RE-FUEL!

In this issue:

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“IAS has shown great vision and leadership, as an organisation focused mainly on the provision of contemporary medical interventions against aging, and in also supporting the SENS Foundation’s efforts to hasten the development of much more powerful future interventions.”

— Dr. Aubrey de Grey

“IAS has a history of making throughout the world crucial, but difficultly accessible medications available to patients. IAS is one of the pioneering societies in antiaging medicine that has helped this new medical specialty move forward."

— Thierry Hertoghe M.D.

“All my working life I’ve been interested in anti-aging medicine. For much of that time I’ve known about and worked alongside IAS. Therefore, I am in a good position to tell you about their commitment to this field, not only to make the latest medicines, hormones and nutrition available, but also to help support and promote the science and organizations including the British Longevity Society, so that together we can make a real difference to the future of health care.”

— Marios Kyriazis M.D., MSc, MIBiol, CBiol

“Every adult has the right to take care of his or her own personal health as he or she chooses. In the 20th and 21st centuries, this universal human right has been nearly obliterated by an ocean of nanny-state regulation and deliberate suppression of information by bureaucracies, with hidden and not-so-hidden agendas. International Antiaging Systems is a beacon of useful health care information and a literal island of freedom of health care product choice in our otherwise un-free health care world.”

— Jonathan Wright M.D.
Rapamycin has attracted a lot of attention ever since it was found in the soils of Easter Island. Whilst its orthodox medical uses are quite narrow, more focus is being placed on its ability to act as an mTOR inhibitor and what that could mean to extend lifespan.

In his balanced article, Dr. Kyriazis helps to inform us all about its latest news and we ponder the question, will it become a classic antiaging drug?

Vitamin C may be old news, but it is still good news. Our article highlights just some of the thousands of published studies that prove its efficacy in all kind of pathogens. Simple it may be, overlooked it cannot be.

Dr. Dean also reminds us of the need to protect against advanced glycated end-products, which nicely abbreviates as AGE. He delves into the studies to discover that aminoguanidine may be more protective and practical than we think.

Lastly, we've written about some high-end books that have recently been released and also introduce you to the RAADfest of San Diego, an exciting development in getting information out to the public about health and longevity.
FEMALE REPRODUCTIVE SYSTEM
New findings present that Metformin improves the menstrual cycle and reduces body mass index, testosterone and luteinizing hormone within 6 months of trials in women who are diagnosed with polycystic ovary syndrome (PCOS) who are a normal weight and are overweight.

This particular study investigates into the long-term effects of Metformin, which was taken daily for two years. Researchers discovered that most benefits were visible after 6 months, with over 40% of candidate's achieving normal menstruation by this point.

With regard to BMI, lean women with PCOS often have elevated LH, while obese women with PCOS have a greater tendency for insulin resistance. Testosterone is thought to be a determinant of menstrual regularity.

Metformin is an insulin sensitizer, and in women with PCOS it has been shown to have beneficial effects on hyperinsulinemia, hyperandrogenemia, ovarian steroidogenesis, menstrual cycles, blood pressure, and pregnancy rates, the authors note.

Further studies are needed to explore the factors that determine the treatment efficacy of metformin in different phenotypic subgroups of women with PCOS, the researchers conclude. An incredibly interesting report, if you're interested to find out more you can read this study in full by following the link below.

Further Reading
The Journal of Clinical Endocrinology & Metabolism, jc.2017-01739.
https://doi.org/10.1210/jc.2017-01739
The thymus gland is an organ in the lymphatic system serves a vital role within the immune system.

In a study published by Science immunology, researchers found a growth protein called BMP4, that is created by the endothelial cells within the inner wall of the thymus and is critical for its repair in mice. *Scientists also discovered that injecting these cells either into the blood stream or into the thymus itself sped up the recovery of the thymus.*

The study’s authors discovered a new axis in the thymus regeneration. Avinash Bhandoola, head of the T-cell biology development unit at the National Cancer Institute’s Centre for Cancer Research, who was not involved in the study stated “They showed that endothelial cells make the molecule BMP4, and this is actually really important for accelerating the regeneration of the thymus after damage.”

The thymus shrinks as we grow older, is highly sensitive to damage from stress and infection. Bhandoola states “We don’t really understand why the thymus shrinks as we get older, or how to make it bigger in patients where it would likely be helpful to have T cells be made.” Therapies based upon this research would be more likely to isolate BMP4 than an endothelial cell line. Thomas Serwold a Harvard Medical School Immunobiologist who was also not involved in the study stated, “Another future interesting direction would be whether this same pathway could be used in the ageing thymus.” In this scenario, or in damage which is linked to chronic conditions, perhaps boosting BMP4 activity would also drive thymus regeneration, Serworld speculates.

An incredibly interesting study, if you would like to read into this further you can access the full study by visiting the website below in the references.

**References**

T. Wertheimer et al., “Production of BMP4 by endothelial cells is crucial for endogenous thymic regeneration,” Science Immunology, doi:10.1126/sciimmunol.aai2736, 2017.

http://immunology.sciencemag.org/content/3/19/eaa12736
MALE THYМUS ANATOMY
BONE MARROW STEM CELL
Is it possible to age without growing fragile? One corporation believe that with the correct treatment the answer to this question could be yes. Clinical trials were published in October in the Journals of Gerontology, the company developing the therapy report that a solo infusion of mesenchymal stem cells from younger donors has no evident safety downsides for people with aging-related frailty, and even presented improvement in many of their symptoms.

Keith March, A cardiologist who directs the centre for regenerative medicine at the University of Florida has stated, the research is “one of the first studies that actually attempts to address frailty in a well-defined or well-described fashion, and certainly, to my knowledge the first such study with mesenchymal stem cells.”

“We looked at a variety of measures, and what was exciting to us was we saw four of five different things in different organ systems that improved- and this was repeated in two studies, in two separate groups of people” states Joshua Hare, who directs the interdisciplinary Stem Cell Institute at the University of Miami.

Frailty syndrome includes symptoms such as weak grip, slow walking, and low energy levels, and patients who have it are more susceptible to severe viruses, falls, and death than people of the same age who do not suffer with Frailty Syndrome.

In current years, scientists have begun to pin point possible biological causes of frailty, such as inflammation, oxidative stress, and dysfunctional mitochondria. “You can have two 80-year-olds—one’s still out playing tennis and the others in a wheelchair—there is a biological difference between those two people. It’s not just the luck of the draw,” Hare stated.

A decline in the quantity of the body’s own stem cells is another biological alteration related to frailty, Hare and fellow researchers wanted to find out what the effect would be of dosing participants with new cells. Phase 1 consisted of 15 patients with different levels of frailty, and dosing them with a solo infusion of stem cells from the bone marrow of healthy adult donors.

Hare suggests that the improvements may come from stem cells’ interactions with various types of immune cells, which have been shown to tamp down inflammation. As an editorial accompanying the studies notes, “[Mesenchymal stem cells] have a number of biological properties that make them attractive as therapeutic agents: they home to sites of inflammation and tissue injury after an intravenous injection; they differentiate into many cell types including muscle and bone; they secrete bioactive compounds that induce tissue recovery and suppress inflammation; and they avoid host immune responses because of their immunomodulatory effects.”

An incredibly interesting study, that we are sure will be developing and expanding for many years to come. If you’re eager to find out more information, you can follow the references below to read more about this study and its results.

References


Researchers have discovered something new in the mission to extend the lifespan of mammals. Inhibiting a common enzyme found in all mammals, humans included, has been shown to prolong the lifecycle of creatures such as flies and worms. This suggests it could be a promising new mechanism for anti-aging therapies.

RNA Polymerase III (Pol III) is an enzyme known to be vital for cell growth, and is found within almost all cells across all mammals. Researchers from the University College London, the University of Kent and the University of Groningen began examining the enzyme’s involvement in aging after the immune-suppressing drug rapamycin, known to inhibit pol III, was seen to extend the lifespan of several animals, including mice.

Nazif Alic the study’s co-author stated, ‘Understandably, there’s a lot of hype around drugs that extend lifespan and promote healthy aging but very little is known about how they work, which is fundamental knowledge.’

The next step for the research is to understand more thoroughly how inhibiting Pol III lengthens lifespan in animals, but scientists suggest that this mechanism is a promising target for future anti-aging therapies.

Dr Jennifer Tullet from the University of Kent said, ‘It is amazing that we can make one genetic adjustment and positively impact on lifespan and intestinal health, understanding more about the underlying molecules at work here promises new strategies for anti-aging therapies.’

Source
DOUBLE HELIX DNA MOLECULE WITH MODIFIED GENES
WHITE BLOOD CELL IN MIDDLE OF RED BLOOD CELLS
NR TRIGGERS CALORIE RESTRICTION CAUSING WEIGHT LOSS

A diet pill that helps weight loss without dieting is in the process of being developed. Scientists in the US have discovered a natural dietary supplement called Nicotinamide Riboside (NAD+), which jump-starts the same chemical pathways as cutting food consumption by a third.

Fasting and calorie restriction are known to activate changes within the body that boost the immune system, lower blood pressure, slow down aging and protect against disease. Researchers revealed that when 24 people took a daily 1,000mg dose it mirrored calorie restriction, lowering blood pressure and slowing the metabolism within candidates.

Professor Doug Seals, a researcher in the Department of Integrative Physiology at the University of Colorado has stated, that early testing indicated that Nicotinamide Riboside could also help decrease the risk of a heart attack by a quarter. It even showed potential benefits for sufferers of Alzheimer’s, although more research is required.

Further Reading

Ten million Britons alive today can expect to reach 100, Government figures reveal. Ministers are investing more than £300 million into researching aging in order to support the aging population.

*Plans are to revolutionise the way we grow older, the money will be used to find alternative ways to support people in their old age. One of the main goals is to facilitate the elderly remaining healthier and independent for as long as possible.*

Business secretary Greg Clark’s pledge has a number of components to it. They will include a dementia research hub and a disease prevention project that analyses more than 500,000 patients. It is hoped that such initiatives will contribute to making British scientists world-leading when it comes to aging.

The elderly population of the future can expect to see regional centres across the UK that use cutting edge technologies, such as artificial intelligence, to aid diagnosis. Innovative new tools, medicines and treatments will also be sought through £210 million competitive fund.

One of the key things in tackling conditions associated with old age is early diagnosis. Investment in genome sequencing is likely to aid with this and usher in a new wave of therapies that will advance the quality of life for many people.
RAPAMYCIN: A CLASSICAL ANTIAGING DRUG
RAPAMYCIN: A CLASSIC ANTIAGING DRUG

By Marios Kyriazis, M.D.

Over the past several years there have been many significant discoveries regarding drugs which can affect the rate of aging. Research has sometimes led to confusing or conflicting results, but it is now becoming increasingly clear that certain agents have a definite action with regards to modifying the aging process. Examples include metformin, certain senolytics, carnosine, resveratrol, and mTOR inhibitors such as rapamycin, (note; the pharmacological inhibition of mTOR is an FDA-approved clinical principle).

mTOR (mammalian/mechanistic Target Of Rapamycin) is a well-known term to those who have an interest in the mechanisms of aging. In technical circles, mTOR is also known as the FK506-binding protein 12-Rapamycin-Associated Protein 1 (FRAP1), a term that has featured in increasingly more scientific papers in recent years. Basically, it is a kinase (a protein and, specifically, an enzyme) which is linked to a variety of other specific proteins and, together, they regulate cell function. Examples of processes which are regulated by mTOR include cell growth and motility, synthesis of other proteins, and importantly, autophagy (the process by which the cell degrades itself). The mTOR network senses signals from the environment, as well as signals originating from inside the cell regarding nutrition and energy requirements. Rapamycin is a well-known modulator of the mTOR process and it is the only existing pharmacological treatment which may increase lifespan in animals, including mammals (but not yet proven in humans) (1).

Apart from rapamycin itself, there exist several analogues which inhibit the immune response by blocking the proliferation of T-cells, by blocking the formation of new blood vessels (and thus block the blood supply to cancer cells), and by reducing the impact of inflammation.
THE ISSUE OF SIDE EFFECTS

A cause for concern has been the side-effects which are associated with the use of rapamycin and its analogues. Common side-effects include immunosuppression, lipid and glucose abnormalities and pneumonitis, all of which greatly depend on the dose used, and usually improve after the dose is decreased. These side-effects however may not be directly related to rapamycin itself. In clinical trials, the side-effects were more evident because rapamycin was given to already severely diseased patients who were also taking other drugs. Lower doses given to healthy patients for preventative purposes may not be associated with such side-effects.

In addition, taking the drug in alternate dosing (one day on, the next day off) may still have positive benefits with an even lower risk of side effects.

However, there is still a lot to learn about the clinical use of rapamycin with regards to slowing aging in humans. Some of the difficulties include the different isoforms (variants) of the components which participate in the mTOR pathway, the exact location of mTOR complexes inside the cell, and other cell functions which depend directly or indirectly on the action of rapamycin.

The complexity of the mTOR reactions.
SENESCENCE

For instance, and just to go into some detail, it is known that rapamycin interferes with senescent cells, which are cells that have lost their ability to divide any longer. These cells activate the senescence-associated secretory phenotype (SASP), which essentially creates a situation whereby normal cells cannot function properly and thus degeneration becomes evident. Rapamycin inhibits cell senescence through a complicated mechanism, and so it increases longevity (2).

RAPAMYCIN IN HUMANS

While human trials specifically for preventing aging are missing, the following research may give us some useful insights regarding clinical use of mTOR inhibitors.

• Degeneration of neurons in mammals is associated with increased activity of mTOR, while inhibition of this prevents degeneration, at least in mice (3).

• Inhibition of mTOR in older people may improve the effectiveness of vaccines (4). This was particularly true in an experiment where response to the influenza vaccination was enhanced by 20% without significant side-effects.

• Rapamycin extended lifespan in mice acting directly on certain aspects of the aging process (and not simply by inhibiting cancer, or by improving immunity). The authors of this study (5) concluded that: “This study helps to further separate the life-extending effect of rapamycin from its cancer-preventing properties. Taken together, these findings indicate that rapamycin can be considered as a good candidate for a preventive anti-aging medicine”.

• In a study of everolimus, (a compound closely-related to rapamycin) in children, it was shown that it can dampen the excessive immune reaction following stem-cell transplantation, and so improved the clinical condition of the patients. This was clear in 93% of the patients. A common side-effect was increased triglycerides in the blood, which did not cause any clinical symptoms. It is important to remember that these patients were also treated with steroids, and thus we are facing the same situation regarding side-effects as was mentioned above. It may be that using mTOR inhibitors for prevention is associated with much less side-effects (6).

NATURAL MIMETICS OF RAPAMYCIN

Researchers have tried to identify other compounds which replicate some of its physiological actions. In a recent study it was suggested that compounds such as epigallocatechin gallate, (in green tea for example), isoliquiritigenin (found in licorice), and withaferin A (used in Ayurvedic medicine) may act as mimetics of rapamycin (7). Another compound is oxaloacetate (oxaloacetic acid), which was featured in the Aging Matters™ magazine, issue 3, 2015.
RAPAMYCIN: A CLASSIC ANTIAGING DRUG

THE BOTTOM LINE

Rapamycin is a drug that has benefits and drawbacks. It is not a nutritional supplement to be taken without supervision. For the specific purpose of preventing age-related degeneration, it is used in low, irregular doses, closely monitoring its response and side effects. This can only be achieved with the help of a knowledgeable professional, and not by the patient on his/her own.

There is great potential in the clinical effects of this and similar drugs, but one must be able to separate hype from science, and not take sensational press news as true facts that are applicable on humans. There is a difference between using rapamycin for established illnesses (cancer) and using it for prevention in healthy people, to avoid aging.

Although in this article I am concentrating on rapamycin, this is not to say that it is one of the few potential treatments for aging. It is important to realize that aging will not be stopped using one, two or more kinds of different pills, but it is a matter of a wider approach, involving a generally appropriate lifestyle, positive attitudes, mental exercises, suitable exposure to positive stress, and many other interdependent factors and processes. In any case, rapamycin and its analogues or mimetics are useful agents to consider in this respect.

References:
A BREAKTHROUGH FOR CATARACTS

Can-C™ eye-drops are the original™ brand-developed by Innovative Vision Products (IVP). This group were the first to research, publish and prove how eye drops can reduce and even eradicate cataracts. Accordingly there are active US and EU patents (and others pending) on this unique and special product.

Unique Formula:

Can-C™ eye-drops are the formula from the original published human trials. They contain a purified and racemized form of n-acetylcarnosine (made in Japan); this natural di-peptide has potent anti-glycating and anti-oxidant properties that prevent liquid peroxidation. Note that the formula is important—it’s not all about the n-acetylcarnosine; he specific carrier agents and their purity are also important. If you look at the Can-C™ formula you will see the differences to the copycats, (remember it is only Can-C™ that is patented in recognition of the original work). If you want the best possible results in the fastest possible time, then choose Can-C™ to deliver them according to the clinical trials.

Clinical Trail:

Patients placed two-drops of Can-C™ into their eyes twice a day for a 6 month period, the outcome was:

• 90% saw an improvement in their visual acuity
• 88.9% of patients showed improvement in the clarity of their lens.

There have always been numerous reports on cataract shrinkage and even disappearance with documented evidence that Can-C™ eye-drops remain effective (and safe) more than 24-months later. The most commonly expressed initial reports are that glare is significantly improved, (for example night driving is much safer) and colour perception is enhanced.

Improving Eye-Sight:

More evidence is mounting that Can-C™ is efficacious for many conditions including:

• Cataracts (particularly in senile vision)
• Glaucoma
• Presbyopia
• Corneal Disorders
• Eye Strain
• Ocular Inflammation
• Blurred Vision
• Vitreous opacities and lesions
• Diabetes mellitus complications
• Contact lens users
• Dry eye syndrome

Of special interest may be to persons who wear contact lenses. This is because Can-C™ inhibits the accumulation of lactic acid and therefore contacts can be worn for longer periods without pain. We have also received reports that Can-C™ not only aids dry-eye syndrome with its lubricants, but that Can-C™ helps to unclog proteins from the lacrimal ducts, thus releasing more natural tears onto the eye. In a similar way it is also believed that the unclogging of proteins in the eye’s drain, (the Schlemm valve), helps to reduce intraocular pressure and this aids glaucoma.

Can-C™ Plus Capsules

In addition to the eye-drops, Can-C™ Plus capsules are also available. They are strongly recommended to be used in combination with the eye-drops- if you have ripe (long existing) cataracts.
DEPRENYL FOR FOCUS AND CONCENTRATION

Deprenyl is also known as selegiline, it was created in the 1960s by Professor Joseph Knoll, principally as an aid to Parkinson’s patients - because deprenyl has a significant benefit to improve dopamine levels in the brain.

Significant longevity studies

Professor Knoll’s experiments on rats produced incredible longevity benefits. When fed deprenyl in their food, they lived longer than those that were not. After the last non-treated rat died, the first of the deprenyl treated rats hadn’t! These results were in another study conducted from research by, Dean, Fowkes and Morgenthaler - published in the book ‘Smart Drugs and Nutrients’. It highlights that the loss of dopamine in humans with age, can be mapped against the development of Parkinson’s and even death.

Deprenyl has been expressed as a MAO-b inhibitor. Preventing the enzyme monoamine-oxidase type-b from destroying dopamine, ergo leading to its greater availability in the brain.

The inhibition of the more common MAO-a can be problematic; leading to something called ‘the cheese effect,’ not a side effect of deprenyl, although it should be noted that dopamine can inhibit type-a, usually at very high doses of 20mg. Professor Knoll has noted that there is another significant action of deprenyl and this is the raising of PEA levels. PEA is a catecholamine activity enhancer that raises norepinephrine levels, it’s a significant attention agent that is behind the primary mechanism of the famous Eugeroic drug- modafinil (Provigil). Read Professor Knoll’s books - ‘The brain and its self’, or ‘How selegiline/ deprenyl slows brain aging.’

Typical patient responses

A patient who has mild cognitive impairment, or age related minor cognitive dysfunction, the most common report is a significant improvement in their focus and concentration. Persons with higher dopamine levels often appear more ‘driven’ and ‘dedicated.’

Avoid overuse since it can lead to what may appear to be an oppressive behavior, as others around you are not so focused and ‘on the ball’ as you! We recommend breaks from deprenyl use.

Some advocate one week off in the month and others use it during the weekdays but not at the weekends.

Doses are based on need and age. Parkinson’s patients will require large doses. A person wanting to improve their cognitive performance may want to consider 1mg to 3mg per day, with occasional breaks. These doses do not take into account synergy with other dopamine enhancing agents and persons using anti-depressants should consult with their physician. Deprenyl tablets are provided in 5mg form (Jumex), some like to take ½ to 1 of these tablets 3-times a week. The use of the deprenyl liquid (Dep-Pro) is particularly attractive for those using deprenyl to generally support, protect and improve neurological function, since 1 drop = 1mg, the liquid can be dosed very precisely by placing those drops into a cold drink. Avoid use in the late evening to prevent any sleep disruption.
A REAL ‘ORAL’ ALTERNATIVE TO GH INJECTIONS

Since Dr. Rudman’s research work in the 1980s and the release of Dr. Klatz’s book ‘grow young with HGH’ in the 1990s, there has been great interest in the use of growth hormone (GH) in antiaging medicine. Dr. Rudman concluded, having injected elderly patients with GH, many had reversals of biological age markers by as much as 20-years. Improved skin, hair, muscle mass, decreased fat levels and enhanced levels of stamina, strength and well-being. It’s not surprising given the multi-faceted role of growth hormone and as its name suggests it is involved in the growth and repair of tissues.

GH injections

The issue with injecting GH, other than expense, is it has to be injected to be effective because as a 191 chain amino acid it can’t be absorbed another way. GH injections can be classified as a controlled substance, due to its anabolic actions. They could require special import and export licenses.

Dr. Richard Walker researched and highlighted that bolus injections of GH are not bio-identical and they induce spikes of GH into the blood so could damage the pituitary gland, leading to a down-regulation of its production of GH, or stop GH production altogether.

Dr. Walker’s research shows using GHRPs (growth hormone releasing peptides) have a safer profile with the same benefits.

Read this article in the Aging Matters™ magazine, No:3, 2014 to understand more.

GHRPs (growth hormone releasing peptides)

GHRPs, (GHRP2, GHRP6 and sermorelin) have these benefits:

They can be sublingually, intra-nasally and even orally, avoiding the need for needles.

Their feedback loop means they cannot cause the pituitary to down-regulate.

GHRPs are not controlled substances.

Rather than inducing a spike of GH in the blood, GHRPs augment (improve) each release of GH naturally into the blood.

Sermorelin is the precursor to GH, being the first 29 amino acids and is applied via the sublingual route. Its function may be to release existing stores of GH from the pituitary- rather than encourage more production as a pure agonist would.

Dr. Walker highlighted that combining sermorelin with GHRP2 or GHRP6 has a highly synergistic effect, in some cases eliciting up to a 5x greater quantity of GH into blood, an action that can be equivocated to using injectable GH itself.

Note: You can hear Dr. Walker discuss this with us on the IAS video page: www.youtube.com/watch?v=S5OIhEhm71Q

The differences:

GHRP6 may induce more hunger feelings than GHRP2 and could improve levels of IGF-1 more. Recommended for those who want to put on muscle mass.

GHRP2 may create fewer hunger feelings. Preferable to those who want to stimulate GH for fat loss. Also as the GHRP6 (Release-Pro™) is a nasal spray, those who don’t like that may prefer GHRP2-Pro™ which can be swallowed.

GHRPs have created a genuine efficacious alternative; simple and easier to use. They have a better/ safer profile than injectable GH.
FUEL YOUR IMMUNE SYSTEM WITH BOOST-P
A robust immune system is crucial to health throughout one’s lifetime for protection against disease-causing pathogens, infections, and cancer. Decades of research has shown that a well-researched and popular nutrient, vitamin C, is crucial to various aspects of immune function. But as we’ll see below, most adults fall short of obtaining optimal, or even adequate amounts of vitamin C in their diets, putting their immune systems and overall health in jeopardy.

What’s more, many have increased requirements for this nutrient due to the declining immunity associated with aging, unhealthy lifestyle factors like smoking, and conditions such as diabetes. The good news is, it’s possible bolster immunity with a targeted nutritional program that includes a generous daily dose of vitamin C as a core component, and Boost-Pro™, a high-potency vitamin C supplement, is ideal for this purpose. In this article we’ll examine the immune-enhancing and other benefits of ensuring optimal intake of vitamin C.

Some Background on Vitamin C

Vitamin C, also known as ascorbic acid, is an essential nutrient, meaning that it cannot be synthesized in the body and must be obtained from the diet (it occurs naturally in a variety of fruits and vegetables). Our physiologies rely on vitamin C for a wide range of functions including growth and repair of tissues; wound healing; maintenance of cartilage, bones, and teeth; collagen formation; and immune function – the focus of this article.

Vitamin C’s importance to immune function is partly based on its role as a potent antioxidant, donating electrons to protect key biomolecules from damage by oxidants generated during normal cell metabolism or through exposure to toxins and pollutants. It scavenges numerous Reactive Oxygen Species (known as “ROS”) such as superoxide and peroxyl radicals, hydrogen peroxide, hypochlorous acid, and oxidant air pollutants, and can regenerate other antioxidants, including glutathione and vitamin E. (1) Vitamin C also functions as a cofactor for various enzymes. (2)

Decades of research, including that of the famous Dr. Linus Pauling, has shown vitamin C to be crucial to various aspects of the immune system, as we’ll see below.
AGING MATTERS

VITAMIN C’S DIVERSE ROLES IN THE IMMUNE SYSTEM

The immune system is a sophisticated network of specialized organs, tissues, cells, proteins, and chemicals that protects against pathogens such as bacteria, viruses, fungi, and parasites, as well as cancer cells, and it relies on adequate stores of vitamin C. There are two arms of the immune system, the innate and adaptive. The innate or nonspecific immune system provides a broad first line of defense against pathogens. The adaptive or specific immune system consists of highly specialized white blood cells called T- and B-lymphocytes, which can detect microbes in a very precise way, store their identity in “memory,” and recognize them when and if they are encountered again.

VITAMIN C’S IMMUNE-MODULATING ACTIONS INCLUDE:

Protecting the skin from pathogens. Vitamin C also reduces the impact of environmental pollutants and enhances collagen synthesis, both of which are essential to healthy, younger looking skin, and speeds wound healing.

Accumulating in white blood cells such as neutrophils and macrophages, which are cells of the innate immune system. Neutrophils are responsible for migrating to the site of wound or infection, engulfing invading pathogens, and killing them via the release of antimicrobial proteins and ROS (thus subjecting pathogens to overwhelming oxidative stress). Once the neutrophils have completed their microbe-killing task, they undergo apoptosis (programmed cell death) and are cleared by macrophages. Vitamin C influences each of these functions carried out by neutrophils and macrophages.

Accumulating in B- and T-lymphocytes and enhancing differentiation and proliferation of these cells of the adaptive immune system.

Reducing inflammation by regulating cytokine production and decreasing histamine levels. Cytokines are cell signaling molecules secreted by a variety of immune cells, both innate and adaptive, in response to infection and inflammation. Histamine is a chemical produced during an immune response that causes inflammation and vasodilation, leading to allergic symptoms such as runny nose and eyes. Studies show that vitamin C influences the production of pro- and anti-inflammatory cytokines and lowers elevated histamine levels.

Stimulating NK cells (a type of white blood cell of the innate immune system that provides a rapid “first” response to infected cells) and increasing antibody activity.
Since Vitamin C plays such a fundamental and varied role in so many aspects of immune function, it follows that deficiency results in impaired resistance and greater susceptibility to infections. Unfortunately, as previously noted, most adults are lacking in the vitamin, for various reasons.

**INADEQUATE VITAMIN C INTAKE AND OTHER CAUSES OF DEFICIENCY**

Vitamin C is water-soluble, and therefore not stored in the body for long periods of time, requiring regular intake (i.e., once or several times a day) to obtain substantial or even adequate blood levels. The Recommended Dietary Allowance (RDA) for vitamin C is set at only 75 to 90 mg per day, which is extremely (even ridiculously) low according to most experts who advocate 500 mg minimum, up to gram quantities per day, (Linus Pauling supposedly consumed 12 g daily.)

A minimally set RDA combined with a general low consumption of fruits and vegetables leads to the common problem of insufficient vitamin C intake; most people simply do not consume the nine or more servings of fruits and vegetables a day necessary to obtain the variety of vitamins, minerals, and micronutrients at levels required for optimal health. And to reach higher, gram quantities of vitamin C, one would have to consume an abundance (i.e., approximately 16 to 18 or more servings a day) of fruits and vegetables, emphasizing the need for dietary supplementation to obtain these optimal levels.

Although the severe vitamin C depletion that results in the disease scurvy (characterized by bleeding, bruising, impaired wound healing, and poor resistance to infections) is a rarity in the 21st century, still, low plasma vitamin C levels are relatively common in the West, and vitamin C deficiency is the fourth leading nutrient deficiency in the US. (2,14)

But it’s not just poor dietary habits and low intake that negatively impact vitamin C status; lifestyle factors such as smoking, drug use, heavy drinking, and exposure to pollutants all increase requirements for vitamin C by upsetting the oxidant/antioxidant balance in the body, (2) leading to higher metabolic turnover of vitamin C to combat the increased oxidative stress.

In addition, certain diseases are associated with low vitamin C levels, including diabetes. Like the lifestyle factors we just examined, the high blood sugar characteristic of type 2 diabetes leads to increased production of ROS and higher requirements for Vitamin C. (2) Interestingly, supplementation with vitamin C improves glycemic control in type-2 diabetes, (15) perhaps due to the corresponding recovery of oxidant/antioxidant balance.

Gastriitis, pancreatitis, pneumonia, sepsis, arthritis, and cancer are other examples of diseases linked with low vitamin C status, as is aging.
Aging individuals are particularly susceptible to infections due to immunosenescence (aging of the immune system) and the poor vitamin C status characteristic of people in this age group, (16) a “double whammy” that can sap immune function, putting those over the age of 60 at greater risk of cancer, pneumonia, and other dangerous diseases.

Aging is also associated with increased levels of oxidative stress due to the age-related decline of antioxidant capacity, (17) which is in part due to low vitamin C blood concentrations. Restoring adequate levels of the vitamin may slow or counter the progression of immunosenescence and improve antioxidant capacity, providing a range of anti-aging benefits.

Besides the factors already mentioned, infections themselves, which are the result of poor vitamin C status to begin with, can cause plasma levels to further plummet. In the process of fighting pathogens, greater quantities of vitamin C are taken up by immune cells, (18) causing plasma levels fall, (19) and requiring higher doses of vitamin C than daily maintenance doses to compensate for the metabolic demand. (20)

Studies have shown that boosting vitamin C levels through supplementation can both prevent and treat several conditions and illnesses. In particular, let’s now look at respiratory infections.

**STUDIES ON VITAMIN C AND RESPIRATORY INFECTIONS**

Pneumonia, a common but potentially fatal respiratory infection, is associated with decreased plasma vitamin C concentrations. (18) Restoring levels through routine daily vitamin C supplementation has been shown to decrease the risk of developing the illness. (19,20)

When used as treatment, even a modest dose of 200 mg lowered the severity of symptoms in hospitalized patients with bronchitis and pneumonia, especially in those most deficient in vitamin C. (21) Another study found that vitamin C at doses up to one gram daily reduced the hospital stay of patients by 19% and doses up to 1.6 g daily cut in-patient time by 36%. (22) (It’s unfortunate the researchers stopped at 1.6 g; since the effect appears to be dose-related, it’s likely that higher doses of 3, 4, or 5 g would have drastically slashed time in the hospital.)
Vitamin C has also been shown to have impact on the most prevalent respiratory infection, the common cold. As with other infections, low vitamin C levels have been linked with increased cold duration and severity. A meta-analysis evaluating only placebo-controlled trials testing doses of at least 200 mg daily showed that regular vitamin C supplementation reduced the severity and duration of the common cold, and, although it did not appear to decrease incidence of colds in the general population, it was shown cut the number of colds in those performing intense physical exercise (i.e., marathon runners, skiers, and soldiers on subarctic exercises) by an impressive 50 percent. As far as treatment at the onset of cold symptoms, two controlled trials found a statistically significant dose-response effect on the duration of colds using high doses of up to 8 grams vitamin C daily.

RECAP: WHAT WE’VE COVERED SO FAR

One of the main points we’ve covered is that vitamin C is a major player in the immune system, enabling it to launch and sustain an effective response against pathogens. We reviewed the causes of deficiency, and the consequences, including greater susceptibility to infections, and reviewed several studies documenting vitamin C’s potential to reduce the risk, severity, and duration of common respiratory infections. We also touched on the link between low vitamin C status and increased oxidative stress in diseases such as diabetes, and in aging, and the benefits of restoring vitamin C levels in these conditions.

But that’s not all: vitamin C also protects against cardiovascular disease, stroke, eye disease, skin aging, and cancer. And on this last note, intriguing recent research published in the journal Nature indicates that vitamin C may reduce the risk of leukemia by accumulating within hematopoietic (blood cell-forming) stem cells, regulating their number and function, and promoting the activity of a tumor-suppressor protein. Ongoing research will likely uncover even more benefits of this multi-faceted nutrient.

It’s clear that ensuring adequate, or better yet, optimal intake of vitamin C, through diet and supplements, should be a health priority for all, and especially aging individuals and those at risk of deficiency, and Boost-Pro™ is a perfect supplement for this purpose. (Note: You should still strive to eat at least five servings of fruits and vegetables daily to obtain a full range of vitamins, minerals, and micronutrients.)
METHYL SULFONYLMETHANE (MSM) is a naturally occurring sulfur compound and a popular dietary supplement shown to function as an anti-inflammatory and antioxidant. It's most commonly used (in gram doses) to alleviate inflammation and joint and muscle pain associated with arthritis and other conditions, though it has other applications, including the treatment of allergies. Boost-Pro™ provides a hefty two grams of vitamin C. The product is formulated with GMS-Ribose™ (glycine methyl sulfone ribose) to maximize vitamin C absorption, assist heart health and aid the feeling of being energized. Two other ingredients, quercetin and MSM, further enhance this unique formulation.

Quercetin is a flavonoid antioxidant found in foods such as fruits, vegetables, tea and wine, with potential anticancer, anti-inflammatory, immune-enhancing, and antiaging activities. Like vitamin C, it scavenges highly reactive oxygenes, which contributes to its beneficial health effects. In yeast and worms, studies show that quercetin increases the capacity to fight oxidative stress (a contributor to aging, as we saw earlier) and lengthens life span.

Methylsulfonylmethane (MSM) is a naturally occurring sulfur compound and a popular dietary supplement shown to function as an anti-inflammatory and antioxidant. It's most commonly used (in gram doses) to alleviate inflammation and joint and muscle pain associated with arthritis and other conditions, though it has other applications, including the treatment of allergies. Boost-Pro™ is a pre-measured powder contained in individual sachets that can be mixed with water or your favorite juice, it's a great addition to your supplement regimen in a convenient formulation that can be taken on the go.

References:
BECAUSE NOT ALL MELATONINS ARE CREATED EQUAL

Melatonin is produced by the pineal gland at night to regulate our circadian rhythm, (sometimes called the sleep wake cycle). As we age the amount of melatonin we produce reduces, resulting in many older people sleeping less and having a lower quality of sleep. Our melatonin has been formulated by the world’s foremost melatonin expert Dr. Walter Pierpaoli, his Melatonin Zn Se, or MZS, is totally unique since it is designed to mimic the natural night peak of melatonin to leave you feeling refreshed and alert the following day.

What does Melatonin do?

Melatonin is vital to protect our hormonal system, regulate immunity and repair our body’s cells. Commonly used by shift workers and to treat jet lag and age related sleep disorders. Melatonin is an extremely effective antioxidant, in fact on a molecule to molecule basis - melatonin has proved to be significantly more efficient in neutralizing toxic hydroxyl radicals than the two wellknown free radical scavengers, glutathione and mannitol. Its effect on longevity is well documented. Experts believe melatonin has a positive effect on aging.

Age related macular degeneration (ARMD) comes in two forms, wet and dry. It’s a difficult disorder to treat and linked to blindness. A 24-month study, (published in NY Academy of Science, 2005, 1057:384-392) on 100 patients showed that after 3 months, the majority of patients taking 3 mg of Melatonin Zn Se nightly had halted the progression of their age related macular degeneration and at 6 months many showed reversal of their ARMD. True for both the wet and dry forms!

Why is Dr. Pierpaoli’s MZS more effective than other melatonin supplements?

Firstly, it is of pharmaceutical quality at a dose of 3 mg. Secondly, it contains the synergistic ingredients of selenium and zinc. Thirdly and most importantly- it is designed to release at a very specific time. Dr. Pierpaoli’s research led him to perfect a formula that exactly mimics the pineal gland’s release of melatonin. MZS is the only melatonin supplement to follow nature’s own night peak. Take half to one 3 mg tablet at bedtime only; do not take more than two tablets. By taking MZS™ between 9pm and 11pm you will create a night peak between 1am and 3am, this is the most natural and normal time to have the highest melatonin levels.

MZS is much more than a sleep aid and melatonin has many published benefits. MZS comes with the endorsement of Dr. Pierpaoli. If you’ve tried other melatonin and didn’t notice any significant effect, then we highly recommend you try Dr. Pierpaoli’s MZS for a superior experience.
ESNATRI AND PROGESTERONE

BIOIDENTICAL HORMONES - NATURAL ESTROGENS AND PROGESTERONE FOR WOMEN

In this featured section we are focusing on the use of natural estrogens and progesterone for women, normally utilised to aid the menopause. IAS carries a wide range of bioidentical hormones - a term that means ‘natural to and in the body’.

When hormone replacement therapy (HRT) was developed in the 1920s, estrogens had to be derived from horse urine because a laboratory solution was too difficult or expensive to synthesize. Facts pointed out by Dr. Wright in his best-selling book ‘Stay Young & Sexy’. Estrogens can be easily produced now. Some people believe that the known side-effects from ‘traditional HRT’ are due to the fact that the hormones given are not correct.

Introducing Esnatri

Esnatri is our bioidentical triple estrogen cream. One of the best bioidentical estrogen creams available. It comes directly from the work of Dr. Wright who has shown that the majority of women produce estrogens in the ratios of 90% estriol, 7% estradiol and 3% estrone.

Most tri-estrogen preparations attempt to replicate the human hormones estriol, estradiol and estrone, apply them in the ratio of 80:10:10, while some even entirely over-look estriol, claiming it is a weak estrogen. But, women naturally produce high levels of estriol and it is considered to have anticarcinogenic effects.

The Esnatri cream can be applied by daily rotation to your neck, upper chest, breasts and behind the knees, or inner thighs. A typical starting dose is 2 mg. Start from day one (of what would have been the start of your menstrual cycle) and continue until day 25. You should stop for five days, before repeating the application at the start of the next menstrual cycle. During these last few days, the estrogen receptors are being allowed to ‘rest’ as they have been accustomed.

Combining Estrogen with Progesterone

Progesterone is the counterbalance to estrogens. Women can significantly decline in estrogen levels during menopause - they rarely reach zero production levels, whereas progesterone can sometimes not be measured at all in elderly women. It is also the low progesterone that most significantly impacts bone strength, leading onto osteoporosis. There are numerous reasons to ensure that progesterone is also taken alongside an estrogen therapy. IAS provides a 5% strength natural progesterone cream. Typical doses are 25 mg to 30 mg of progesterone applied on day 10 and continuing to 25. The start date varies according to the usual timing of your ovulation. As with the Esnatri cream, stop for the last five days of your cycle so that the estrogen receptors have their accustomed ‘rest’ period. Remember, your hormone replacement therapy should be overseen by a physician and should not be undertaken if you have undergone cancer treatment.
Oxytocin is a hormone produced by the hypothalamus, excreted via the pituitary gland. Its orthodox medicine role is to help women give birth, since the large dose that’s injected helps relaxes the uterus and alleviates the passage of the child. Dr. Thierry Hertoghe’s book, ‘Passion, sex and longevity, the oxytocin adventure’ highlights that it has many other roles too.

The love hormone

Oxytocin has been dubbed ‘the love hormone’. It can induce feelings of bonding and care. Its measurements have been taken between lovers, friends, relatives, parents and their children etc. It has been noted that oxytocin levels are higher when they are in their presence. Mothers naturally bond with their children, but even men, (especially those who experience the live birth), express their emotions as wanting to care and protect their offspring. These effects may be attributable to the release of oxytocin hence triggering the bond. However, psychopaths are notoriously low in their oxytocin levels, which may be a cause of their uncaring feelings towards other humans.

The pain and orgasm connection - Fibromyalgia can be a very debilitating disorder with a lot of pain, sometimes constant for those who suffer with it. In women, it was noted that when they were experiencing an orgasm they felt no pain at all. Women undergo a burst of oxytocin during orgasm. Trials were undertaken to see if oxytocin supplementation could alleviate the pain of fibromyalgia, there was some success, but the side-effect noted was that those women now enjoyed multiple orgasms!

The effects of Oxytocin

Dr. Hertoghe explained that some will not feel the effects of Oxytocin. For two reasons, (if we consider that the dose is correct for that individual). Firstly, some people are ‘low’ in their own principal sex hormone, so if a man is low testosterone, or if a woman is low estrogen, it is possible that oxytocin will not elicit its full potential in those persons. The other issue could be low vasopressin, vasopressin is a counterpart to oxytocin, produced and released via the same glands. In cases of vasopressin deficiency, the patient may enhance the oxytocin experience by adding one or two sprays (10 IU each) of vasopressin via the Vaso-Pro nasal spray.

Doses are very dependent upon its use. For social or sexual enhancement, 5 IU to 10 IU is a ‘typical’ dose. Dr. Hertoghe reduced the doses that he recommends in his book, (transmitted via personal conversation to me). Currently, IAS is providing Oxy-Sub in 20 IU troughes (a soft sublingual tablet). These can be cut into half or quarter for a dose of 5 or 10 IU and should be placed under the tongue and allowed to melt. The other option is Oxy-Pro which is applied intranasally delivering 10 IU per spray.
SHIELDING AGAINST AGE
THE CROSSTYPE THEORY OF AGING

By Ward Dean, M.D.

The Crosslinkage Theory of Aging was first proposed by Dr. Johan Bjorksten in 1941. Bjorksten believed that aging was caused by inter- and intra-molecular crosslinks in proteins, nucleic acids, and other vital macromolecules that caused them to gradually “stiffen” and lose their function.\(^1\)

Bjorksten initially searched for enzymes capable of “dissolving” damaging crosslinks. But as he grew older he realized that he didn’t have enough years of life ahead of him to allow for the identification and isolation of these enzymes. Consequently, he shifted his line of research to a more immediately solvable approach: using chelating agents to remove toxic heavy metals, (especially aluminum) that were believed to be one cause of crosslinking. He hoped that by eliminating the crosslink-promoting tri-valent (three points of attachment) aluminum atoms, (which he believed displaced di-valent [two points of attachment] calcium atoms, he would reduce one of the major sources of crosslinking, and thereby “buy enough time” to solve the rest of the crosslinkage problem.\(^2\)

Bjorksten ended his active research career in 1991 with one last publication that summarized his progress up to that point. \(^3\) Ironically, at about the time Bjorksten was retiring from his quest to unravel the crosslinkage problem, other scientists were “picking up the baton”- although they approached the problem from a slightly different direction.
ADVANCED GLYCATION END PRODUCTS OF AGING (AGES)

A characteristic of all long-lived proteins in the body is that as they age, they turn brown and become fluorescent (under UV light), become more crosslinked, less soluble, less elastic, and less digestible by enzymes. In 1965, Dr. H.B. Bensusan first proposed that it was a process known as the Maillard reaction that caused these changes. The Maillard reaction is named for the noted French scientist, Louis Camille Maillard (1912), who described the non-enzymatic chemical reactions between proteins and carbohydrates that cause cooked foods to turn brown. This time-honored bit of kitchen chemistry has been used by cooks for centuries to enhance flavor and transform plain foods into delicacies by adding flavor and color to recipes.

In 1985, Monnier, Kohn and Cerami provided further details of the role of the Maillard reaction as a major source of the age-dependent increase in browning, fluorescence and crosslinking. They further developed the idea that it is the Maillard reaction that results in premature aging and degenerative diseases such as diabetes and heart disease. In this regard, many scientists think the human body may be viewed as a “low temperature oven” with a relatively long—approximately 75-100 year—“cooking cycle.”

The Maillard reaction involves a chemical reaction (“condensation”) between a sugar (usually glucose) with a protein. This complex is known as a Schiff base. In the human body, this is a reversible reaction which reaches equilibrium (i.e., stabilizes) within several hours.

With continued exposure to the sugar, the Schiff base undergoes a “rearrangement” known as non-enzymatic glycosylation that results in a more stable, less reversible substance, known as an Amadori product. Again, in the human body, this process reaches equilibrium over several weeks. (Fig. 1) (7)

![Figure 1: The pathway of advanced glycosylation, from Schiff bases to AGEs over time.](image)

The Amadori product further degrades irreversibly into several highly reactive carbonyl (C=O) compounds. These reactive substances, called Advanced Glycation End products have been designated by the acronym AGE. AGE is a clever pun which reflects the proposed relationship of these reactive substances to aging and age-related diseases. AGEs can further react with other fats, proteins and nucleic acids to form largely indissoluble crosslinks. The age related accumulation of these AGE products has been demonstrated in many tissues of the body (Fig. 2).
Furthermore, during long-term hyperglycemia (elevated blood sugar), as in diabetics, glycation and AGE formation may increase up to four times as much! This explains why diabetics suffer the premature onset of a wide range of age-related complications including cataracts, retinopathy, neuropathy, nephropathy, atherosclerosis and osteoporosis. (6)

CROSSLINKAGE THEORY GETS NEW LIFE

Bjorksten was a talented petroleum chemist. Had he been a food chemist instead, he may have appreciated this link between the Maillard Reaction and crosslinking much earlier and made even greater progress in developing preventive and therapeutic approaches to crosslink-induced aging. Through their insightful work in understanding this process, scientists like Brownlee, Cerami and Monnier provided a renewed impetus and a “rebirth” for the crosslinkage theory. (6) Unfortunately, they did this with little attribution to Bjorksten, who had doggedly pursued this approach to aging for over 50 years.

Figure 2:
Increase accumulation of AGES (CML) with age in human lens protein and skin collagen.
(Dyer et al. The Maillard reaction in vivo, 1991.)
APPROACHES TO PREVENTING AND REMOVING AGE-INDUCED CROSSLINKS

Scientists in the Departments of Biochemistry at the Universities of Kansas and South Carolina proposed a multi-pronged approach to inhibit the formation of AGEs (Fig. 3). Here are some of the most promising substances to use to inhibit/dissolve AGE-induced crosslinks.

Figure 3: Schematic of Maillard Reactions and potential sites of intervention (Type A-F).

AMINOGLUANIDINE (PIMAGEDINE)

Aminoguanidine has been known to chemists for over 100 years. In 1986, aminoguanidine was found to prevent diabetes-induced arterial wall cross-linking in rats. Subsequent studies confirmed aminoguanidine’s ability to block the formation of AGEs and AGE-induced cross-linkages in collagen and other tissues (Fig. 4). Animal studies indicated that aminoguanidine prevented or delayed the onset of cataracts, inhibited atherosclerosis and myocardial stiffening and protected against diabetic retinopathy, nephropathy and neuropathy.
After nearly 15-years of in-vitro and in-vivo studies with rats, demonstrating the AGE-reducing properties of aminoguanidine, two large clinical trials were conducted to determine its efficacy in humans: Aminoguanidine Clinical Trial in Overt Nephropathy of Type 1 and Type II diabetics (“ACTION I” and “ACTION II”).

In the ACTION I trial, 690 diabetics with retinopathy and nephropathy were assigned to one of three groups: placebo; low dose (150 mg aminoguanidine twice daily); or high dose (300 mg aminoguanidine twice daily). The end-point of the study was the time it took for the serum creatinine to double from the baseline at entry into the trial. This would indicate a significant decline in renal function, a major complication of diabetes.

Serum creatinine doubled in only 20% of the pimagedine (aminoguanidine) group compared to 26% of the placebo group. Glomerular filtration rate (GFR, a sensitive indicator of kidney function) declined more slowly in the pimagedine-treated patients—and pimagedine reduced the 24-hour total urinary proteinuria. Surprisingly, the reduction was more pronounced in patients who received the low dose pimagedine. Pimagedine treatment was associated with a significant protection against doubling of creatinine. In addition, fewer Pimagedine-treated patients (10%) as compared with those receiving placebo (16%) experienced a three-step or greater progression of retinopathy; and treatment with low dose pimagedine was associated with a larger decrease in triglycerides and increase in high density lipoprotein cholesterol compared to placebo.

Mild adverse events included a transient flu-like syndrome between weeks 2 and 4 of treatment, which resolved spontaneously. Mild liver enzyme elevations were also occasionally noted, which were also self-limited and resolved.
spontaneously, regardless of whether pimagedine was continued or stopped. A mild to moderate anemia of unknown cause occurred in all study patients, (including placebo) but was more pronounced in those patients on pimagedine, especially during the first few weeks of treatment.

A more severe adverse effect, was crescentic glomerulonephritis which was observed in 3 patients in the high dose pimagedine group. Two of the three patients required maintenance dialysis. Significantly, glomerulonephritis was not observed in any of the 229 subjects receiving low dose pimagedine for an average of 2.5 years. It was this adverse effect that caused the trial’s FDA monitors to terminate the trial.

The authors of the report concluded that pimagedine produced a significant protective effect on the GFR compared with placebo; caused a significant decrease in proteinuria; was associated with a reduced progression of retinopathy; was associated with a reduction in the levels of total cholesterol and triglycerides and an increase in HDL cholesterol; and minimal adverse effects for those who received the lower, 300 mg/day dose.

"These effects are consistent with broad-spectrum activity of AGE formation on the pathogenesis of diabetic complications. The beneficial effects of pimagedine were apparent at the lower, 150 mg twice-daily dose, and this dose was well tolerated for a duration of exposure of up to 4.5 years. Toxicity observed with the higher dose of pimagedine was not noted with the lower dose.”

Unfortunately, virtually every article that subsequently mentioned aminoguanidine (pimagedine) that I have seen referred only to the study’s early termination and exaggerated the side-effects, without mentioning the beneficial effects experienced by the patients on the low dose regimen. I think the backers of pimagedine, (Alteon Pharmaceuticals) were intimidated by the FDA and may have realized the difficulties they would encounter to have a generic substance like aminoguanidine approved as a profitable prescription drug, causing them to abandon any further evaluation and development. However, I think the study very authoritatively attested to the safety and benefits of low-dose (150-300 mg) aminoguanidine.
METFORMIN (GLUCOPHAGE)

Metformin is an anti-diabetic biguanide that was derived from the herb, Goat’s rue (Galega officinalis). Biguanide drugs were recognized by Prof. Vladimir Dilman as early as the mid 1970s as the most effective anti-aging drug in existence. Metformin is known primarily as an insulin receptor sensitizer, capable of normalizing blood sugar and insulin. However, Dilman demonstrated that biguanides restored receptor sensitivity for cortisol and other hormones, as well. Metformin has many other beneficial properties, including optimizing the lipid profile, reducing body fat, maintaining levels of growth hormone, stimulating immunity, and extending the maximum lifespan of experimental animals. I reviewed the anti-aging/life-extending effects of Metformin in my article, “Metformin Update: Still the most effective anti-aging, life extension drug, with a broad range of benefits” in Aging Matters™ Magazine, No. 4, 2013.

Metformin is similar in structure to aminoguanidine (Fig. 5), suggesting that it may also have a potential effect on the inhibition of glycation reactions. Clinical studies in diabetics confirm metformin’s ability to prevent the formation of the potent AGE-precursor methylglyoxal (MG),35-38 and the AGEs carboxymethyl-lysine (CML)38,39 and pentosidine.29,40

PYRIDOXAMINE (AND PYRIDOXAL-5-PHOSPHATE [P-5-P])

Several compounds are commonly referred to as vitamin B6--pyridoxine, pyridoxal, pyridoxamine, and their respective 5’-phosphate forms. These are considered pyridoxine vitamers, and our body is capable of interconverting between them. Pyridoxamine is a metabolic precursor P-5-P that exerts antiglycative effects.7 The effect of pyridoxal, P-5-P, two forms of vitamin C (sodium ascorbate and dehydroascorbate [DHA]) and aminoguanidine were tested for their ability to prevent the non-enzymatic glycosylation (formation of AGEs) of bovine serum albumin (BSA) with radioactive-labeled glucose. P-5-P was exceeded only by aminoguanidine in its ability to inhibit AGE formation. (Fig. 6)41 Clinical studies of the P-5-P precursor pyridoxamine demonstrated it to be effective in reducing the increase of serum creatinine in diabetic patients with early nephropathy.42,43

Figure 5:
The comparative structures of metformin and aminoguanidine.
VITAMIN B1 (BENFOTIAMINE)

In their book, Life Extension, Durk Pearson and Sandy Shaw reported that thiamine was an effective crosslink inhibitor. They were, at that time, consuming two grams of thiamine each day in their personal anti-aging regimens. Benfotiamine is a lipid-soluble form of vitamin B1. It was found to be a potent inhibitor of glycation, inhibited the formation of AGEs and normalized nerve conduction velocity in diabetic rats, and blocked three major pathways of hyperglycemic damage and prevented diabetic retinopathy in rats.

Scientists in Germany, aware that AGEs play a role in the development of endothelial dysfunction and vasculopathies, tested the ability of benfotiamine to reduce the AGE-precursor methylglyoxal (MG) and the AGE carboxymethyl-lysine (CML) in a group of patients with type II diabetes. Patients were given a cooked, high-AGE content test meal, and were then treated with 1000 mg of benfotiamine each day for three days and were then given another high-AGE test meal. Blood levels of MG, CML, and other tests of endothelial function, inflammation, and oxidative stress were measured before and after the test meals. The scientists found that benfotiamine prevents post-meal increases in circulating MG and CML levels in humans, and completely prevents micro- and macrovascular dysfunction caused by an AGE-rich test meal.

A recent study concluded that, “this antiglycative compound (pyridoxamine) exerts protective beneficial effects by reducing AGEs levels, leading to interferences with selective inflammatory and profibrotic signaling pathways.” Combining pyridoxamine with metformin and aminoguanidine may enhance their AGE-inhibiting actions even more.

Figure 6: In vitro (“test tube” test) comparing the formation of AGEs on bovine serum albumin when exposed to glucose.

Note the dramatic reduction of AGE formation when aminoguanidine or pyridoxal-5-phosphate are added. (Khatami, et al, Life Sciences, 1988)
CARNOSINE

Probably the leading proponent of the anti-aging effects of carnosine is Dr. Alan Hipkiss of the Division of Biomolecular Sciences, King’s College, London. Dr. Hipkiss first wrote of carnosine’s ability as a powerful crosslink inhibitor and AGE-breaker in 1994,50 and has subsequently produced a stream of papers describing its multiple uses to help control age-related glycation and associated diseases. Most recently, Dr. Hipkiss attributes methylglyoxal-induced AGEs as a cause of Parkinson’s disease, which may be alleviated by carnosine.51-52 Scientists in Turkey recently confirmed Hipkiss’ concepts by demonstrating age-related increases in the AGE-precursor methylglyoxal in rats, and the effectiveness of carnosine to reduce MG levels in the old rats.53 Carnosine’s AGE-inhibiting properties are the basis for the patented N-acetyl carnosine-containing eye drops (Can-C™), combined with an oral supplement of L-carnosine (Can-C+) to prevent and treat age-related cataracts and primary open-angle glaucoma.54

CARNITINE

In 2007, scientists in India examined the anti-glycating effect of L-carnitine in rats fed a high-fructose diet to determine the potential of carnitine to inhibit in-vitro glycation. They found that the high-fructose diet caused hyperglycemia and glycation of hemoglobin and skin and tail tendon collagen; and that these effects were dramatically reduced in carnitine-fed rats. They concluded that carnitine not only has antiglycation effects but also provides evidence for the therapeutic use of carnitine in diabetes and associated complications.

In 2013, scientists in Japan found that diabetic patients with end-stage renal disease (ESRD) undergoing hemodialysis had higher levels of fluorescent AGEs in their skin compared to normal, non-diabetics, indicating that severe diabetics had higher levels of systemic glycation.

To test the effects of carnitine on AGEs in humans, seventy-two diabetics with ESRD were divided into two groups—a placebo group, and a test group treated with 1000 mg of carnitine daily for six months. Six months’ treatment with carnitine resulted in a dramatic reduction in skin auto-fluorescence (SAF) (Fig. 7). The carnitine treatment also resulted in improved endothelial and cardiac function, reduction of high-sensitivity C-reactive protein, and improved carotid pulsatility index. The authors concluded that suppression of AGE accumulation by L-carnitine may play a protective role against cardiovascular disease.

Figure 7:

Correlation between the change in skin advanced glycation end products (AGEs) from the pre-treatment baseline levels to the post-treatment level, and the change in free carnitine levels. This figure clearly shows that the greater the increase in free carnitine levels, the greater the reduction in skin AGEs.
The venerable crosslinkage theory of aging has thus far gained newly respected recognition considering the advances in understanding of non-enzymatic glycation and the formation of AGEs and AGE-inhibiting crosslinks. Although various substances have identified that inhibit the formation of intermediates in the AGE-formation cascade (Fig. 3), the problem remains to find a truly effective cross-link breaker that will “undo the damage.” In the meantime, the most effective approach is to minimize the formation of advanced glycation end products (AGEs). This can be accomplished by consuming a low carbohydrate diet and exercising regularly, and adding a potent antiaging combination of AGE-inhibiting substances like aminoguanidine, metformin, carnosine, carnitine, benfotiamine and pyridoxamine or P-5-P.

References:

Today Professor Vladimir Khavinson is the president of the European Academy of Gerontology and Geriatrics, but in the 1980s he was a Colonel in Soviet Union military medical corps. At the time, he and his team were approached by Kremlin officials, they wanted them to find a way to protect their troops from a myriad of problems; issues such as radiation for submariners in nuclear submarines to troops that may be blinded from known (but thankfully unused) new weapons such as battlefield lasers.

A former Soviet military secret!

What their research uncovered—that was for two decades on many thousands of men and women—was a remarkable link between short chain peptides and DNA. This former military secret is now available to the public as peptide bioregulators. Their published research has identified that each organ/gland/tissue use a highly specific short chain peptide, obtained from food, to act as a ‘short-cut’ to initiate protein synthesis. These peptides, unlike proteins, can enter the blood through the stomach.

Though a comprehensive list of patents and even copyrighted PowerPoint slides, the Russian research group have shown that each of the concentrated peptide bioregulators so far examined, interact with particular strands of DNA effectively and very specifically activating repair and regenerative processes. This is a remarkable story since what we are describing here are peptides that act as individualised gene switches. To date, they have been tested for many years on thousands of individuals, without report of any serious side effects or contradictions. We believe that they could be set to ‘out do’ stem cells.

Why? Because this peptide therapy is relatively cheap, highly specific, can be taken orally and doesn’t require any suppression of the immune system to operate fully (as stem cells do).

Dosing

Doses are very dependent upon the need and unlike hormones these peptides do not have to be taken every day, hence making them a cost effective regime. A typical/average use could be considered as follows:

- Start with an intensive course: 2 capsules once a day for 30 days
- Thereafter use 2 capsules once a day for 10 days, repeat every 2, 3, 4 or even as little as 6 months

The story of peptide bioregulators is a remarkable one and we recommend that you read the articles, interviews and see the video on the IAS website.
PIRACETAM, THE ORIGINAL NOOTROPIC

Smart drugs and nutrients, or to give them their correct medical terminology, nootropics are agents that can improve conditions of senile dementias and have become popular for older individuals to improve their mental and cognitive processes. It was Ward Dean, M.D. who highlighted these facts through his very popular ‘Smart Drug’ series of books in the 1980s, since then the term ‘smart drugs’ has become mainstream.

Piracetam, the original nootropic

This smart drug was first developed by Dr. Giurgea for UCB laboratories in Belgium in the 1960s. Originally it was designed to assist with travel and altitude sickness, but shortly afterwards individuals realised that piracetam had positive cognitive enhancement effects.

Piracetam is a cognition agent that has been used successfully to treat a wide range of conditions, for example, it has been shown to increase a person’s attention levels and improve memory and intelligence. Piracetam can help to slow down ‘senile involution’, dementia and Alzheimer’s disease. In tests and trials, piracetam induces significant improvement to memory consolidation and recall in those suffering from ‘age-associated memory impairment’. It has also been used to improve patient’s recovery from strokes, particularly improving post stroke speech impairment (aphasia). Another use has been in cases of acute and chronic cerebral ischaemia, (decreased blood flow to the brain). Using piracetam has restored speech and the use of limbs in these patients; it has also increased neuronal activity in the brain when measured with EEG.

For regular individuals, piracetam has been shown to enhance idea creation and the ability to ‘see things through’. The level of clarity piracetam creates is often described, “the fog has lifted.”

How does piracetam work?

Piracetam's key and unique method of action is upon the Corpus Callosum, the region of the brain that links the two hemispheres. Most experts believe it is the key that gives piracetam users the ability to channel greater brain potential by connecting the logical side of the brain with the creative side more effectively.

What are the doses of piracetam?

A common dose is 800mg tablets three times a day, then lowering to 800mg twice a day after the first month. The effects of piracetam can be enhanced if taken concurrently with centrophenoxine or Hydergine. Side effects are minimal and seldom experienced, but should you experience nausea or a headache then it is usually caused by an overdose. In which case reduce the dose and build up more slowly.
FOR THE HYPOTHYROID EPIDEMIC

Dr. Broda Barnes in the 1970s estimated that 40% of the adult population was deficient in thyroid hormones. He published this statement in his excellent book - ‘Hypothyroidism, the unsuspected epidemic.’ Since then, pupils of Dr. Barnes, such as Dr. Richard Wilkinson, have suggested that this figure could be even greater now!

The thyroid gland is of pivotal importance to our overall health, as we age the production of thyroid hormones decline. This lack of thyroid function is the root cause of a variety of age related health disorders. Ergo, supplementation with a synthetic or a natural thyroid can have a significant positive effect on a wide range of age related problems.

The importance of the thyroid gland

The hormones produced by the thyroid control the body’s metabolism—the rate at which it burns calories for energy. It controls the body’s utilization of fat, so a decline in the secretion of hormones from the thyroid gland, (known as hypothyroidism) can result in a range of symptoms such as poor concentration, confusion, memory problems, cold hands and feet and weight gain. Another serious condition which can be caused by and result from an underactive thyroid are painful musculoskeletal issues that affect tendons, muscles and ligaments. Your doctor can have your blood levels of thyroid checked. In addition to that, you can take your body temperature when you wake in the morning, it should be in the range of 97.8 to 98.2 degrees Fahrenheit. If it is regularly lower you could be hypothyroid and if higher then hyperthyroid.

Choosing between synthetic and natural thyroid supplements

IAS stocks a comprehensive range of both synthetic and natural thyroids, although we advocate the use of a natural supplement over a synthetic, this is because products such as Armour are of a porcine origin, so they naturally contain the full spectrum of T1, T2, T3 and T4 thyroid hormones, (note the bottles only list the amounts of T3 and T4 because very few physicians are familiar with T1 and T2).

Natural desiccated thyroids are measured in grains; with one grain being equivalent to approximately 60 mg. IAS carries doses from ¼ grain to 3 grains, with brands including Armour, ERFA and Nature. IAS also provides synthetic T3 in 20 mcg and T4 in 100 mcg tablets.

Thyroid supplements provide potent antiaging protection. Many aging individuals can benefit from taking a thyroid supplement because this remarkable hormone has such a profound affect across so many different conditions. Many antiaging physicians consider thyroid support an essential part of any serious attempt to improve a person’s health-span and longevity.
TOP OF THE LINE INFO
AGING, HEALTH AND LONGEVITY RESOURCES

We hope you find this an interesting new feature of the Aging Matters™ magazine. It’s a report on the latest books, videos and conferences that are featuring the topics of health related to aging and longevity.

In this initial report, we are looking at what might be described as ‘top of the line’ publications, meaning serious pieces of work that have significant detail and references. In other words, these are not ‘light weight’ reads, but could none-the-less be desktop references for the health professional, or individual committed to this field.

In addition, we have a look at an upcoming US public meeting taking place in September 2018 which looks exciting.
PEPTIDES IN THE EPIGENETIC CONTROL OF AGEING

By Professors Khavinson, Maryanovich & Phil Micans

Those who have been following the incredible story of the short-chain peptide bioregulators (PB) will know how remarkable their story is. However, unlike most ‘new’ technologies, these PBs have been used in Russia for many years since they were originally developed for use by the Soviet Union’s elite military.

The man who headed that project was Professor Vladimir Khavinson and today you can find much of that research and clinical studies on PubMed etc. But, until recently, one would have had to spend a considerable amount of time collating and reviewing, to get a complete picture of what they mean to health, aging and longevity.

That is why it is exciting to have this new book published in English. It is a scientific reference manual to describe how the PBs operate and what they have achieved. If you want answers to questions like how they operate, how they pass through the stomach and what they have achieved in the Russian studies, then this is your fully-referenced resource guide.

Peptides in the Epigenetic Control of Ageing, is a 115-page book, it summarizes the results of a long quest; more than forty years of research for endogenous substances able to retard aging processes. It reveals the discovery that short-chain peptides can pass through the cell and nuclear membranes, bind to DNA and produce epigenetic effects that culminate in the restoration of disrupted cell functions.

The analogues of these peptides are now being used as peroral geroprotector drugs and have wide implications for the restoration of numerous degenerative disorders related to aging.

The experimental and clinical evidence of the effects of these peptides on cell proliferation, tissue regeneration, innate and adaptive immunity, metabolic homeostasis, lipid peroxidation, antiradical defences, and other functions is described and referenced in this book.

For those who are looking for the detail and the references about PBs, this is the only book currently available that can provide them.
REVERSING PHYSICAL AGING

By Dr. Thierry Hertoghe

A video interview about this book with Dr. Hertoghe can be viewed here: www.antiaging-systems.com/videos

This 1089-page book represents nearly 5-years of Dr. Hertoghe’s ‘spare time.’ As a result, it is a Magnum Opus; in-fact, he had to take a sabbatical from his regular clinical work to make sure it was completed to his typical high-standards.

For those who don’t know him, Thierry Hertoghe, M.D., is an endocrinologist based in Brussels, Belgium. He comes from a long-line of hormone experts in his family; as a result, he has amassed an amazing collection of information and photographs of patients stretching back into the early 20th century.

His latest epistle is the most complete mass of detailed information designed for the practitioner- to apply antiaging medicine to the ‘head.’ What is meant, is not just how to improve the aesthetic aspects to the face and eyes etc., but what technologies (principally based on hormones and nutrition, whether applied orally, nasally, injected or topically) that prevent and treat failing eyesight, smell, hearing and hair loss; in other words, all matters relating to the head.

At $440 there is no denying that this is an expensive book, perhaps even so for a serious antiaging enthusiast, but for the health practitioner wanting to have a referenced Bible at their disposal, it would be hard to find anything more detailed or up-to-date as this.

THE RAAD FESTIVAL

SAN DIEGO CALIFORNIA, USA, SEPTEMBER 20-23, 2018

A calendar of antiaging events around the world can be viewed here: www.antiaging-systems.com/content/9-calendar

RAAD stands for ‘Revolution Against Aging and Death.’ It is an event aimed at a public audience and this September will be its third event. The meeting is very interesting and clearly it is doing something right, since each year the number of attendees has doubled, with an expected 2000 individuals turning up in September 2018.

Some of the nice things about RAAD is that it is aimed at people, rather than health professionals, and it combines education with entertainment; in-other-words, there is a fun atmosphere that is conducive to learning.

We appreciate that such gatherings are also great for networking, after all, meeting with like-minded people can do wonders for one’s empowerment. There are numerous world-class speakers lined-up with hot and up-to-the-minute topics too. See you there!

SAVE $50

IAS members going to www.raadfest.com can save $50 by entering the code: IAS at the checkout.
SAVE ON MANY ANTIAGING PRODUCTS.

Simply use the voucher codes below within the stated timeframe and on the websites mentioned, (prices may be subject to taxes and S&H where appropriate).

**LONGEVITY SUPPLIES STORE**

**BOOST-PRO™**

Save $5.00 normally $37.49 just $32.49 for 30-sachets, valid until October 2018

Use code: LONGEVITY-1

**PEPTIDES IN THE EPIGENETIC CONTROL OF AGEING**

A 263-page book by Professor Vladimir Khavinson. Save $20.00 normally $94.99 just $74.99, valid until October 2018

Use code: LONGEVITY-2

**REVERSING PHYSICAL AGING**

A 1089-page book by Dr. Thierry Hertoghe. Save $40.00 normally $439.99 just $399.99, valid until October 2018

Use code: LONGEVITY-3

**CARNO-PRO™**

Save $5.00 normally $29.99 just $24.99 for 50x 250mg capsules, valid until October 2018

Use code: LONGEVITY-4

For the above go to: www.longevitiesupplements.store (payments by all major credit cards).
THE ANTIAGING STORE

AMINO GUANIDINE (AMINO-PRO™)
Save $5.00 normally $17.48 just $12.49 for 90x 75mg tablets, valid until October 2018
Use code: ANTIAGING-1

RAPAMYCIN (RAPA-PRO™)
Save $10.00 normally $89.99 just $79.99 for 12x 5 mg double-scored tablets, valid until October 2018
Use code: ANTIAGING-2

4MU-PRO™
100x 1000 mg tablets $119.99 buy 3x and save $20.00 per pack.

For the above go to: www.theantiaging.store (payments by e-Check and Wire).

MULTI PACK OFFERS

CAN-C™
Eye-drops 1x pack (2x 5ml bottles) $39.99 buy 3x and save 10% buy 6x and save 20%

ACF-228®
30-capsules $39.99 buy 3x and save $6.66 per pack.

PEPTIDE BIOREGULATORS
Save $30.00 when you buy them in 60-capsule packs.

For the above go to: www.longevitiesupplements.store (payments by all major credit cards).
WHERE TO FIND THE INFORMATION YOU NEED

www.antiaging-systems.com is your comprehensive resource for information about all the leading commercially available antiaging, preventative and regenerative products and therapies available today. Visit www.antiaging-systems.com and find articles, videos, audio-files, all referenced with a guide of where to obtain your needs.

Currently the site covers topics related to all of the following products.

BOOKS

- Atlas of Endocrinology
- Melatonin, the Key of Life
- Physician Hormone Handbook V2
- Cataract Cure
- Natural Skin Cancer Treatments
- Peptides in the Control of Ageing
- Great Teeth for Life
- Passion, Sex & Oxytocin
- Reversing Physical Aging V1

GHRPS

- GHRP2 (GHRP2-Pro™)
- GHRP6 (Release-Pro™)
- Sermorelin (Serm-Pro™)

PEPTIDE BIOREGULATORS

- Adrenal (Glandokort®)
- Bone Marrow (Bonomarlot®)
- Heart (Chelohart®)
- Lungs (Taxorextm)
- Pancreas (Suprefort®)
- Prostate (Libidon®)
- Testes (Testoluten®)
- Bladder (Chitomur®)
- Cartilage (Sigumir®)
- Kidney (Pielotax®)
- Muscle (Gotratix®)
- Parathyroid (Bonothyrtm)
- Retina (Visoluten®)
- Thymus (Vladonix®)
- Blood Cell (Ventforttm)
- CNS/ Brain (Cerluten®)
- Liver (Svetinorm®)
- Ovaries (Zhenoluten®)
- Pineal (Endoluten®)
- Stomach (Stamakort®)
- Thyroid (Thyreogen®)

HORMONES

- Aldosterone (Aldo-Pro™)
- HCG (HCG-Pro™)
- MSH2 (MSH2-Pro™)
- Progesterone (Progest-Pro™)
- TRH (Abaris™)
- DHEA (DHEA-Pro™)
- Hydrocortisone (Hydrocort-Pro™)
- Oxytocin (Oxy-Pro™)
- Thymus
- Vasopressin (Vaso-Pro™)
- Estrogens (Esnatri™)
- Melatonin (MZS™)
- Pregnenolone (Preg-Pro™)
- Thyroid (Armour™ etc.)
### TOPICALS
- BEC5® Curaderm cream
- Minmax-Pro™
- Retin-Pro™
- Can-C™ eye-drops
- NeyDent® toothpaste
- TA65® cream
- Joint-Pro™ cream
- Oralide™ mouthwash
- Youth Gems®

### DIAGNOSTICS
- Bio-Clip™ CUFF
- Foodsafe®
- NEO40® Saliva Strips

### SMARTS
- Adrafinil (Adra-Pro™)
- Deprenyl (Dep-Pro™)
- Modafinil (Moda-Pro™)
- Pramiracetam (Pram-Pro™)
- Aniracetam (Ani-Pro™)
- Hydergine® (Hy-Pro3™)
- Picamilone (Picamilon-Pro™)
- Reminyl® (Galantamine)
- Centrophoxine (Centro-Pro™)
- Idebenone (Ideb-Pro™)
- Piracetam (Pira-Pro™)
- Vinpocetine (Vin-Pro™)

### NUTRITION
- 1st Line™ (OSCN)
- Benfotiamine (Milgamma™)
- Boost-Pro™
- CoQ10 (CoQ10-Pro™)
- Fenfurro-Pro™
- MultiV45-Pro™
- NEO40®
- PEA (Pain-Pro™)
- Resveratrol (Resveratrol-Pro™)
- TA65®
- 5HTP (5-HTP-Pro™)
- Beta-Glucans (BG-Pro™)
- Can-C™ +
- Curcumin (Curcumin-Pro™)
- GCB70-Pro™
- NAD+ (NAD+Pro™)
- Nitric-Pro™
- PEO (PEO-Pro™)
- Sleep-Pro™
- Vitamin B12 (B12-Pro™)
- ACF-228®
- Boluoke® (Lumbrokinase)
- Carnosine (Carno-Pro™)
- DIM (DIM-Pro3™)
- L-tryptophan (Ltryp-Pro™)
- NADH
- Novisyn® (GH3-Pro™)
- Piracetam (Pira-Pro™)
- Vinpocetine (Vin-Pro™)

### OTHERS (INCLUDING MEDICINES)
- 4MU (4MU-Pro™)
- Anastrozole (Arimidex®)
- BHT (BHT-Pro™)
- Doxycycline
- Finasteride (Proscar®)
- Naltrexone (Nal-Pro™)
- SAMe (SAME-Pro™)
- Acarbose (Glucobay®)
- ATP-Pro™
- Bromocriptine (Parlodel®)
- Dutasteride (Avodart®)
- Gerovital-H3® (GH3-Pro™)
- Rapa-Pro (Rapamycin)
- Sildenafil (Sildenafil-Pro™)
- Aminoguanidine (Amino-Pro™)
- B17-Pro™ (Amadaylin)
- DMSA (DMSA-Pro™)
- EDTA (EDTA-Pro™)
- Metformin (Met-Pro™)
- Relax-Pro™ (GABOB)
LOOK INSIDE FOR:

- The latest information on rapamycin, a potential new antiaging agent.

- How to boost and maintain a strong immunity to fend off deadly pathogens.

- Longevity, health and aging in the recent news.

- Read about class-leading books, videos and events related to life extension.

- Learn about the damage of AGE and how to shield yourself against it.

- See some great offers and money saving coupons that you can use today.

And more besides!