the amount of telomerase activity.[52]

Dr. Blasco's research team achieved a **24%** increase in the lifespan of one-year-old mice by delivering a

telomerase gene using a virus that does not incorporate the gene into chromosomes.[53] There was no increase in cancer.[53] Her team has also used the virus to deliver telomerase genes to increase survival of mice suffering from aplastic anemia,[54] and of mice who have suffered a myocardial infarction (heart attack).[55]

Factors from Young Blood to Rejuvenate the Elderly

Thomas Rando, MD, PhD (professor of neurology, Stanford University Medical Center, Stanford, California) supervised a landmark 2005 study which joined the circulatory system of young and old mice (**parabiosis**).[56]

The parabiosis experiment showed that the blood of young mice rejuvenated muscle stem cells in old mice, enhancing muscle regeneration after injury.[56] But in the young mice, the stem cells lost some of their regenerative potential from exposure to "old" circulating blood.[57]

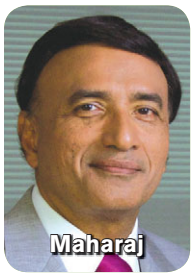
One of the students at the time conducting that experiment (Irina Conboy) later showed that the social bonding hormone **oxytocin** declines with age and contributes to muscle stem cell rejuvenation in old mice.[58] She also showed that the growth factor TGF-beta produced by old muscle cells inhibits muscle stem cell function.[59]

Another student at the time who had participated in the breakthrough 2005 parabiosis study (Amy Wagers) later showed that the growth factors **GDF11** and GDF8 (myostatin) decline with age and rejuvenate old mice when administered to them.[60]

Dr. Rando himself went on to show that repeated injections of young blood plasma improve cognitive function in old mice.[61] He also showed that inflammatory factors in the blood that increase with age, such as CCL11 caused reduction in stem cell activity.[62]

Proposed Clinical Trial with Young Blood Factors

Dipnarine Maharaj, MD (medical director, South Florida Bone Marrow/Stem Cell Transplant Institute, Boynton Beach, Florida) believes that increasing chronic inflammation as a consequence of aging causes decreasing function of stem cells, thereby impairing the function of bodily organs and tissues.



A study of elderly adults showed that high levels of **chronic inflammation** were highly predictive of low cognition, low bodily function, and a higher likelihood of impending death.[63] Most of the aging-related diseases (cancer, heart disease, stroke, Alzheimer's disease, arthritis, diabetes, etc.) are associated with chronic inflammation.[64]

Impairment of stem cell function reduces the ability of body tissues and organs to heal wounds and prevent impaired function due to cell depletion.[65] Elderly people become frail not only with respect to weak muscles and bones, but because of a frail brain, frail hormonal system, and frail immune system.[66]

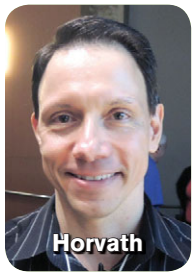
Adjoining the circulatory system of young mice to old mice (parabiosis) has shown rejuvenation of the old mice due to blood components of the young mice restoring stem cell function in the old mice.[67]

Dr. Maharaj wants to conduct clinical trials that demonstrate rejuvenation of elderly humans by infusion of stem cell-mobilized plasma from young, healthy humans. He has patented the procedure he would use in these clinical trials (patent 2014/0336443).

His procedure involves stimulating bone growth with oscillating magnetic fields, mobilizing stem cells from young donors by administering **G-CSF** (**granulocyte-colony stimulating factor**),[68] infusing plasma (not blood cells) containing growth factors mobilized by the G-CSF from the young donors into elderly subjects, and then assessing the youthfulness of the elderly subjects using eight biomarkers. The biomarkers include measures of inflammation, insulin sensitivity, telomere length, etc.

A Method to Evaluate Rejuvenation Therapies

Steve Horvath, PhD, ScD (professor, Human Genetics and Biostatistics, University of California, Los Angeles) has noticed that the addition of methyl groups to DNA increases with age (a process known as epigenetic change). Analyzing 7,844 samples of healthy human tissues, he developed a method of estimating chronological age that is **96%** correct.[69] Dr. Horvath believes that his method could be useful in evaluating rejuvenation therapies.[69]



His method demonstrates accelerated aging in HIV infection,[70] Parkinson's disease,[71] Down's syndrome,[72] and obesity.[73] His method also predicts impending death from any cause.[74]

Applying his method to the offspring of persons close to 105 years of age, he found the offspring to have an "epigenetic age" about five years younger than age-matched controls.[75-77]

Concluding Remarks

Based on these findings, we appear to be on the verge of breakthrough methods of rejuvenating human beings.

Sadly, vastly more money is spent on various forms of entertainment than on research to develop these methods.

There are currently initiatives to raise money for this research by the SENS Foundation, Age Reversal Therapeutics, Inc., and other organizations.

Life Extension supporters are encouraged to donate or invest in these organizations for the sake of their health, their longevity, and their survival, and the health, longevity, and survival of their loved-ones. ●

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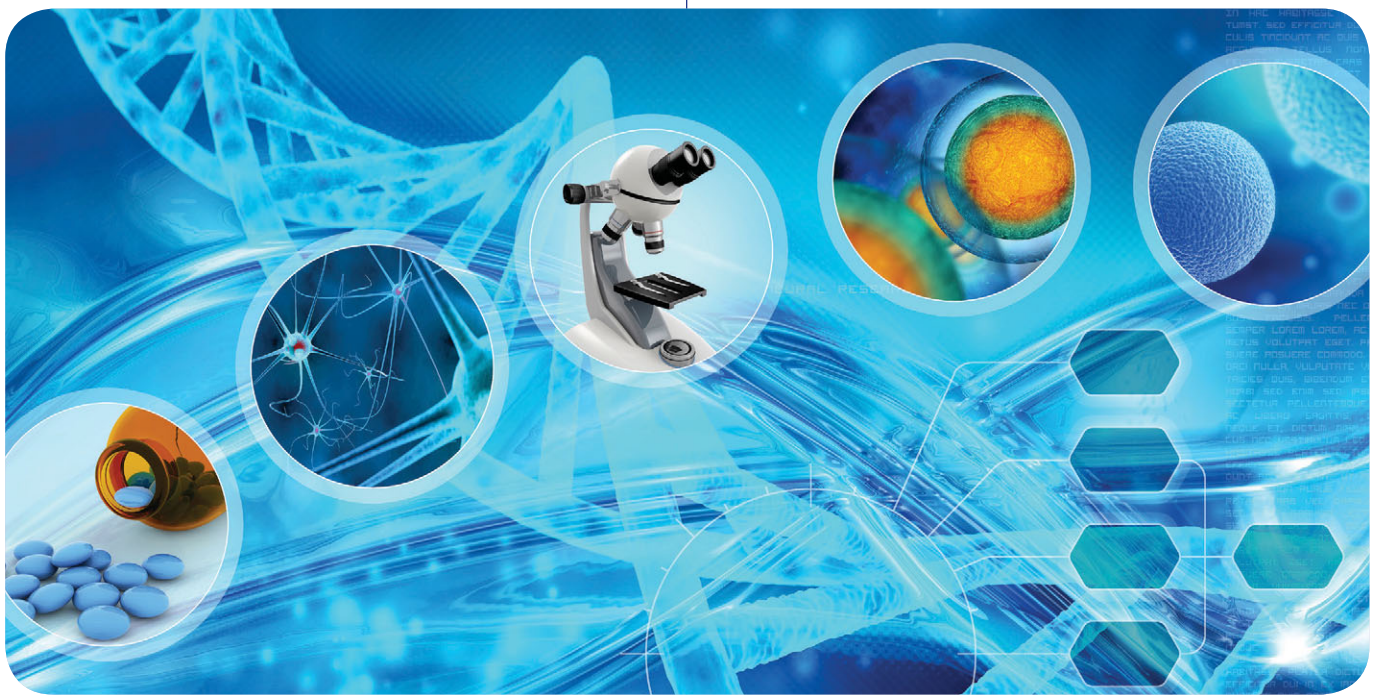

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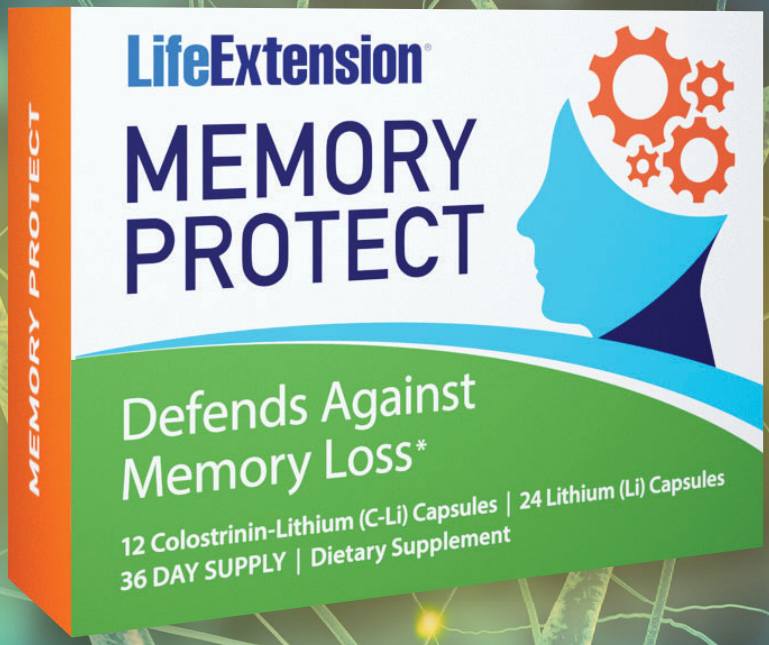

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Cancer

There's evidence to suggest that garlic has cancer-fighting abilities. For instance, the large-scale Iowa Women's Health Study analyzed the diets of over 41,000 middle-aged women and found that higher garlic consumption was associated with reduced colon cancer risk.[1]

Immune System

Research shows garlic can boost the human immune system. A randomized, double-blind, placebo-controlled study conducted during flu season found that subjects taking aged garlic extract had reduced cold and flu severity with fewer symptoms and had a lower number of school and work absences.[2]

Vitamins and Minerals

Garlic is notably rich in a number of important nutrients. Garlic contains fiber, as well as selenium, vitamin C, manganese, calcium, vitamin B6, copper, potassium, phosphorous, and iron.[3]

Heart Disease

Analysis of numerous studies has shown that garlic lowers total cholesterol levels and also lowers diastolic and systolic blood pressure.[4]

Antibiotic

Going back to the 19th century, when Louis Pasteur discovered during laboratory tests that it could kill bacteria, garlic has been known to have antibiotic properties. Studies comparing garlic to broad-spectrum commercial antibiotics have sometimes shown it to be the more effective of the two. And interestingly, bacteria don't seem to evolve a resistance to garlic the way they do with typical antibiotic medications.[5]

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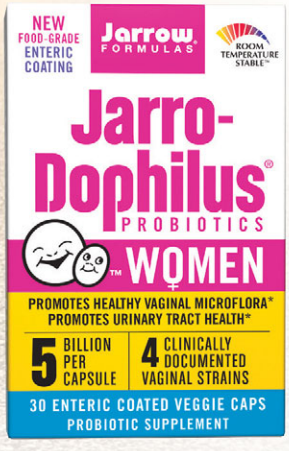

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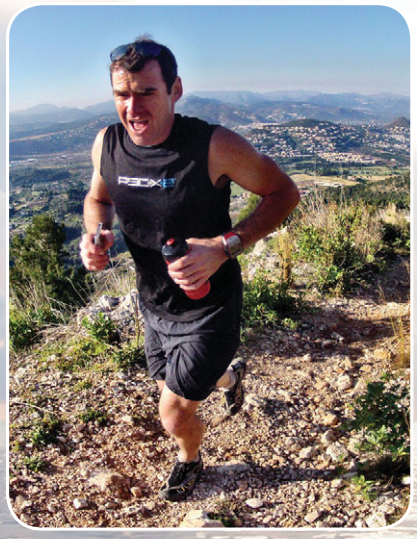

BY KYLE RODERICK

"My life's work is helping people exercise the right way for their bodies while inspiring them to accomplish feats they never dreamed possible," says yoga teacher and personal trainer Ted McDonald.

"We have the power to enhance our health as we mature. The key to unlocking this involves following a realistic exercise plan and scheduling extra time to rest. Taking time to regenerate your body and mind is as vital a part of a mature lifestyle as exercise."

McDonald also aims to help people of all ages repel aging through a combination of healthy diet and smart supplementation.

McDonald, age 45, is a globe-trotting yoga teacher and personal trainer to Tour de France cyclists, Olympic medalists, post-pregnancy mothers and mature adults who are late to the exercise game. He is also a triathlete, marathon runner and owner of 5 Point Yoga, the premier yoga and fitness studio in Malibu, Calif. A former ULCA lacrosse player, McDonald's positive-aging exercise programs for men and women are informed by evidence-based medical research. As founder of Yoga Adventures (adventureyogaretreats.com) Ted also leads people on adventure yoga and fitness vacations around the US and to countries such as Peru and Ethiopia.

This writer caught up with McDonald one afternoon while he babysat his infant daughter, Madison, his first child with wife Lauren Lobley. (A health coach, vegan chef and blogger, Lobley dispenses a treasure trove of healthy recipes, evidence-based mind/body research and information on her website, delectableyou.com)

While he has been teaching yoga since 2000, McDonald became hooked on mind/body discipline because it helped him prepare for and recover from marathons, triathlons and 24-hour adventure racing.

"24-hour adventure racing is a multisport event that includes mountain biking, kayaking, trekking and navigation across land and sea," McDonald says. He competed for four years on a team of men and women called the Zen Warriors.

"I raced on PowerBar's Team Elite," McDonald recalls. "I served as a navigator because I love plotting courses and guiding a team, despite the added mental exertion.

"A typical race could start off with a 14-mile three-person kayak race, followed by a 20-mile mountain-bike ride, which culminates in a 17-mile trek moving forward via running or hiking. Adventure racing can also involve coasteering, which is like mountaineering only along the seacoast. This means you're running on the beach or walking as fast as you can over the rocks."

Although McDonald has given up 24-hour adventure racing, he still competes in marathons and triathlons.

"My longtime yoga practice comes into play whenever I'm racing today," he says.

Along with teaching yoga and personally training clients, Ted works as the official yoga teacher for the BMC Tour de France team of cyclists.

"The BMC Tour de France training camp encompasses rigorous cycling practice and other workouts in the mountains of Spain," McDonald explains.

Every morning at the BMC training camp, McDonald leads the cyclists in a 30-minute "easy yoga flow class that gets their hearts going, promotes blood circulation, loosens them up and gets them focused for the day's training." After the morning yoga session, the cyclists ride in the mountains for four to six grueling hours.

"In the early evening," McDonald says, "the athletes do restorative yoga that helps them recover from the day's exertions for 45 minutes.

"In the 2016 Tour de France, one of the BMC team members from Belgium, Greg Van Avermaet, won a stage, which means he came in first during one section of the race. I felt so happy for him."

Following this successful showing, Van Avermaet went to the Rio Olympic Games and won a Gold Medal for a 236-kilometer road race.

"Phenomenal achievements like these remind me how fortunate I am to work with and learn from athletes who are continually developing their performance, endurance and recovery capabilities."

Speaking of recovery, McDonald diligently combs through peer-reviewed medical journals for exercise physiology and biology research studies on the subject.

"Research published in the June 2016 *FASEB Journal* (the official journal of the Federation of American Societies for Experimental Biology) suggests that the ability of muscles to repair themselves, though impeded by aging, can be gradually improved by enacting a regular exercise routine," McDonald says.

"It appears that in older populations, exercise can help promote muscle healing. This is important and especially great news for people 40 and over. Previously, exercise physiologists widely believed that muscle repair from injury consistently declined with age. These latest findings signal that it's never too late to reap the benefits of an exercise regimen."

In the study that McDonald is referring to, scientists tracked three groups of mice. One group consisted of young mice that were never exercise-trained, another consisted of old mice that were also never exercise-trained, while the third group was comprised of older mice that had been put through workouts.

The athletic older mice worked out three days per week for eight weeks. Scientists later tested all three groups after giving them a tiny dose of snake venom, which created a physiological condition that simulated the effect of a muscle injury. All the mice were tested 10 days after and then 28 days after they received the snake venom. The group of trained older mice had notably more muscle repaired compared to the two other groups.

Anytime is the right time to go outside for a brisk walk, hike or run.

"If you're into low-impact activities, you can ride a bike," McDonald suggests. "When you start to feel the positive physical, mental and emotional benefits of exercise, you will feel too energized to slide back into sedentary living."

While the major issues that affect members of the Baby Boomer population include declining muscle mass, loss of bone density, reduced cardiovascular fitness and declining aerobic capacity, McDonald observes that high-intensity interval training can be a highly effective strategy for managing these age-associated conditions.

"High-intensity interval training helps Baby Boomers condition and strengthen their bodies very effectively in a relatively short period of time," he says. "This is because it demands that the body function at high aerobic intensity while also forcing muscles and bones to work at their upper limits."

McDonald believes the exertions involved in high intensity interval training can help counteract the effects of aging.

Supplements For Enhanced Endurance

On a weekly basis, depending on the season and whether he's training for a marathon or a triathlon, Ted takes varying doses of vitamins.

Probiotics, schisandra fruit, maca root, green tea extract, spirulina, calcium and iron are also in the mix, along with reishi mushroom, ashwagandha root, whole plant chlorella, cordyceps mushroom, astragalus root, wolfberry, maitake mushroom, MSM, and rose hips.

Every day between meals, McDonald drinks a vegan, low-glycemic index protein drink.

He also takes an enzyme blend of amylase, cellulase, lactase, glucoamylase, alpha-galactosidase and invertase.

"Once you pass the age of 40, you still have to push yourself just as much as you did when you were in your 20s, if not more, but you need to give yourself extra time to recover from exercise," he says.

Citing an article about the scientific basis of high-intensity interval training published in the journal *Sports Medicine*, McDonald notes that plyometrics, also known as "jump training," is also another highly effective workout for developing speed and strength. Plyometrics involves learning how to move from a muscle extension into a contraction in rapid sequence, such as in specialized, repeated jumping.

"As long as you don't have arthritis or joint problems, plyometrics can be a great workout."

While exercise increases release of endorphins, the body's natural feel-good chemicals, "it also helps promote sounder sleep and initiates a cascade of other beneficial physiological processes that help build strength, balance and confidence," McDonald notes. "This confidence translates to physical grace and more self-assured body language, which in turn makes it easier for you to move through the world."

Exercise, however, is just one component of enjoying mental, emotional and physical fitness well into maturity. Another essential tool to adult wellness is blood and cholesterol tests.

"Body biochemistry panels provide essential evidence that will help you maintain the most positive diet and active, mature lifestyle," McDonald says. "I know this as a result of personal experience."

When he turned 40, McDonald decided to get blood work done so he knew the facts about his body biochemistry.

He finally got around to it at age 43, and lab results indicated that he was insulin resistant, "literally prediabetic."

McDonald realized that so much of the so-called "healthy" food he had been eating for years had been causing cumulative damage.

"I ate a lot of high carbohydrate foods such as oatmeal, bananas, sugar-rich protein bars and energy gels that are high in fructose," he says. "When I started adding up all the carbohydrates that I had been eating, I realized that one energy gel I regularly consumed contained **27 grams** of carbohydrate. I had been overstimulating my pancreas for years, which is why I was headed for diabetes."

After this wake-up call, McDonald totally revamped his diet.

"I cut out energy bars and energy gels and fructose-laden energy drinks, plus I stopped eating fruits except for berries. Because of the carbs in oatmeal, bread, rice and pasta, I also stopped eating these. I stopped eating corn chips and tortillas and reduced my corn consumption to a fraction of what I formerly ate. For healthy protein, healthy fat and energy, I started eating handfuls of nuts, mainly almonds, throughout the day. I also increased my intake of avocados and started eating wild fish twice weekly."

Three months later, McDonald got retested and his numbers had dropped markedly.

"I am living proof that exercise is no substitute for a bad diet. The upside of my insulin resistance scare is that it helps me explain how this condition can be reversed by eating a low-carb diet. Moreover, checking with one's doctor to establish a safe exercise regimen, customized supplementation, plus frequent rest and recovery periods rounds out the plan for optimal health." ●

Ted McDonald can be reached by email at ted@teddymcdonald.com. For inspiration and information on health and exercise, read his blog at teddymcdonald.com.

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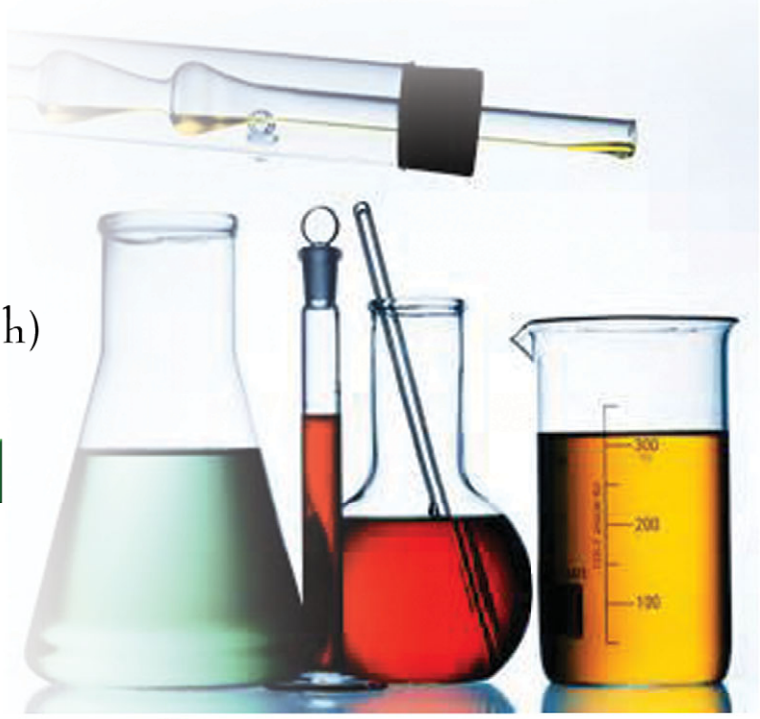

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Fort Lauderdale, FL 33309

Phone your order to: **1-800-208-3444**
Fax your order to: **1-866-728-1050**

PRODUCTS

Amino Acids

Arginine/L-Ornithine Capsules
Arginine Ornithine Powder
Branched Chain Amino Acids
D,L-Phenylalanine Capsules
L-Arginine Caps
L-Carnitine
L-Glutamine
L-Glutamine Powder
L-Lysine
L-Taurine Powder
L-Tyrosine Powder
Super Carnosine
Taurine

Blood Pressure & Vascular Support

Advanced Olive Leaf Vascular Support with Celery Seed Extract
Arterial Protect
Blood Pressure Monitor Arm Cuff
Dual Action Blood Pressure
Endothelial Defense™ with Pomegranate Complete and CORDIART™
Endothelial Defense™ with GliSODin®
Natural BP Management
NitroVasc with CORDIART™
Pomegranate Complete
Pomegranate Fruit Extract
Triple Action Blood Pressure AM/PM
VenoFlow

Bone Health

Bone Restore
Bone Restore with Vitamin K2
Bone Strength Formula with KoAct®
Bone-Up™
Calcium Citrate with Vitamin D
Dr. Strum's Intensive Bone Formula
Strontium Caps

Brain Health

Acetyl-L-Carnitine
Acetyl-L-Carnitine Arginate
Blast™
Brain Shield® Gastrodin
Cognitex® Basics
Cognitex® with Brain Shield®
Cognitex® with Pregnenolone & Brain Shield®
Cognizin® CDP-Choline Caps
DMAE Bitartrate (dimethylaminoethanol)
Dopa-Mind™
Ginkgo Biloba Certified Extract™
Huperzine A
Lecithin Granules
Memory Protect
Migra-Eeze™
Neuro-Mag® Magnesium L-Threonate
Neuro-Mag® Magnesium L-Threonate with Calcium and Vitamin D3
Optimized Ashwagandha Extract
PS (Phosphatidylserine) Caps
Vinpocetine

Cholesterol Management

Advanced Lipid Control
Cho-Less™
CHOL-Support™
Red Yeast Rice
Theaflavins Standardized Extract
Vitamin B3 Niacin Capsules

Digestion Support

Artichoke Leaf Extract
Digest RC®
Effervescent Vitamin C - Magnesium Crystals
Enhanced Super Digestive Enzymes
Enhanced Super Digestive Enzymes w/Probiotics
EsophaCool™
Esophageal Guardian
Extraordinary Enzymes
Fem Dophilus
Fiber-Immune Support
Gastro-Ease
Ginger Force®
Organic Golden Flax Seed
Pancreatin
Regimint
Tranquil Tract™
TruFiber™
WellBetX PGX plus Mulberry

Energy Management

Adrenal Energy Formula
Asian Energy Boost
D-Ribose Powder
D-Ribose Tablets
Forskolin
Mitochondrial Basics with BioPQQ®
Mitochondrial Energy Optimizer with BioPQQ®
NAD+ Cell Regenerator™
Peak ATP® with GlycoCarn®
PQQ Caps with BioPQQ®
Rhodiola Extract
RiboGen™ French Oak Wood Extract
Triple Action Thyroid

Eye Health

Astaxanthin with Phospholipids
Brite Eyes III
Certified European Bilberry Extract
Eye Pressure Support with Mirtogenol®
MacuGuard® Ocular Support
MacuGuard® Ocular Support with Astaxanthin
Tear Support with MaquiBright®

Fish Oil & Omegas

OMEGA FOUNDATIONS® Mega EPA/DHA
OMEGA FOUNDATIONS® Mega GLA with Sesame Lignans
OMEGA FOUNDATIONS® Super Omega-3 EPA/DHA with Sesame Lignans & Olive Extract
OMEGA FOUNDATIONS® Super Omega-3 Plus EPA/DHA with Sesame Lignans, Olive Extract, Krill & Astaxanthin
OMEGA FOUNDATIONS® Provinal® Purified Omega-7
OMEGA FOUNDATIONS® Vegetarian DHA
Organic Golden Flax Seed

Food

California Estate Extra Virgin Olive Oil
Rich Rewards® Breakfast Blend
Rich Rewards® Breakfast Blend Natural Mocha Flavor
Rich Rewards® Breakfast Blend Natural Vanilla Flavor
Rich Rewards® Breakfast Blend Whole Bean Coffee
Rich Rewards® Decaf Roast
Stevia Sweetener

Glucose Management

CinSulin® with InSea2® and Crominex® 3+
Mega Benfotiamine
Natural Glucose Absorption Control
Tri Sugar Shield®

Heart Health

Aspirin (Enteric Coated)
BioActive Folate & Vitamin B12 Caps
Cardio Peak™ with Standardized Hawthorn and Arjuna
Optimized Carnitine with GlycoCarn®
Super Ubiquinol CoQ10
Super Ubiquinol CoQ10 with BioPQQ®
Super Ubiquinol CoQ10 with Enhanced Mitochondrial Support™
Super-Absorbable CoQ10 Ubiquinone with *d*-Limonene
TMG Powder
TMG Liquid Capsules

Hormone Balance

DHEA (Dehydroepiandrosterone)
Inner Power
Pregnenolone
Triple Action Cruciferous Vegetable Extract with Resveratrol
Triple Action Cruciferous Vegetable Extract

Immune Support

AHCC®
Echinacea Extract
Enhanced Zinc Lozenges
Immune Modulator with Tinofend®
Immune Protect with PARACTIN®
Immune Senescence Protection Formula™
Kinoko® Gold AHCC
Kinoko® Platinum AHCC
Kyolic® Garlic Formula 102
Kyolic® Reserve
Lactoferrin (apolactoferrin) Caps
NK Cell Activator™
Optimized Garlic
Optimized Quercetin
Peony Immune
ProBoost Thymic Protein A
Reishi Extract Mushroom Complex
Standardized *Cistanche*
Ten Mushroom Formula®
Zinc Lozenges

Inflammation Management

5-LOX Inhibitor with AprèsFlex®
Advanced Bio-Curcumin® with Ginger & Turmerones
Black Cumin Seed Oil
Black Cumin Seed Oil with Bio-Curcumin®
Boswella
Cytokine Suppress™ with EGCG
Serraflazyme
Specially-Coated Bromelain
Super Bio-Curcumin®
Zyflamend® Whole Body

Joint Support

Arthro-Immune Joint Support
ArthroMax® Advanced with UC-II® & AprèsFlex®
ArthroMax® with Theaflavins & AprèsFlex®
ArthroMax® Herbal Joint Formula
Bio-Collagen with Patented UC-II®
Fast-Acting Joint Formula
Glucosamine/Chondroitin Capsules
Krill Healthy Joint Formula
MSM (Methylsulfonylmethane)

Kidney & Bladder Support

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

Liver Health & Detoxification

Anti-Alcohol with HepatoProtection Complex
Calcium D-Glucarate
Chlorella
Chlorophyllin
European Milk Thistle
Glutathione, Cysteine & C
HepatoPro
Liver Efficiency Formula
N-Acetyl-L-Cysteine
PectaSol-C®
Silymarin
SODzyme® with GliSODin® & Wolfberry

Longevity & Wellness

Ageless Cell™
Alpha-Lipoic Acid
AMPK Activator
AppleWise Polyphenol Extract
Berry Complete
Blueberry Extract
Blueberry Extract with Pomegranate
CR Mimetic Longevity Formula

DNA Protection Formula
Enhanced Berry Complete with Acai
Essential Daily Nutrients
Grapeseed Extract with Resveratrol & Pterostilbene
Mediterranean Whole Food Blend
Mega Green Tea Extract (decaffeinated)
Mega Green Tea Extract (lightly caffeinated)
Optimized Fucoidan with Maritech® 926
Optimized Resveratrol
Optimized Resveratrol with Nicotinomide Riboside
pTeroPure®
Pycnogenol® French Maritime Pine Bark Extract
Resveratrol with Pterostilbene
RNA (Ribonucleic Acid)
Super R-Lipoic Acid
X-R Shield

Men's Health

Mega Lycopene Extract
PalmettoGuard® Saw Palmetto with Beta-Sitosterol
PalmettoGuard® Saw Palmetto/Nettle Root Formula with Beta-Sitosterol
Pomi-T®
Prelox® Natural Sex for Men®
Super MiraForte with Standardized Lignans
Triple Strength ProstaPollen™
Ultra Natural Prostate

Minerals

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

Miscellaneous

Potassium Iodide
Solarshield® Sunglasses

Mood & Stress Management

5 HTP
L-Theanine
Natural Cortisol Balance
Natural Stress Relief
SAMe (S-Adenosyl-Methionine)

Multivitamins

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

Personal Care

Anti-Aging Rejuvenating Scalp Serum
Biosil
Dr. Proctor's Advanced Hair Formula
Dr. Proctor's Shampoo
European Leg Solution Featuring Certified Diosmin 95
Face Master Platinum Facial Toning System
Hair, Skin & Nail Rejuvenation Formula w/VERISOL®
Hair Suppress Formula
Life Extension Toothpaste
Sinus Cleanser
Venotone
Xyliwhite Mouthwash

Pet Care

Cat Mix
Dog Mix

Probiotics

Bifido GI Balance
BroccoMax®
FLORASSIST® Balance
FLORASSIST® GI with Phage Technology
FLORASSIST® Heart Health
FLORASSIST® Mood
FLORASSIST® Oral Hygiene
FLORASSIST® Throat Health
Jarro-Dophilus® for Women
Theralac® Probiotics
TruFlora® Probiotics

Skin Care

Advanced Anti-Glycation Peptide Serum
Advanced Lightening Cream
Advanced Peptide Hand Therapy
Advanced Triple Peptide Serum
Advanced Under Eye Serum with Stem Cells
Amber Self MicroDermAbrasion
Anti-Aging Face Oil
Anti-Aging Mask
Anti-Aging Rejuvenating Face Cream
Anti-Glycation Serum with Blueberry & Pomegranate Extracts
Antioxidant Facial Mist
Anti-Oxidant Rejuvenating Foot Cream
Anti-Redness & Adult Blemish Lotion
Bioflavonoid Cream
Broccoli Sprout Cream
Collagen Boosting Peptide Serum
Corrective Clearing Mask
DNA Repair Cream
Essential Plant Lipids Reparative Serum
Eye Lift Cream
Face Rejuvenating Anti-Oxidant Cream
Fine Line-Less
Healing Formula
Healing Mask
Healing Vitamin K Cream
Hyaluronic Facial Moisturizer
Hyaluronic Oil-Free Facial Moisturizer
Hydrating Anti-Oxidant Facial Mist
Hydroderm
Lifting & Tightening Complex
Lycopene Cream
Melatonin Cream
Mild Facial Cleanser
Multi Stem Cell Skin Tightening Complex
Neck Rejuvenating Anti-Oxidant Cream
Pigment Correcting Cream
Rejuvenating Serum
Rejuvenex® Body Lotion
RejuveneX® Factor Firming Serum
Renewing Eye Cream
Resveratrol Anti-Oxidant Serum
Shade Factor
Skin Lightening Serum
Skin Restoring Phytoceramides with Lipowheat®
Skin Stem Cell Serum
Skin Tone Equalizer
Stem Cell Cream with Alpine Rose
Tightening & Firming Neck Cream
Triple-Action Vitamin C Cream
Ultimate MicroDermabrasion
Ultra Eyelash Booster
Ultra Lip Plumper
Ultra Rejuvenex®
Ultra RejuveNight®
Ultra Wrinkle Relaxer
Under Eye Refining Serum
Under Eye Rescue Cream
Vitamin C Serum
Vitamin D Lotion
Vitamin E-ssential Cream
Youth Serum

Sleep

Bioactive Milk Peptides
Enhanced Natural Sleep® with Melatonin
Enhanced Natural Sleep® without Melatonin
Fast-Acting Liquid Melatonin
Glycine
L-Tryptophan
Melatonin
Optimized Tryptophan Plus

Sports Performance

Creatine Capsules
Creatine Whey Glutamine Powder (Vanilla Flavor)
New Zealand Whey Protein Concentrate (Natural Chocolate and Vanilla Flavor)
Tart Cherry with CherryPure®
Whey Protein Isolate (Chocolate and Vanilla Flavor)

Vitamins

Ascorbyl Palmitate
Benfotiamine with Thiamine
Beta-Carotene
BioActive Complete B-Complex
Biotin
Buffered Vitamin C Powder
Fast-C® with Dihydroquercetin
Gamma E Mixed Tocopherol Enhanced with Sesame Lignans
Gamma E Mixed Tocopherol/Tocotrienols
High Potency Optimized Folate
Inositol Caps
Liquid Emulsified Vitamin D3
Liquid Vitamin D3
Low-Dose Vitamin K2
Methylcobalamin
MK-7
Natural Vitamin E
No Flush Niacin
Optimized Folate (L-Methylfolate)
Pantothenic Acid (Vitamin B-5)
Pyridoxal 5'-Phosphate Caps
Super Absorbable Tocotrienols
Super Ascorbate C Capsules
Super Ascorbate C Powder
Super K with Advanced K2 Complex
Vitamin B12
Vitamin B6
Vitamin C with Dihydroquercetin
Vitamin D3 with Sea-Iodine™
Vitamin D3
Vitamins D and K with Sea-Iodine™

Weight Management

7-Keto® DHEA Metabolite
Advanced Anti-Adipocyte Formula
Advanced Natural Appetite Suppress
CalReduce Selective Fat Binder
DHEA Complete
Garcinia HCA
HCActive™ Garnicia Cambogia Extract
Integra-Lean®
Mediterranean Trim with Sinetrol™-XPur
Optimized Irvingia with Phase 3™ Calorie Control Complex
Optimized Saffron with Satiereal®
Super Citrimax®
Super CLA Blend with Guarana and Sesame Lignans
Super CLA Blend with Sesame Lignans
Waist-Line Control™

Women's Health

Advanced Natural Sex for Women® 50+
Breast Health Formula
Femmenessence MacaPause®
Natural Estrogen
Progesta-Care®
Super-Absorbable Soy Isoflavones
Ultra Soy Extract

ITEM No.	PRODUCT	Retail Each $	YOUR PRICE 1 Unit Each	4 Unit Each	10 Unit Each	QTY	Total
	A						
01524	**ACETYL-L-CARNITINE** • 500 mg, 100 veg. caps	34.00	25.50	22.50			
01874	**ACETYL-L-CARNITINE ARGINATE** • 90 veg. caps	52.00	39.00	35.00			
01628	**ADRENAL ENERGY FORMULA** • 60 veg. caps	24.00	18.00	16.50			
01630	**ADRENAL ENERGY FORMULA** • 120 veg. caps	46.00	34.50	31.50			
01828	**ADVANCED LIPID CONTROL** • 60 veg. caps	30.00	22.50	20.25			
02119	**AGELESS CELL™** • 30 softgels	40.00	30.00	27.00			
00681	**AHCC®** • 500 mg, 30 caps	59.98	44.99				
24404	**AHCC® (KINOKO® PLATINUM)** • 750 mg, 60 veg. caps	84.95	63.71				
29727	**AHCC® (KINOKO® GOLD)** • 500 mg, 60 veg. caps	74.95	52.47				
00457	**ALPHA-LIPOIC ACID W/BIOTIN** • 250 mg, 60 caps	37.00	27.75	24.00			
01907	**AMPK ACTIVATOR** • 90 veg. caps	48.00	36.00	33.00			
01509	**ANTI-ADIPOCYTE FORMULA W/MERATRIM® & INTEGRA LEAN®** (Advanced) • 60 veg. caps	39.00	29.25	27.00			
02140	**ANTI-ALCOHOL w/HEPATOPRO COMPLEX** • 60 caps	22.00	16.50	15.00			
01625	**APPLEWISE POLYPHENOL EXTRACT** 600 mg, 30 veg. caps	21.00	15.75	14.25			
01039	**ARGININE/ORNITHINE** • 500/250, 100 caps	17.99	13.49				
00038	**ARGININE/ORNITHINE POWDER** • 150 grams	22.95	17.21	14.25			
01624	**(L)-ARGININE CAPS** • 700 mg, 200 veg. caps	26.50	19.88	17.44			
02004	**ARTERIAL PROTECT** • 30 veg. caps	48.00	36.00	33.00			
01617	**ARTHROMAX® W/THEAFLAVINS & APRÈSFLEX®** 120 veg. caps	44.00	33.00	30.00			
01618	**ARTHROMAX® ADVANCED W/UC-II® & APRÈSFLEX®** 60 caps	36.00	27.00	24.00			
02108	**ARTHROMAX® HERBAL JOINT FORMULA** • 60 veg. caps	40.00	30.00	27.00			
01404	**ARTHRO-IMMUNE JOINT SUPPORT** • 60 veg. caps	32.00	24.00	21.00			
00919	**ARTICHOKE LEAF EXTRACT** • 500 mg, 180 veg. caps	30.00	22.50	21.00			
01533	**ASCORBYL PALMITATE** • 500 mg, 100 veg. caps	22.50	16.88	15.00			
00888	**ASHWAGANDHA EXTRACT** (Optimized) • 60 veg. caps	10.00	7.50	6.75			
01805	**ASIAN ENERGY BOOST** • 90 veg. caps	24.00	18.00	16.50			
01066	**ASPIRIN** • 81 mg, 300 enteric coated tablets	6.00	4.50	4.00			
01923	**ASTAXANTHIN WITH PHOSPHOLIPIDS** • 4 mg, 30 softgels	16.00	12.00	10.50			
	B						
00920	**BENFOTIAMINE W/ THIAMINE** • 100 mg, 120 veg. caps	19.95	14.96	13.95			
00925	**BENFOTIAMINE** (Mega) • 250 mg, 120 veg. caps	30.00	22.50	20.25			
01206	**BERRY COMPLETE** • 30 veg. caps	21.00	15.75	14.00			
01496	**BERRY COMPLETE W/ACAI** (Enhanced) • 60 veg. caps	29.00	21.75	19.50			
00664	**BETA-CAROTENE** • 25,000 IU, 100 softgels	11.50	8.63				
01622	**BIFIDO GI BALANCE** • 60 veg. caps	20.00	15.00	13.50			
01873	**BILBERRY EXTRACT** • 100 mg, 90 veg. caps	36.00	27.00	24.00			
01512	**BIOACTIVE MILK PEPTIDES** • 30 caps	18.00	13.50	12.00			
01631	**BIO-COLLAGEN W/PATENTED UC-II®** • 40 mg, 60 small caps	36.00	27.00	24.00			
††01006	**BIOSIL™** • 5 mg, 30 veg. caps	19.99	15.99				
††01007	**BIOSIL™** • 1 fl oz	31.99	25.59				
00102	**BIOTIN** • 600 mcg, 100 caps	7.50	5.63	4.88			
01709	**BLACK CUMIN SEED OIL** • 60 softgels	16.00	12.00	10.50			
01710	**BLACK CUMIN SEED OIL W/BIO-CURCUMIN®** • 60 softgels	32.00	24.00	22.50			

SUBTOTAL OF COLUMN 1

ITEM No.	PRODUCT	Retail Each $	YOUR PRICE 1 Unit Each	4 Unit Each	10 Unit Each	QTY	Total
01008	**BLAST™** • 600 grams of powder	26.95	20.21				
02025	**BLOOD PRESSURE** (Dual Action) • 60 veg. tabs	44.00	33.00	28.00			
70000	**BLOOD PRESSURE MONITOR (ACCUFIT™)** • med/lg cuff	79.99	49.99				
70004	**BLOOD PRESSURE MONITOR** • Digital wrist cuff	69.95	52.46				
02024	**BLOOD PRESSURE** (Triple Action AM/PM) • 60 veg. tabs	44.00	33.00	28.00			
01214	**BLUEBERRY EXTRACT** • 60 veg. caps	22.50	16.88	15.00			
01438	**BLUEBERRY EXTRACT W/ POMEGRANATE** • 60 veg. caps	30.00	22.50	20.25			
01506	**BONE FORMULA** (DR. STRUM'S INTENSIVE) • 300 caps	56.00	42.00	37.50			
01726	**BONE RESTORE** • 120 caps	22.00	16.50	14.25			
01727	**BONE RESTORE W/VITAMIN K2** • 120 caps	24.00	18.00	16.50			
01725	**BONE STRENGTH FORMULA W/KOACT®** • 120 caps	45.00	33.75	30.00			
00313	**BONE-UP®** • 240 caps	28.95	21.71	20.41			
01661	**BORON** • 3 mg, 100 veg. caps	5.95	4.46	3.94			
00202	**BOSWELLA** • 100 caps	38.00	28.50	22.50			
01802	**BRAIN SHIELD® GASTRODIN** • 300 mg, 60 veg. caps	33.00	24.75	22.50			
01253	**BRANCHED CHAIN AMINO ACIDS** • 90 caps	19.50	14.63	12.75			
01942	**BREAST HEALTH FORMULA** • 60 caps	34.00	25.50	22.50			
00893	**BRITE EYES III** • 2 vials, 5 ml each	34.00	25.50	24.00			
26576	**BROCCO MAX®** • 60 veg. caps	26.95	20.21				
01203	**BROMELAIN** (Specially-coated) 500 mg, 60 enteric coated tablets	21.00	15.75	14.25			
	C						
01653	**CALCIUM CITRATE W/VITAMIN D** • 300 caps	24.00	18.00	15.94			
01651	**CALCIUM D-GLUCARATE** • 200 mg, 60 veg. caps	18.00	13.50	11.25			
†01823	**CALREDUCE SELECTIVE FAT BINDER** 120 mint chewable tablets	45.00	33.75	28.50			
01700	**CARDIO PEAK™ w/STANDARDIZED HAWTHORN & ARJUNA** 120 veg. caps	36.00	27.00	24.00			
00916	**CARNITINE W/GLYCOCARN®** (Optimized) • 60 veg. caps	36.00	27.00	24.00			
01532	**L-CARNITINE** • 500 mg, 30 veg. caps	15.00	11.25	9.90			
01829	**CARNOSINE** • 500 mg, 60 veg. caps	36.00	27.00	24.00			
02020	**CARNOSINE** (Super) • 500 mg, 60 veg. caps	40.00	30.00	27.00			
01932	**CAT MIX** • 100 grams powder	14.00	10.50	8.25			
01899	**CHILDREN'S FORMULA LIFE EXTENSION MIX™** 100 chewable tablets	20.00	15.00	13.50			
00550	**CHLORELLA** • 500 mg, 200 tablets	23.98	17.99				
01571	**CHLOROPHYLLIN** • 100 mg, 100 veg. caps	24.00	18.00	15.00			
01359	**CHO-LESS™** • 90 capsules	35.00	26.25				
01910	**CHOL-SUPPORT™** • 60 liquid veg. caps	48.00	36.00	32.00			
01504	**CHROMIUM W/CROMINEX®** 3+ (Optimized) 500 mcg, 60 veg. caps	9.00	6.75	6.00			
01503	**CINSULIN® W/INSEA2® AND CROMINEX® 3+** • 90 veg. caps	38.00	28.50	25.50			
01906	***CISTANCHE*** (Standardized) • 30 veg. caps	20.00	15.00	12.00			
01818	**CITRIMAX®** (Super) • 180 veg. caps	40.00	30.00	28.50			
00818	**CLA BLEND W/SESAME LIGNANS** (Super) 120 softgels	36.00	27.00	24.75	19.75		
00819	**CLA BLEND W/GUARANA & SESAME LIGNANS** (Super) 120 softgels	42.00	31.50	28.75			
01896	**COGNITEX® W/BRAIN SHIELD®** • 90 softgels	60.00	45.00	39.00	36.00		

SUBTOTAL OF COLUMN 2

ITEM No.	PRODUCT	Retail Each $	YOUR PRICE 1 Unit Each	4 Unit Each	10 Unit Each	QTY	Total
01897	**COGNITEX® W/PREGNENOLONE & BRAIN SHIELD®** 90 softgels	62.00	46.50	39.75	37.50		
01421	**COGNITEX® BASICS** • 60 softgels	38.00	28.50	26.25	24.00		
01659	**COGNIZIN® CDP CHOLINE CAPS** • 250 mg, 60 veg. caps	36.00	27.00	25.50			
01945	**COMPLETE B-COMPLEX** (BioActive) • 60 veg. caps	12.00	9.00	8.00			
02198	**COMPREHENSIVE NUTRIENT PACKS ADVANCED** • 30 packs	90.00	67.50	61.50			
01949	**COQ10 w/*d*-LIMONENE** (Super-Absorbable) 50 mg, 60 softgels	25.00	18.75	16.50	15.00		
01948	**COQ10 w/*d*-LIMONENE** (Super-Absorbable) 100 mg, 100 softgels	46.00	34.50	28.00	26.25		
01929	**COQ10** (Super Ubiquinol) • 100 mg, 60 softgels	56.00	42.00	36.00	33.00		
01733	**COQ10 w/BIOPQQ®** (Super Ubiquinol) • 100 mg, 30 softgels	54.00	40.50	33.00	30.00		
01426	**COQ10 w/ENH MITOCHONDRIAL SUPPORT™** (Super Ubiquinol) • 100 mg, 60 softgels	62.00	46.50	39.00	36.00		
01425	**COQ10 w/ENH MITOCHONDRIAL SUPPORT™** (Super Ubiquinol) • 50 mg, 100 softgels	58.00	43.50	34.50	31.50		
01427	**COQ10 w/ENH MITOCHONDRIAL SUPPORT™** (Super Ubiquinol) • 50 mg, 30 softgels	20.00	15.00	12.00			
01431	**COQ10 w/ENH MITOCHONDRIAL SUPPORT™** (Super Ubiquinol) • 200 mg, 30 softgels	62.00	46.50	39.00	36.00		
00862	**CRAN-MAX®** • 500 mg, 60 veg. caps	17.50	13.13	11.25			
01424	**CRAN-MAX® WITH ELLIROSE™** (Optimized) • 60 veg. caps	18.00	13.50	12.00			
01529	**CREATINE CAPSULES** • 120 veg. caps	10.95	8.21	6.94			
01746	**CREATINE WHEY GLUTAMINE POWDER** • 454 grams (vanilla)	30.00	22.50	19.50			
01429	**CR MIMETIC LONGEVITY FORMULA** • 60 veg. caps	39.00	29.25	27.00			
00407	**CURCUMIN®** (Super Bio) • 400 mg, 60 veg. caps	38.00	28.50	26.25			
01924	**CURCUMIN® W/GINGER & TURMERONES** (Advanced Bio) 30 softgels	30.00	22.50	20.25			
01804	**CYTOKINE SUPPRESS™ W/EGCG** • 30 veg. caps	30.00	22.50	20.25			
	COSMESIS						
80157	**ADVANCED ANTI-GLYCATION PEPTIDE SERUM** • 1 oz	53.00	39.75	34.50			
80154	**ADVANCED LIGHTENING CREAM** • 1 oz	65.00	48.75	42.75			
80155	**ADVANCED PEPTIDE HAND THERAPY** • 4 oz	46.00	34.50	29.25			
80152	**ADVANCED TRIPLE PEPTIDE SERUM** • 1 oz	65.00	48.75	42.75			
80140	**ADVANCED UNDER EYE SERUM W/STEM CELLS** • .33 oz	49.00	36.75	31.50			
80139	**AMBER SELF MICRODERMABRASION** • 2 oz	49.00	36.75	31.50			
80158	**ANTI-AGING FACE OIL** • 1 oz	59.00	44.25	39.00			
80118	**ANTI-AGING MASK** • 2 oz	72.00	54.00	47.52			
80151	**ANTI-AGING REJUVENATING FACE CREAM** • 2 oz	65.00	48.75	42.75			
80153	**ANTI-AGING REJUVENATING SCALP SERUM** • 2 oz	46.00	34.50	29.25			
80134	**ANTI-GLYCATION SERUM W/BLUEBERRY & POMEGRANATE EXTRACTS** • 1 oz	33.00	24.75	23.51			
80133	**ANTIOXIDANT FACIAL MIST** • 2 oz	32.00	24.00	22.80			
80127	**ANTIOXIDANT REJUVENATING FOOT CREAM** • 2 oz	45.00	33.75	32.10			
80105	**ANTI-REDNESS & ADULT BLEMISH LOTION** • 1 oz	74.50	55.88	49.17			
80147	**BIOFLAVONOID CREAM** • 1 oz	46.00	34.50	29.25			
80144	**BROCCOLI SPROUT CREAM** • 1 oz	46.00	34.50	29.25			
80156	**COLLAGEN BOOSTING PEPTIDE SERUM** • 1 oz	59.00	44.25	39.00			
80120	**CORRECTIVE CLEARING MASK** • 2 oz	64.50	48.38	42.57			
80141	**DNA REPAIR CREAM** • 1 oz	49.00	36.75	31.50			

SUBTOTAL OF COLUMN 3

ITEM No.	PRODUCT	Retail Each $	YOUR PRICE 1 Unit Each	4 Unit Each	10 Unit Each	QTY	Total
80108	**ESSENTIAL PLANT LIPIDS REPARATIVE SERUM** • 1 oz	74.95	56.21	49.46			
80163	**EYE LIFT CREAM** • 0.5 fl oz	59.00	44.25	39.00			
80123	**FACE REJUVENATING ANTIOXIDANT CREAM** • 2 oz	69.50	52.13	45.87			
80107	**FINE LINE-LESS** • 1 oz	74.50	55.88	49.17			
80131	**HAIR SUPPRESS FORMULA** • 4 oz	59.00	44.25	38.94			
80137	**HEALING FORMULA ALL-IN-ONE CREAM** • 1 oz	53.00	39.75	34.07			
80115	**HEALING MASK** • 2 oz	64.50	48.38	42.57			
80102	**HEALING VITAMIN K CREAM** • 1 oz	79.50	59.63	52.47			
80109	**HYALURONIC FACIAL MOISTURIZER** • 1 oz	58.00	43.50	38.28			
80110	**HYALURONIC OIL-FREE FACIAL MOISTURIZER** • 1 oz	58.00	43.50	38.28			
80138	**HYDRATING ANTIOXIDANT FACE MIST** • 4 oz	39.95	29.96	28.50			
80103	**LIFTING & TIGHTENING COMPLEX** • 1 oz	74.50	55.88	49.17			
80146	**LYCOPENE CREAM** • 1 oz	28.00	21.00	19.05			
80135	**MELATONIN CREAM** • 1 oz	33.00	24.75	20.33			
80114	**MILD FACIAL CLEANSER** • 8 fl. oz	59.00	44.25	38.94			
80159	**MULTI STEM CELL SKIN TIGHTENING COMPLEX** • 1 oz	59.00	44.25	39.00			
80122	**NECK REJUVENATING ANTIOXIDANT CREAM** • 2 oz	64.00	48.00	42.24			
80111	**PIGMENT CORRECTING CREAM** • 1/2 oz	74.00	55.50	48.84			
80106	**REJUVENATING SERUM** • 1 oz	74.50	55.88	49.17			
80150	**RENEWING EYE CREAM** • 1/2 oz	65.00	48.75	42.75			
80142	**RESVERATROL ANTI-OXIDANT SERUM** • 1 oz	46.00	34.50	29.25			
80112	**SKIN LIGHTENING SERUM** • 1/2 oz	85.00	63.75	56.10			
80130	**SKIN STEM CELL SERUM** • 1 oz	74.00	55.50	51.75			
80164	**SKIN TONE EQUALIZER** • 12 ml	59.00	44.25	39.00			
80143	**STEM CELL CREAM W/ALPINE ROSE** • 1 oz	66.00	49.50	43.50			
80148	**TIGHTENING & FIRMING NECK CREAM** • 2 oz	39.00	29.25	26.25			
80161	**TRIPLE ACTION VITAMIN C CREAM** • 1 oz jar	59.00	44.25	39.00			
80162	**ULTIMATE MICRODERMABRASION** • 8 fl. oz	39.00	29.25	26.25			
80160	**ULTRA EYELASH BOOSTER** • 0.25 oz (2 units $39)	59.00	44.25				
80116	**ULTRA LIP PLUMPER** • 1/3 oz	64.00	48.00	42.24			
80101	**ULTRA WRINKLE RELAXER** • 1 oz	89.95	67.46	59.82			
80113	**UNDER EYE REFINING SERUM** • 1/2 oz	74.50	55.88	49.17			
80104	**UNDER EYE RESCUE CREAM** • 1/2 oz	74.50	55.88	49.17			
80129	**VITAMIN C SERUM** • 1 oz	85.00	63.75	56.10			
80136	**VITAMIN D LOTION** • 4 oz	36.00	27.00	25.25			
80145	**VITAMIN E-ESSENTIAL CREAM** • 1 oz	28.00	21.00	19.50			
80149	**YOUTH SERUM** • 1 oz	65.00	48.75	42.75			
	D						
00658	**7-KETO® DHEA METABOLITE** • 25 mg, 100 caps	28.00	21.00	18.00			
01479	**7-KETO® DHEA METABOLITE** • 100 mg, 60 veg. caps	40.00	30.00	27.00			
01640	**DHA** (Vegetarian) • 30 veg. softgels	20.00	15.00	13.50			
00607	**DHEA** • 25 mg, 100 tablets (Dissolve in mouth)	14.00	10.50	8.81			
01478	**DHEA COMPLETE** • 60 veg. caps	48.00	36.00	32.40			
00335	**DHEA** • 25 mg, 100 caps	16.00	12.00	11.00			
00454	**DHEA** • 15 mg, 100 caps	14.00	10.50	9.00			
00882	**DHEA** • 50 mg, 60 caps	19.00	14.25	12.75			

SUBTOTAL OF COLUMN 4

ITEM No.	PRODUCT	Retail Each $	YOUR PRICE 1 Unit Each	4 Unit Each	10 Unit Each	QTY	Total
01689	**DHEA** • 100 mg, 60 veg. caps	24.00	18.00	16.50			
01358	**DIGEST RC®** • 30 tablets	19.95	14.96	12.75			
02021	**DIGESTIVE ENZYMES** (Enhanced Super) • 60 veg. caps	22.00	16.50	15.00			
02022	**DIGESTIVE ENZYMES w/PROBIOTICS** (Enhanced Super) • 60 veg. caps	28.00	21.00	18.00			
01671	**D, L-PHENYLALANINE** • 500 mg, 100 veg. caps	18.75	14.06	12.00			
01540	**DMAE BITARTRATE** • 150 mg, 200 veg. caps	18.00	13.50	11.25			
01570	**DNA PROTECTION FORMULA** • 60 veg. caps	34.00	25.50	24.00			
01931	**DOG MIX** • 100 grams powder	18.00	13.50	11.25			
02006	**DOPA-MIND™** • 60 veg. tabs	44.00	33.00	28.00			
00321	**DR. PROCTOR'S ADVANCED HAIR FORMULA** • 2 oz	39.95	29.96	24.00			
00320	**DR. PROCTOR'S HAIR SHAMPOO** • 8 oz	24.95	18.71	16.50			
	E						
01528	**ECHINACEA EXTRACT** • 250 mg, 60 veg. caps	14.35	10.76	9.38			
01997	**ENDOTHELIAL DEFENSE™ w/POMEGRANATE COMPLETE AND CORDIART™** • 60 softgels	68.00	51.00	46.50			
00997	**ENDOTHELIAL DEFENSE™ w/GLISODIN®** • 60 veg. caps	54.00	40.50	36.00			
01937	**EPA/DHA** (Mega) • 120 softgels	20.00	15.00	13.50			
02009	**ESOPHACOOL™** • 120 chewable tablets	20.00	15.00	13.50			
01737	**ESOPHAGEAL GUARDIAN** (Berry flavor) • 60 chewable tablets	36.00	27.00	24.00			
01042	**EUROPEAN LEG SOLUTION DIOSMIN 95** 600 mg, 30 veg. tabs	20.00	15.00	13.50			
01706	**EXTRAORDINARY ENZYMES** • 60 caps	26.00	19.50	18.00			
02008	**(CALIFORNIA ESTATE) EXTRA VIRGIN OLIVE OIL** • 500 ml (16.9 fl. oz)	33.00	24.75	22.50			
01514	**EYE PRESSURE SUPPORT W/MIRTOGENOL®** • 30 veg. caps	38.00	28.50	25.50			
	F						
*01054	**FACE MASTER® PLATINUM** • Facial Toning System	199.00	199.00				
00965	**FAST-ACTING JOINT FORMULA** • 30 caps	39.00	29.25	27.00			
01717	**FAST-C® W/DIHYDROQUERCETIN** • 120 veg. tabs	26.00	19.50	18.00			
20053	**FEM DOPHILUS®** • 30 caps	25.95	19.46				
20055	**FEM DOPHILUS®** • 60 caps	39.95	29.96				
01064	**FEMMENESSENCE MACAPAUSE®** • 120 veg. caps	34.99	26.24				
02007	**FIBER-IMMUNE SUPPORT** (Apple Cinnamon) • 235 grams	34.00	25.50	23.50			
01749	**FLAX SEED** (Organic golden) • 14 oz	11.67	8.75				
02125	**FLORASSIST® GI w/PHAGE TECHNOLOGY** • 30 liquid veg. caps	33.00	24.75	22.50			
01821	**FLORASSIST® HEART HEALTH** • 60 veg. caps	32.00	24.00	21.00			
02019	**FLORASSIST® ORAL HYGIENE** • 30 lozenges	18.00	13.50	12.75			
01825	**FLORASSIST® BALANCE** • 30 liquid veg. caps	32.00	24.00	21.00			
02000	**FLORASSIST® MOOD** • 60 caps	33.00	24.75	22.50			
01920	**FLORASSIST® THROAT HEALTH** • 30 lozenges	20.00	15.00	13.50			
01913	**FOLATE HIGH POTENCY** (Optimized) • 5,000 mcg, 30 veg. tablets	25.00	18.75	16.50			
01939	**FOLATE** (Optimized) • 1,000 mcg, 100 veg. tablets	19.00	14.25	12.75			
01842	**FOLATE + VITAMIN B12** (BioActive) • 90 veg. caps	12.00	9.00	8.00			
01544	**FORSKOLIN** • 10 mg, 60 veg. caps	16.00	12.00	10.50			
01513	**FUCOIDAN W/MARITECH® 926** (Optimized) • 60 veg. caps	36.00	27.00	24.75			
	G						
02070	**GAMMA E MIXED TOCOPHEROL/TOCOTRIENOLS** • 60 softgels	40.00	30.00	27.00			
02075	**GAMMA E MIXED TOCOPHEROL w/ENHANCED SESAME LIGNANS** • 60 softgels	32.00	24.00	21.75			
01394	**GARLIC** (Optimized) • 200 veg. caps	24.95	18.71	15.75			

SUBTOTAL OF COLUMN 5

ITEM No.	PRODUCT	Retail Each $	YOUR PRICE 1 Unit Each	4 Unit Each	10 Unit Each	QTY	Total
02100	**GASTRO-EASE** • 60 veg. caps	44.00	33.00	30.00			
**01122	**GINGER FORCE®** • 60 liquid caps	34.95	26.21				
01658	**GINKGO BILOBA CERTIFIED EXTRACT™** 120 mg, 365 veg. caps	50.00	37.50	33.00			
00756	**GLA WITH SESAME LIGNANS** (Mega) • 60 softgels	19.50	14.63	13.50			
00345	**(L-) GLUTAMINE CAPSULES** • 500 mg, 100 veg. caps	14.95	11.21	10.13			
00141	**(L-) GLUTAMINE POWDER** • 100 grams	22.00	16.50	15.00			
00522	**GLUCOSAMINE/CHONDROITIN CAPSULES** • 100 caps	38.00	28.50	24.00			
01541	**GLUTATHIONE, CYSTEINE & C** • 100 veg. caps	20.00	15.00	13.50			
01669	**GLYCINE** • 1,000 mg, 100 veg. caps	12.00	9.00	8.10			
01411	**GRAPE SEED EXTRACT W/RESVERATROL & PTEROSTILBENE** 100 mg, 60 veg. caps	36.00	27.00	25.50			
01620	**GREEN COFFEE EXTRACT COFFEEGENIC®** 400 mg, 90 veg. caps	32.00	24.00	21.00			
00953	**GREEN TEA EXTRACT** (Mega) • lightly caffeinated, 100 veg. caps	30.00	22.50	18.00			
00954	**GREEN TEA EXTRACT** (Mega) • decaffeinated, 100 veg. caps	30.00	22.50	18.00			
	H						
01074	**5 HTP** • 100 mg, 60 caps	27.95	20.96				
**02002	**HAIR, SKIN & NAIL REJUVENATION FORM W/VERISOL®** 90 tabs	32.00	24.00	22.00			
01738	**HCA** (Garcinia) • 90 veg. caps	17.00	12.75	11.25			
29754	**HCACTIVE™ GARCINIA CAMBOGIA EXTRACT** • 90 caps	30.00	22.50				
01393	**HEPATOPRO** • 900 mg, 60 softgels	50.00	37.50	34.50			
01527	**HUPERZINE A** • 200 mcg, 60 veg. caps	40.00	30.00	27.00			
00661	**HYDRODERM®** • 1 oz	79.95	59.96	49.00			
	I						
01704	**IMMUNE MODULATOR W/TINOFEND®** • 60 veg. caps	17.00	12.75	11.25			
00955	**IMMUNE PROTECT W/PARACTIN®** • 30 veg. caps	29.50	22.13	19.91			
02005	**IMMUNE SENESCENCE PROTECTION FORMULA™** • 60 veg. tabs	40.00	30.00	27.00			
01049	**INNERPOWER™** • 530 grams powder	42.00	31.50				
01674	**INOSITOL CAPSULES** • 1,000 mg, 360 veg. caps	62.00	46.50	43.50			
01292	**INTEGRA-LEAN® AFRICAN MANGO IRVINGIA** 150 mg, 60 veg. caps	28.00	21.00	18.00			
30731	**IONIC SELENIUM** • 2 oz, 300 mcg	13.25	9.94				
01677	**IRON PROTEIN PLUS** • 300 mg, 100 caps	28.00	21.00	19.50			
01492	**IRVINGIA W/PHASE 3™ CALORIE CONTROL COMPLEX** (Optimized African Mango) • 120 veg. caps	56.00	42.00	36.00			
	J, K, L						
52142	**JARRO-DOPHILUS® PROBIOTIC FOR WOMEN** 30 enteric-coated veg. caps	27.95	20.96				
00056	**JARRO-DOPHILUS EPS®** • 60 veg. caps	22.95	17.21				
01834	**K W/ADVANCED K2 COMPLEX** (Super) • 90 softgels	30.00	22.50	20.25			
01600	**KRILL HEALTHY JOINT FORMULA** • 30 softgels	32.00	24.00	21.75			
01050	**KRILL OIL** (Jarrow) • 60 softgels	33.95	25.46				
00316	**KYOLIC® GARLIC FORMULA 102** • 200 veg. caps	27.45	20.59				
00789	**KYOLIC® RESERVE** • 600 mg, 120 caps	28.95	21.71				
01681	**LACTOFERRIN** • 60 caps	44.00	33.00	30.00			
00020	**LECITHIN** • 16 oz granules	18.00	13.50	12.00			
02155	**LIFE EXTENSION MIX™** • 315 tablets	80.00	60.00	52.00	43.75		

SUBTOTAL OF COLUMN 6

ITEM No.	PRODUCT	Retail Each $	YOUR PRICE 1 Unit Each	4 Unit Each	10 Unit Each	QTY	Total
02157	**LIFE EXTENSION MIX™ W/EXTRA NIACIN** • 315 tablets	80.00	60.00	52.00	43.75		
02154	**LIFE EXTENSION MIX™** • 490 caps	90.00	67.50	58.00	47.50		
02156	**LIFE EXTENSION MIX™ POWDER** • 14.81 oz	80.00	60.00	52.00	43.75		
02165	**LIFE EXTENSION MIX™** • 315 tablets w/o copper	80.00	60.00	52.00	43.75		
02164	**LIFE EXTENSION MIX™** • 490 caps w/o copper	90.00	67.50	58.00	47.50		
02166	**LIFE EXTENSION MIX™ POWDER** • 14.81 oz w/o copper	80.00	60.00	52.00	43.75		
01608	**LIVER EFFICIENCY FORMULA** • 30 veg. caps	18.00	13.50	12.00			
01639	**5-LOX INHIBITOR W/APRÈSFLEX®** • 100 mg, 60 veg. caps	22.00	16.50	15.00			
01678	**L-LYSINE** • 620 mg, 100 veg. caps	9.00	6.75	6.00			
00455	**LYCOPENE** (Mega) • 15 mg, 90 softgels	35.00	26.25	22.50			
	M						
01992	**MACUGUARD® OCULAR SUPPORT** • 60 softgels	25.00	18.75	17.50			
01993	**MACUGUARD® OCULAR SUPPORT w/ASTAXANTHIN** 60 softgels	44.00	33.00	30.00			
01459	**MAGNESIUM CAPS** • 500 mg, 100 veg. caps	12.00	9.00	7.50			
01682	**MAGNESIUM (CITRATE)** • 160 mg, 100 veg. caps	12.00	9.00	7.50			
02107	**(EXTEND-RELEASE) MAGNESIUM** • 60 veg. caps	13.00	9.75	8.75			
01908	**MEDITERRANEAN TRIM WITH SINETROL™-XPUR** 60 veg. caps	18.00	13.50	12.00			
02109	**MEDITERRANEAN WHOLE FOOD BLEND** 90 veg. caps	44.00	33.00	30.00			
01668	**MELATONIN** • 300 mcg, 100 veg. caps	5.75	4.31	3.75			
01083	**MELATONIN** • 500 mcg, 200 veg. caps	18.00	13.50	12.00			
00329	**MELATONIN** • 1 mg, 60 caps	5.00	3.75	3.47			
00330	**MELATONIN** • 3 mg, 60 veg. caps	8.00	6.00	5.16			
00331	**MELATONIN** • 10 mg, 60 veg. caps	28.00	21.00	18.00			
00332	**MELATONIN** • 3 mg, 60 veg. lozenges	8.00	6.00	5.16			
01734	**MELATONIN** (Fast-Acting Liquid) • 2 fl. oz (Citrus-Vanilla)	12.00	9.00	8.25			
01787	**MELATONIN TIMED RELEASE** • 300 mcg, 100 veg. tabs	12.00	9.00	8.25			
01788	**MELATONIN TIMED RELEASE** • 750 mcg, 60 veg. tablets	8.00	6.00	5.25			
01786	**MELATONIN TIMED RELEASE** • 3 mg, 60 veg. tabs	12.00	9.00	8.25			
02101	**MEMORY PROTECT** • 36 day supply	24.00	18.00	16.00			
01536	**METHYLCOBALAMIN** • 1 mg, 60 veg. lozenges (vanilla)	9.95	7.46	6.00			
01537	**METHYLCOBALAMIN** • 5 mg, 60 veg. lozenges (vanilla)	32.00	24.00	18.75	17.25		
00709	**MIGRA-EEZE™** (Butterbur) • 60 softgels	33.00	24.75	22.00			
01522	**MILK THISTLE** (European) • 60 veg. caps	34.00	25.50	22.50			
01922	**MILK THISTLE** (European) • 60 softgels	28.00	21.00	18.75			
01925	**MILK THISTLE** (European) • 120 softgels	44.00	33.00	30.00			
01940	**MIRAFORTE w/STANDARDIZED LIGNANS** (Super) • 120 veg caps	62.00	46.50	42.00			
01869	**MITOCHONDRIAL BASICS W/BIOPQQ®** • 30 caps	44.00	33.00	30.00			
01868	**MITOCHONDRIAL ENERGY OPTIMIZER w/BIOPQQ®** • 120 caps	72.00	54.00	48.00			
00065	**MK-7** • 90 mcg, 60 softgels	28.00	21.00	18.75			
00451	**MSM** (Methylsulfonylmethane) • 1,000 mg, 100 caps	14.00	10.50	8.96			
	N						
01534	**N-ACETYL-L-CYSTEINE** • 600 mg, 60 veg. caps	14.00	10.50	9.25			
01904	**NAD+ CELL REGENERATOR™** • 100 mg, 30 veg. caps	34.00	25.50	19.50			
01807	**NATURAL APPETITE SUPPRESS** (Advanced) • 60 veg. caps	38.00	28.50	25.50			
00984	**NATURAL BP MANAGEMENT** • 60 tablets	44.00	33.00	30.00			

SUBTOTAL OF COLUMN 7

ITEM No.	PRODUCT	Retail Each $	YOUR PRICE 1 Unit Each	4 Unit Each	10 Unit Each	QTY	Total
02012	**NATURAL CORTISOL BALANCE** • 30 veg. caps	45.00	33.75	30.00			
01892	**NATURAL ESTROGEN** • 60 veg. tabs	38.00	28.50	25.50			
01626	**NATURAL SEX FOR WOMEN® 50+** (Advanced) • 90 veg. caps	59.00	44.25	34.00			
01444	**NATURAL SLEEP®** • 60 veg. caps	13.00	9.75	7.50			
01551	**NATURAL SLEEP® w/ MELATONIN** (Enhanced) • 30 caps	22.00	16.50	15.00			
01511	**NATURAL SLEEP® W/O MELATONIN** (Enhanced) • 30 caps	20.00	15.00	13.50			
01445	**NATURAL SLEEP® MELATONIN** • 5 mg, 60 veg. caps	18.00	13.50	12.00			
00987	**NATURAL STRESS RELIEF** • 30 veg. caps	28.00	21.00	18.00			
01603	**NEURO-MAG® MAGNESIUM L-THREONATE** • 90 veg. caps	40.00	30.00	27.00			
01602	**NEURO-MAG® MAGNESIUM L-THREONATE w/CALCIUM & VITAMIN D3** • 25 grams • Lemon flavor	40.00	30.00	27.00			
01990	**NITROVASC w/CORDIART™** • 30 veg. caps	18.00	13.50	12.00			
01903	**NK CELL ACTIVATOR™** • 30 veg. tablets	45.00	33.75	31.50			
00373	**NO FLUSH NIACIN** • 800 mg, 100 caps	19.00	14.25	12.75			
	O						
01824	**OLIVE LEAF VASCULAR SUPPORT w/CELERY SEED EXTRACT** (Advanced) • 60 veg. caps	36.00	27.00	24.00			
01988	**OMEGA-3 PLUS EPA/DHA w/SESAME LIGNANS, OLIVE EXTRACT, KRILL & ASTAXANTHIN** (SUPER) • 120 softgels	45.00	33.75	31.50	24.75		
01983	**OMEGA-3 EPA/DHA w/SESAME LIGNANS & OLIVE EXTRACT** (Super) • 60 softgels	18.00	13.50	12.00	9.38		
01982	**OMEGA-3 EPA/DHA w/SESAME LIGNANS & OLIVE EXTRACT** (Super) • 120 softgels	32.00	24.00	21.00	17.05		
01984	**OMEGA 3 EPA/DHA w/SESAME LIGNANS & OLIVE EXTRACT** (Super) • 120 enteric coated softgels	34.00	25.50	23.25	18.00		
01985	**OMEGA 3 EPA/DHA w/SESAME LIGNANS & OLIVE EXTRACT** (Super) • 60 enteric coated softgels	20.00	15.00	13.50	10.50		
01986	**OMEGA 3 EPA/DHA w/SESAME LIGNANS & OLIVE EXTRACT** (Super) • 240 small softgels	32.00	24.00	21.00	17.25		
01991	**ONCE-DAILY HEALTH BOOSTER** • 60 softgels	54.00	40.50	38.00			
02113	**ONE-PER-DAY** • 60 tablets	22.00	16.50	15.00			
01328	**ONLY TRACE MINERALS** • 90 veg. caps	15.00	11.25	9.38			
	P						
01789	**PALMETTOGUARD® SAW PALMETTO W/BETA-SITOSTEROL** 30 softgels	15.00	11.25	10.50	9.00		
01790	**PALMETTOGUARD® SAW PALMETTO/ NETTLE ROOT W/BETA-SITOSTEROL** • 60 softgels	28.00	21.00	19.50	18.00		
01323	**PEAK ATP® WITH GLYCOCARN®** • 60 veg. caps	54.00	40.50	37.50			
*00342	**PECTA SOL-C® MODIFIED CITRUS PECTIN** • 454 grams powder	109.95	93.46				
*01080	**PECTA SOL-C® MODIFIED CITRUS PECTIN** • 270 veg. caps	79.95	67.96				
01811	**PEONY IMMUNE** • 60 veg. caps	36.00	27.00	24.00			
**00673	**PGX® PLUS MULBERRY** (WellBetX®) • 180 veg. caps	34.95	26.21				
01953	**POMEGRANATE COMPLETE** • 30 softgels	24.00	18.00	15.75			
00956	**POMEGRANATE FRUIT EXTRACT** • 30 veg. caps	19.50	14.63	13.16			
**01837	**POMI-T®** • 60 veg. caps	35.00	26.25	24.00			
00577	**POTASSIUM IODIDE** • 130 mg, 14 tabs	6.95	5.21	3.94			
01500	**PQQ CAPS W/BIOPQQ®** • 10 mg, 30 veg. caps	24.00	18.00	13.50	12.00		
01647	**PQQ CAPS W/BIOPQQ®** • 20 mg, 30 veg. caps	40.00	30.00	24.00	21.00		
00302	**PREGNENOLONE** • 50 mg, 100 caps	26.00	19.50	16.50			
00700	**PREGNENOLONE** • 100 mg, 100 caps	30.00	22.50	20.25			
**01373	**PRELOX® NATURAL SEX FOR MEN®** • 60 tablets	52.00	39.00	36.00			

SUBTOTAL OF COLUMN 8

ITEM No.	PRODUCT	Retail Each $	YOUR PRICE 1 Unit Each	4 Unit Each	10 Unit Each	QTY	Total
00525	**PROBOOST™ THYMIC PROTEIN A** • 30 packets	66.60	49.95				
01441	**PROGESTA-CARE®** • 4 oz cream	36.39	27.29	25.72			
01928	**PROSTATE FORMULA** (Ultra NAT) • 60 softgels	38.00	28.50	26.25	24.00		
01909	**PROSTAPOLLEN™** (Triple strength) • 30 softgels	28.00	21.00	18.75			
01742	**PROTEIN-ISOLATE** (Whey) Vanilla • 403 grams	30.00	22.50	19.50			
01743	**PROTEIN-ISOLATE** (Whey) Chocolate • 437 grams	30.00	22.50	19.50			
01770	**PROTEIN CONCENTRATE** (New Zealand Whey) Vanilla 500 grams	30.00	22.50	19.95			
01771	**PROTEIN CONCENTRATE** (New Zealand Whey) Chocolate 640 grams	30.00	22.50	19.95			
01812	**PROVINAL® PURIFIED OMEGA-7** • 30 softgels	27.00	20.25	18.00			
01676	**PS CAPS** (Phosphatidylserine) • 100 mg, 100 veg. caps	54.00	40.50	36.00			
01508	**PTEROPURE®** Pterostilbene • 50 mg, 60 veg. caps	32.00	24.00	22.50			
01209	**PUMPKIN SEED EXTRACT** (Water-soluble) • 60 veg. caps	20.00	15.00	13.50			
01637	**PYCNOGENOL® FRENCH MARITIME PINE BARK EXTRACT** 100 mg, 60 veg. caps	64.00	48.00	45.00			
01217	**PYRIDOXAL 5'-PHOSPHATE** • 100 mg, 60 veg. caps	22.00	16.50	14.85			
	Q, R						
01309	**QUERCETIN** (Optimized) • 250 mg, 60 veg. caps	22.00	16.50	15.00			
01030	**RED YEAST RICE** (Bluebonnet) • 600 mg, 60 veg. caps	18.08	13.56				
00605	**REGIMINT** • 60 enteric-coated caps	19.95	14.96	14.00			
01708	**REISHI EXTRACT MUSHROOM COMPLEX** • 60 veg. caps	30.00	22.50	20.25			
01448	**REJUVENEX® BODY LOTION** • 6 oz	24.00	18.00	14.85	12.75		
01621	**REJUVENEX® FACTOR FIRMING SERUM** • 1.7 oz	65.00	48.75	37.50			
01220	**REJUVENEX®** (Ultra) • 2 oz	52.00	39.00	33.00	29.25		
00676	**REJUVENIGHT®** (Ultra) • 2 oz	39.95	29.96	27.00			
01410	**RESVERATROL W/PTEROSTILBENE** • 100 mg, 60 veg. caps	36.00	27.00	24.00			
02031	**RESVERATROL W/NICOTINAMIDE RIBOSIDE** (Optimized) • 30 veg. caps	42.00	31.50	27.00			
02030	**RESVERATROL** (Optimized) • 60 veg. caps	46.00	34.50	31.00			
00889	**RHODIOLA EXTRACT** • 250 mg, 60 veg. caps	14.00	10.50	9.00			
01900	**RIBOGEN™ FRENCH OAK WOOD EXTRACT** 200 mg, 30 veg. caps	36.00	27.00	24.75			
00972	**(D) RIBOSE POWDER** • 150 grams	27.50	20.63	18.56			
01473	**(D) RIBOSE TABLETS** • 100 veg. tabs	32.00	24.00	21.00			
01609	**RICH REWARDS® BREAKFAST GROUND COFFEE** • 12 oz. bag	13.00	9.75				
01730	**RICH REWARDS® BREAKFAST BLEND GROUND COFFEE** Natural Mocha • 12 oz. bag	15.00	11.25	10.50			
01729	**RICH REWARDS® BREAKFAST BLEND GROUND COFFEE** Natural Vanilla • 12 oz. bag	15.00	11.25	10.50			
01612	**RICH REWARDS® BREAKFAST BLEND WHOLE BEAN COFFEE** 12 oz. bag	13.00	9.75				
01610	**RICH REWARDS® DECAFFEINATED ROAST GROUND COFFEE** 12 oz. bag	14.00	10.50				
01208	**R-LIPOIC ACID** (Super) • 240 mg, 60 veg. caps	49.00	36.75	33.75			
00070	**RNA CAPSULES** • 500 mg, 100 caps	17.95	13.46	12.12			
	S						
01432	**SAFFRON W/SATIEREAL®** (Optimized) • 60 veg. caps	36.00	27.00	24.00			
01935	**SAMe** (S-ADENOSYL-METHIONINE) 200 mg, 30 enteric coated tablets	25.00	18.75	16.50			

SUBTOTAL OF COLUMN 9

ITEM No.	PRODUCT	Retail Each $	YOUR PRICE 1 Unit Each	4 Unit Each	10 Unit Each	QTY	Total
01933	**SAMe** (S-ADENOSYL-METHIONINE) 400 mg, 30 enteric coated tablets	36.00	27.00	24.00			
01934	**SAMe** (S-ADENOSYL-METHIONINE) 400 mg, 60 enteric coated tablets	66.00	49.50	45.00			
01740	**SEA-IODINE™** • 1,000 mcg, 60 veg. caps	8.00	6.00	5.40			
01879	**SE-METHYL L-SELENOCYSTEINE** • 200 mcg, 90 veg. caps	11.00	8.25	7.50			
00318	**SERRAFLAZYME** • 100 tablets	18.00	13.50	12.00			
01938	**SHADE FACTOR** • 120 veg. caps	44.00	33.00	30.00			
01884	**SILYMARIN** • 100 mg, 90 veg. caps	14.00	10.50	9.50			
01249	**SINUS CLEANSER** • 4 oz. bottle	25.00	18.75				
01596	**SKIN RESTORING PHYTOCERAMIDES w/LIPOWHEAT®** 30 liquid veg. caps	25.00	18.75	17.25			
00961	**SODZYME® w/GLISODIN® & WOLFBERRY** • 90 veg. caps	28.00	21.00	18.00			
00657	**SOLARSHIELD® SUNGLASSES** • Smoke color	12.99	9.74	8.63			
01649	**SOY ISOFLAVONES (SUPER ABSORBABLE)** • 60 veg. caps	28.00	21.00	18.75			
00432	**STEVIA™** (Better) • 100 packets, 1 gram each	9.95	7.46				
00438	**STEVIA™ ORGANIC LIQUID SWEETENER** (Better) • 2 oz	11.00	8.25				
01476	**STRONTIUM** • 750 mg, 90 veg. caps	20.00	15.00	13.50			
01778	**SUPER SELENIUM COMPLEX** • 200 mcg, 100 veg. caps	14.00	10.50	9.00	8.25		
	T						
02023	**TART CHERRY W/CHERRYPURE®** 60 veg. caps	20.00	15.00	14.00			
01827	**TAURINE** • 1,000 mg, 90 veg. caps	13.00	9.75	9.00			
01918	**TEAR SUPPORT w/MAQUIBRIGHT®** • 60 mg, 30 veg. caps	18.00	13.50	12.00			
00133	**L-TAURINE POWDER** • 300 grams	20.00	15.00	12.66			
*13685	**TEN MUSHROOM FORMULA®** • 120 veg. caps	39.95	33.96				
01304	**THEAFLAVIN STANDARDIZED EXTRACT** • 30 veg. caps	18.00	13.50	12.00			
01683	**(L) THEANINE** • 100 mg, 60 veg. caps	24.00	18.00	15.38			
***01038	**THERALAC® PROBIOTICS** • 30 caps	47.95	35.96				
00668	**THYROID FORMULA** (Metabolic Advantage™) • 100 caps	21.95	16.46				
00349	**TMG POWDER** • 50 grams	14.00	10.50	8.25			
01859	**TMG** • 500 mg, 60 liquid veg. caps	13.00	9.75	9.00			
01400	**TOCOTRIENOLS** (Super-absorbable) • 60 softgels	30.00	22.50	21.00			
01278	**TOOTHPASTE** • 4 oz (Mint) tube	9.50	7.13	6.50			
01917	**TRANQUIL TRACT™** • 60 veg. caps	52.00	39.00	34.50			
01468	**TRIPLE ACTION CRUCIFEROUS VEGETABLE EXTRACT** 60 veg. caps	24.00	18.00	16.50			
01469	**TRIPLE ACTION CRUCIFEROUS VEGETABLE EXTRACT w/RESVERATROL** • 60 veg. caps	32.00	24.00	22.20			
02003	**TRIPLE ACTION THYROID** • 60 veg. caps	36.00	27.00	24.00			
01803	**TRI SUGAR SHIELD®** • 60 veg. caps	36.00	27.00	24.00			
01386	**TRUFIBER™** • 180 grams	32.95	24.71				
01389	**TRUFLORA® PROBIOTICS** • 32 veg. caps	42.95	32.21				
01722	**L-TRYPTOPHAN** • 500 mg, 90 veg. caps	33.00	24.75	22.50			
01721	**TRYPTOPHAN PLUS** (Optimized) • 90 veg. caps	32.00	24.00	21.75			
02116	**TWO-PER-DAY** • 60 tablets	10.50	7.88	7.13			
02115	**TWO-PER-DAY** • 120 tablets	20.00	15.00	13.50			
02114	**TWO-PER-DAY** • 120 caps	22.00	16.50	15.00			
00326	**L-TYROSINE** • 500 mg, 100 tablets	13.50	10.13				

SUBTOTAL OF COLUMN 10

ITEM No.	PRODUCT	Retail Each $	YOUR PRICE 1 Unit Each	4 Unit Each	10 Unit Each	QTY	Total
	U, V						
01921	**URIC ACID CONTROL** • 60 veg. caps	24.00	18.00	16.50			
00213	**VANADYL SULFATE** • 7.5 mg, 100 veg. tablets	15.00	11.25	9.38			
02102	**VENOFLOW** • 30 veg. caps	52.00	39.00	36.00			
00408	**VENOTONE** • 60 caps	18.95	14.21	12.00			
01327	**VINPOCETINE** • 10 mg, 100 veg. tablets	18.00	13.50	10.50			
00372	**VITAMIN B3 NIACIN** • 500 mg, 100 caps	7.65	5.74	4.99			
02028	**VITAMIN B5** • 500 mg, 100 veg. caps (Pantothenic Acid)	11.00	8.25	7.50			
01535	**VITAMIN B6** • 250 mg, 100 veg. caps	12.50	9.38	8.25			
00361	**VITAMIN B12** • 500 mcg, 100 lozenges	8.75	6.56	5.44			
01634	**VITAMIN C w/DIHYDROQUERCETIN** 1,000 mg, 60 veg. tablets	10.00	7.50	6.75			
00927	**VITAMIN C w/DIHYDROQUERCETIN** 1,000 mg, 250 veg. tablets	27.00	20.25	18.00			
00084	**VITAMIN C POWDER** (BUFFERED) • 454 grams	23.95	17.96	16.50			
01736	**VITAMIN C-MAGNESIUM CRYSTALS** (EFFERVESCENT) 180 grams	20.00	15.00	13.50			
01732	**VITAMIN D3** • 2,000 IU, 1 fl. oz, Mint flavor	28.00	21.00	18.75			
01753	**VITAMIN D3** • 1,000 IU, 90 softgels	7.00	5.25	4.50			
01751	**VITAMIN D3** • 1,000 IU, 250 softgels	12.50	9.38	8.44			
01713	**VITAMIN D3** • 5,000 IU, 60 softgels	10.00	7.50	6.50			
01718	**VITAMIN D3** • 7,000 IU, 60 softgels	14.00	10.50	9.45			
01758	**VITAMIN D3 W/SEA-IODINE™** • 5,000 IU, 60 caps	14.00	10.50	9.38			
00864	**VITAMIN D3 LIQUID** • 2,000 IU, 1 fl. oz	28.00	21.00	18.75			
01840	**VITAMINS D AND K W/SEA-IODINE™** • 60 caps	24.00	18.00	16.50			
01863	**VITAMIN E** (Natural) • 400 IU, 90 softgels	28.00	21.00	19.50	18.00		
01936	**VITAMIN K2** (Low dose) • 45 mcg, 90 softgels	18.00	13.50	12.00			
	W						
01902	**WAIST-LINE CONTROL™** • 120 veg. caps	42.00	31.50	28.50			
	X, Y						
01919	**X-R SHIELD** • 90 veg. caps	15.00	11.25	9.75			
00409	**XYLIWHITE™ MOUTHWASH** • 16 oz	10.00	7.50				
	Z						
01813	**ZINC HIGH POTENCY** • 50 mg, 90 veg. caps	7.95	5.96	5.25			
01561	**ZINC LOZENGES** • 60 veg. lozenges	9.00	6.75	6.00			
01961	**ZINC LOZENGES** (Enhanced) • 30 veg. lozenges	12.00	9.00	6.00			
**01051	**ZYFLAMEND® WHOLE BODY** • 120 liquid veg. caps	72.95	54.71				
	BOOKS						
34002	**THE 30-DAY HEART TUNE-UP** by Steven Masley, MD • 2016	17.59	13.19				
33999	**THE MENOPAUSE CURE** by Jill D. Davey & Sergey Dzugan, MD • 2016	17.32	12.99				
33998	**THE RIGHT TO TRY** by Darcy Olsen • 2016	26.99	20.24				
33840	**THE CRWAY® TO GREAT GLUCOSE CONTROL CD** by Paul McGlothin and Meredith Averill • 2016	189.00	189.00				
33890	**FORTIFY YOUR LIFE** by Tieraona Low Dog, MD • 2016	28.89	21.67				
33885	**THE BLUE ZONES SOLUTION** by Dan Buettner • 2015	26.00	19.50				

SUBTOTAL OF COLUMN 11

ITEM No.	PRODUCT	Retail Each $	YOUR PRICE 1 Unit Each	4 Unit Each	10 Unit Each	QTY	Total
33880	**OUTSTANDING HEALTH:** THE 6 ESSENTIAL KEYS TO MAXIMIZE YOUR ENERGY AND WELL BEING by Michael Galitzer, MD & Larry Trivieri Jr. • 2015	24.95	18.71				
33878	**TESTOSTERONE REPLACEMENT THERAPY** by Dr. John Crisler • 2015	19.99	14.99				
33877	**THE TRUTH ABOUT MEN AND SEX** by Abraham Morgentaler, MD, FACS • 2015	16.99	12.74				
33876	***TOX*-SICK** • by Suzanne Somers • 2015	26.00	19.50				
33875	**DOCTORED: THE DISILLUSIONMENT OF AN AMERICAN PHYSICIAN** • by Sandeep Jauhar • 2015	26.00	19.50				
33874	**MISSING MICROBES** • by Martin J. Blaser, MD • 2014	28.00	21.00				
33873	**EATING ON THE WILD SIDE** • by Jo Robinson • 2014	16.00	12.00				
33872	**GET SERIOUS** • by Brett Osborn, MD • 2014	24.95	18.71				
33868	**TOXIN TOXOUT:** GETTING HARMFUL CHEMICALS OUT OF OUR BODIES AND OUR WORLD • by Bruce Lourie and Rick Smith • 2014	25.99	19.49				
33867	**THE COMPLETE MEDITERRANEAN DIET** by Michael Ozner, MD • 2014	19.95	14.96				
33869	**UNLEASH THE POWER OF THE FEMALE BRAIN** by Daniel Amen, MD • 2014	16.00	12.00				
33870	**MAGNIFICENT MAGNESIUM** by Dennis Goodman, MD • 2014	14.95	11.21				
DPT05	**DISEASE PREVENTION AND TREATMENT, EXPANDED FIFTH EDITION** (Hardcover) • 2014	69.95	39.95	36.00			
33865	**THE RESTORATION OF THE HUMAN BODY [IN 7 PARTS]** by Sergey A. Dzugan, MD, PhD • 2014	29.95	22.46				
33862	**I'M TOO YOUNG FOR THIS** • by Suzanne Somers • 2013	26.00	19.50				
33835	**PHARMOCRACY** • by William Faloon • 2011	24.00	9.60	8.00			
33958	**THE VITAMIN D SOLUTION** by Michael F. Holick, PhD, MD (Paperback) • 2013	16.00	12.00				
33838	**YOUR GUIDE TO HEALTHY SKIN THE NATURAL WAY** by Gary Goldfaden, MD • 2012	26.00	15.00				
33815	**KNOCKOUT** • by Suzanne Somers • 2009	25.99	17.00				
33809	**TESTOSTERONE FOR LIFE** by Abraham Morgentaler, MD • 2008	16.95	11.87				
33696	**LIFE EXTENSION REVOLUTION** by Philip Lee Miller, MD (Paperback)	16.00	12.00				
33805	**MIAMI MEDITERRANEAN DIET WITH 300 RECIPES** by Michael D. Ozner, MD, FACC, FAHA (Hardcover) • 2008	24.95	16.25				
33803	**WHAT YOUR DOCTOR MAY NOT TELL YOU ABOUT DIABETES** by Steven V. Joyal, MD • 2008	14.99	10.49				

SUBTOTAL OF COLUMN 12

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