



Immune System
Management

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OPTIMAL HEALTH

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“Live Long And Prosper” Part 3

“You can avoid reality; but you cannot avoid the consequences of avoiding reality.” – Ayn Rand

We are all mortal and yet we can all take responsibility for the quality of our lives.

In March we began a three-part series dedicated to the question of how to live long, and why some people do and others don't. That month we looked at 'Why me?', 'Why Am I Still Sick?', and 'Our Central Control of Health – the Immune System'. In April we covered, 'We Eat Too Much, Yet We Suffer From Malnutrition', and 'Our Chemistry Changes As We Age'.

Access previous March newsletter <http://www.aminomics.com/pdf/March2015Newsletter.pdf>

Access previous April newsletter <http://www.aminomics.com/pdf/April2015Newsletter.pdf>

This month we'll discuss 'Brain Health', 'Our Lives Are Exhausting Us!', 'Immune Senescence', and 'ISM and the Three Tiers'

To your good health!

Kathryn O'Neill, CEO

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Brain Health

Brain shrinkage is a silent threat to our health and longevity. Loss of brain volume means loss of brain cells, which in turn means loss of memory and learning. There are a myriad of threats to brain volume as we age. Virtually all of the chronic symptoms of aging have been associated with, and to some extent implicated in, brain shrinkage. In addition, lifestyle habits can further complicate matters.

Fortunately, like other symptoms of aging, brain shrinkage appears to be preventable through a combination of lifestyle changes and sensible natural therapeutic support.

Even if you seem perfectly healthy, you may be losing as much as 0.4% of your brain mass every year. The rate of brain shrinkage increases with age and is a major factor in early cognitive decline and premature death.⁷⁴

Studies show that older adults with significant brain shrinkage are much more likely to have cognitive and movement disorders than similarly aged people with normal brain size. They are also at an increased risk of vascular death and ischemic stroke and depression.^{75,76}

Perhaps most alarmingly, brain shrinkage sharply increases risk of early death by 30-70%.^{77,78}

But brain shrinkage is by no means inevitable... it can be slowed or even reversed.⁷⁹⁻⁸¹

There is a strong connection between cardiovascular disease and brain shrinkage. Perhaps the most obvious connection is the one between blood vessel disease (atherosclerosis) and brain volume. Atherosclerosis occurs when plaque builds up

inside your arteries and restricts blood flow throughout the body and of course affects the heart. But its effect on your brain is equally devastating.

When blood flow to the brain is restricted, your brain receives less oxygen and fewer nutrients, causing it to shrink.⁸²

The relationship between cardiovascular disease and brain volume operates in both directions: People with smaller brain volumes have been found to have a 58% increase in the risk of death from all causes, a 69% increase in risk of vascular death, and a 96% increase in the risk of stroke, compared with those having normal brain volumes.⁸³

High levels of the amino acid homocysteine, another risk factor typically associated with heart disease, have now also been connected to brain shrinkage (independent of its impact on cardiovascular disease).⁸⁴ Researchers have found that those with the highest homocysteine levels have a tremendous 8.8-fold increase in risk of brain shrinkage.⁸⁵

A deficiency of B vitamins has also been tied to brain shrinkage. This makes sense, since inadequate amounts of vitamins B6, B12, and folic acid can lead to elevated homocysteine levels.⁸⁶

Remarkably, it has been found that brain shrinkage due to high homocysteine levels must reach a critical level before cognitive decline sets in. This is another example of the "'window of opportunity' during which brain shrinkage may be prevented by natural therapeutic support"^{87,88}

Our Lives Are Exhausting Us!



Up until the end of WWII most of the diseases in the world were 'diseases of contagion' which were created by the introduction of an outside pathogen – a bacteria, a virus, etc. With the advent of antibiotics and some other pharmaceuticals these diseases of contagion were fairly effectively treated.

The majority of disorders since the end of WWII are 'diseases of toxicity'. They are triggered as a result of the increased exposure to new chemicals in the air we breathe, the water we drink and, to a very large degree, the food we eat. So now we are not only exposed to bacteria and viruses, but to heavy metals like mercury, plastics, herbicides, pesticides, food additives, increasing antibiotic and pharmaceutical usage, fluoride, etc. This toxic burden triggers 'misplaced immunity'. The immune system sends out auto-antibodies to expel these outside invaders but begins to attack healthy tissue instead because cellular communication breaks down with this toxic insult.

What compounds the situation even more is that chemicals and heavy metals compete for the same biological space as essential minerals, B vitamins and some other nutrients. So, not only are we poisoned, but undernourished as well!

Environmental Factors

Researchers estimate that lifestyle and environmental factors may contribute to approximately 90% of cancer cases!^{89,90}

On a daily basis, we are exposed to a rapidly growing list of carcinogens in the environment. These chemicals damage DNA and disrupt proper cell communication, potentially leading to tumor formation. With contamination of our food, air, and water, it's impossible to completely avoid environmental carcinogens. In a cruel twist, some of these toxins even activate cancer-causing genes that could otherwise have remained dormant.

The 'electrosmog' that first began developing with the rollout of the electrical grid a century ago and now envelops every inhabitant of Earth may be responsible for many of the diseases that impair – or kill – us. Cumulative exposure to transient electrical spikes can increase the likelihood of cancer by 64%.⁹¹

An international collaboration of prestigious scientists and public health policy experts around the world released a 650-page report citing more than 4,000 studies that detail the toxic effects of electromagnetic fields (EMFs) from all sources. Chronic exposure to even low-level radiation (like that from cell phones) can cause a variety of cancers, impair immunity, and contribute to Alzheimer's disease and dementia, heart disease, and many other ailments.⁹²

Lifestyle

As many as 75 percent of computer users show symptoms of headaches; dry, red, or burning eyes; blurred or double vision; trouble focusing; difficulty distinguishing colors; sensitivity to light; and pain in the neck or back. This condition is related to deep vein thrombosis, where blood clots form in deep veins, such as those in the legs. These clots can be fatal if they migrate to the lungs and cause a pulmonary embolism. Clots can form when blood supply slows or stops, such as in a period of prolonged immobility. Similarly, e-thrombosis is the development of clots in the deep veins of someone who spends long amounts of time in front of a computer without moving.

Of course, the list goes on:

- Physical inactivity
- Insufficient or inadequate sleep
- Fast-paced stressful lives

- Chronic psychological stress
- Insufficient or over-exposure to the sun
- Recreational drugs
- Smoking
- Pollution

Face it. Life is a balancing act. Between work, relationships, family duties, staying fit, academic efforts, maintaining friendships, community involvement and personal fulfillment, it's a wonder most of us can even find time to catch our breath.

Chronic activation of the neurological pathways associated with stress result in the production of hormones and neurotransmitters/ chemicals, which then alter the function of certain cells of the immune system. These altered cells cause the immune system to respond improperly, either by over-responding or under-responding to bacteria, viruses, allergens, fungi and parasites.

Becoming familiar with the ways different types of stress can affect our minds and bodies, specifically our immune system, as well as learning about the available natural tools that have been clinically proven to manage the impact of stress on the immune system, are proactive steps toward keeping healthy. Lessening the impact of harmful invaders on our immune system entails not just strengthening it to combat the bacteria and viruses that cause common illnesses, but also ensuring that our immune system's response to such external stimuli as allergens is not too strong – as asthma and other long-term health implications can result.

The fact remains that a certain amount of stress will be present in our lives, especially in today's increasingly overscheduled society. So, if escaping stress is not an option – and for most

of us it's not – we should look for help keeping our immune system in balance while we deal with it.

A strong immune system is not one that has only been stimulated or boosted. Those actions can certainly be helpful at specific times, but as we have just learned, there are times that the immune system can over-respond, leading to

Immune Senescence

Healthy people's immune systems are operating at peak capacity, turning 'on' and 'off' at precise times to eradicate pathogens, while not causing the chronic inflammation that can lead to cardiovascular disease and diabetes.¹⁸

As we age, this picture of health changes. By then, we have depleted our valuable treasure chest of defensive immunity cells and the balance shifts to a less vigorous immune system. Serious infections, cancers, and inflammatory diseases are among the leading causes of premature death in older adults.¹⁹ These disorders all arise from a common cause: the aging of the immune system, or immune senescence.²⁰

Let's take a quick tour of your immune system.

There are two main components of immune function that are intimately interconnected and work together to deliver round-the-clock surveillance and defense against body invasion. Immune senescence involves the gradual loss of function of both of these components called the innate and the adaptive branches. Normally, both branches of the immune system work closely together, with the innate immune system taking the initial lead in defending the body against infection.

health issues. A strong immune system is one that is balanced and can respond appropriately, depending on the situation at hand.

That's why ISM believes that keeping our immune systems not only in check, but more importantly, individually balanced, is imperative for our overall health.

- i. Innate immunity is the first line of defense to neutralize a foreign threat in the form of a bacterium, a virally infected cell, or a cell that has undergone malignant transformation early in the development of a cancer.²¹
- ii. While the innate immune system is launching its first attacks, the adaptive immune system ramps up its targeted defenses that include 'smart' weapons like antibodies against specific organisms and the group of immune system cells known as T-cells.²²

Adaptive immunity, with its heavy reliance on T-cells, begins to fade surprisingly early in life. The primary source of T-cells, the thymus gland in the chest, begins to shrink by young adulthood, making new, naïve T-cells increasingly rare.^{23,24,25}

Doctors today respond to immune senescence by treating each disease or condition separately. This approach fails to correct a major underlying mechanism behind both disease and aging and leaves us waiting for the next health problem to manifest.

Immune senescence occurs when our aging immune system fails to protect against cancers/infections, and instead generates excess inflammatory reactions that attack every cell in our body.

ISM's ongoing mission is to further the understanding of how aging accelerates immune decline and to help reverse the immune dysfunction that plagues virtually all aging humans.

Some of the underlying causes of immune senescence described in more technical detail below are^{26,27}:

1. Increase in Exhausted Memory T-cells
2. Decrease in Functional Natural Killer (NK) Cell Activity
3. Immune Cell Exhaustion
4. More T-Helper Cells Needed

1. Increase in Exhausted Memory T-Cells

To protect against the ravages of immune senescence, we need to increase our numbers of naïve cells ('virgin' immune cells), while reducing numbers of surplus senile memory cells.

Memory T-cells form when our immune system successfully eradicates an invader. They remain in the body and are ready to instantly respond when that same bacteria, virus, or cancer cell reappears. One would think it desirable to have lots of memory T-cells. The problem is that memory T-cells only work against prior infections. As we age, we collect excess numbers of memory T-cells and produce fewer critically important naïve T-cells.²⁸ The term 'naïve' may not sound like something beneficial as it relates to immune function, but it is. A naïve immune cell is one that has not been activated by an antigen (a substance that provokes an adaptive immune response). Since it has not yet been exposed to an antigen, a naïve immune

cell is primed to effectively respond to new infectious agents and malignancies.²⁹

Once exposed, naïve immune cells become memory cells or plasma cells specific to the original antigen. As our internal reservoir of naïve immune cells is decreased, we have less ability to respond to new infections and malignancies.³⁰

To make matters worse, excess numbers of senescent memory cells provoke undesirable inflammatory reactions that are thought to underlie most age-related diseases including atherosclerosis, cancer, and dementia.³¹⁻⁴⁰

2. Decrease in Functional Natural Killer Cell Activity

If an aging person is to better manage debilitating and deadly infections and malignancies, maintaining youthful NK function is critical.

The first line of defense against virus-infected or cancer cells is our natural killer cells. Young individuals have high levels of functional natural killer (NK) immune cells, but this declines with aging.⁴¹⁻⁴⁴

In elderly subjects, decreased NK cell activity is associated with an increased incidence and severity of viral infections (i.e., shingles, flu).⁴⁵⁻⁴⁸ Healthy NK function is critical in eliminating transformed cancer cells. NK cells are also involved in the elimination of senescent cells that otherwise cause chronic inflammation.⁴⁹⁻⁵³

3. Immune Cell Exhaustion

The accumulation of senile (exhausted) T-cells is a factor that accelerates a broad array of age-associated diseases.⁵⁴

Over the course of our lifetime, our immune system becomes 'exhausted'. What this refers

to is the excess accumulation of worn-out memory T-cells and reduced production of vital naïve T-cells.⁵⁵⁻⁵⁷

As people accumulate exhausted T-cells, an adverse consequence is that these senile memory cells emit pro-inflammatory cytokines that worsen chronic inflammatory conditions. Inflammation is associated with increased risk of coronary heart disease, impaired vascular function, vascular inflammation, and endothelial dysfunction.⁵⁸⁻⁶⁰

4. More T-Helper Cells Needed

To combat immune senescence, it is critical to boost T-helper counts while lowering regulatory T-cells.

T-helper cells identify and tag invaders for elimination by the immune system. Regulatory T-cells tell the immune system that its job is

finished and it's time to stop the attack. A normal balance involves having at least one to four T-helper cells for each regulatory T-cell (regulatory T-cells are sometimes called suppressor T-cells).⁶¹⁻⁶⁴

As humans age, too many regulatory T-cells form while T-helper cell counts drop, resulting in there being more regulatory T-cells than T-helpers. The T-helper/regulatory T-cell ratio can be considered to be a predictor of mortality. People with low T-helper counts and higher regulatory T-cell counts die sooner.^{65,66}

Cancer patients often present with a low T-helper/regulatory T-cell ratio. Some studies show that tumor cells secrete chemicals that turn up regulatory T-cell formation in order to prevent the immune system from attacking cancer cells. Cancer chemotherapy dramatically lowers T-helper counts.⁶⁷⁻⁷³

ISM and the Three Tiers

At ISM Clinic and Lab, we focus on three tiers in our approach to wellness:

1. Foundation

Your body demands a sturdy base – a strong foundation for both the metabolic and immune systems. At this level ISM supports basic life processes, such as cellular energy production, growth, repair, and regeneration.

No matter who you are or what you're going through, you have the same foundational requirements as everybody else. Amounts may vary from person to person but you need them all. Think of them as the essential nutrients for living well as a human. This includes:

- Balanced amino acids to form the millions of proteins your body utilizes daily
- Vitamins/ minerals and various cofactors to enable the reactions of the various proteins in every cell
- Energy sources to ensure each cell is fully energized

2. Personalization

Personalization is all about you. It's about finding the right clinically demonstrated, evidence-based approaches to help you control the conditions most likely to affect you personally. What is your unique situation?

- Undergoing chemotherapy or radiation?
- Gastrointestinal issues?
- Chronic stress?
- Autoimmune tendencies?
- Fatigue?

This level is designed to prevent and mitigate ongoing disease through optimally balancing for immune function and specifically targeting various illness drivers.

3. Optimization

ISM efforts in this level do exactly what the name implies. They don't just meet your immediate healthcare needs – instead they optimize your regimen for future wellness.

- Often one must focus on gut issues before one can truly resolve amino acid or other nutrient imbalances.
- Often one must focus on depression/ anxiety before chronic inflammation can be controlled.
- Often an individual's pharmaceutical drugs, that are not treating the base cause of the problem, are creating symptoms of their own and disguising or complicating an appropriate route to health.

At this stage, we focus on many proven integrative healthcare approaches that can help you live a longer and better life.

"Optimal Health" is written and produced by staff, associates and friends of Immune System Management Inc.

It is our philosophy that diverse health care modalities can work in conjunction with each other as part of a unified team rather than in competition. Such an integrated approach ultimately will lead to safer and more effective health care.

Optimal Health will act as a gathering place and forum for comments and articles from medical professionals, educators and researchers from all health care specialties to the ultimate benefit of both the patient and the health care provider. We aim to share up-to-date news, information and diverse views for the growing integrative, alternative and complementary medicine movement, particularly as it applies to cancer and other chronic diseases.

Your comments and article contributions are welcome.

info@aminomics.com | www.aminomics.com

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