Immunology: Seeking homeostasis

"*Your immune system is a peacekeeping force that more than anything else seeks to create harmony. The job of the immune system is to circulate… keeping an eye out for troublemakers and then—this is key—tossing out bad guys while doing as little damage to other cells as possible…We need many of the alien organisms that Iive on and in us, including the billions of bacteria that live in our guts… Like an out-of-control police state, an unchecked immune system can grow so zealous that it turns as dangerous as any foreign disease. This is called autoimmunity. It is on the rise…[[1]](#endnote-1)*

Can Tattoos improve your immunity?[[2]](#endnote-2)

This quirky medical story all began when Dr. Christopher Lynn, an associate professor of anthropology, received a tattoo and realized he was physically drained from the process.

"They don't just hurt while you get the tattoo, but they can exhaust you," Lynn said. "It's easier to get sick. You can catch a cold because your defenses are lowered from the stress of getting a tattoo."

The body's response to tattooing is akin to that experienced from exercising in the gym when you're out of shape. Initially, muscles become sore, but if you continue, the soreness fades, and the muscles become stronger following subsequent workouts. This process is, basically, an example of hormesis, a favorite tool of Dr. One.

Because of Dr. Lynn's experience, he and a group of scientists published the following findings in the American Journal of Human Biology. First-time tattoos could weaken the immune system and cause an upper respiratory infection, but if repeated over time, tattoos would decrease them. "Toughen Up: Tattoo experience and secretory Immunoglobulin." Discounting this counterintuitive study as an outlier or a mistake, or "correlation is not causation" would be understandable unless you look closer at the science of the immune system. This study did not surprise acupuncturists in the least. The study found that Levels of immunoglobulin A dropped significantly in those receiving initial tattoos. This would be expected because of the immunosuppressant effects of cortisol, responding to the stress of tattooing. But the immunoglobulin A decrease was less marked among those receiving tattoos more frequently. "*When receiving a tattoo, the body mobilizes immunological agents to fight possible infections at the site of the new tattoo.  Repeated tattooing makes your immune system stronger.[[3]](#footnote-1)[[4]](#endnote-3) [[5]](#endnote-4)*

# Principles of Dr. One and Immunology

So what can tattoos teach us about the immune system and how to make it stronger and deeply resilient?

First, let us consider that the immune system has something to do with all the systems involved in this book and other life-threatening conditions. It underlies cancer, Alzheimer's, diabetes, covid 19, flu, stroke. All of it. It involves mind-bending biochemistry, the autonomic nervous system, and stress response. We will look at the basic mechanics of the immune system, so you will see how it works as a feedback system maintaining homeostasis.

 But we will also see how acupuncture exploits elements of the immune system in piercing the first defense, the skin. In so doing, it sets into motion cascades of responses and positive feedback loops. Acupuncture can be seen as a type of hormetic, or gentle challenge to the system that has systemic effects to make your system more resilient and tougher.

We will see stark examples where without the daily hormetic challenges to the immune we evolved with bacteria or parasites, our immune system can attack our own tissues in the modern-day epidemic of autoimmune disease. This immune system spinning out of control is the predicament known as the absence of "Old Friends."

An important lesson learned in previous chapters is that nonlinear systems can lead to outsized results. So, in other words, we can see exponential rates of change, or sometimes quantum leaps in physiological systems when it comes to immunology because of the multiple and varied feedback systems that are triggered. The immune system needs to be **exponential** to counteract the growth of bacteria or viruses, which multiply **exponentially**.

# Immune Dysfunction in Public Health: Scope of the Problem

Immune dysfunction is at the root of many common illnesses, even the big killers, cancer and heart disease. The Immune system is involved with many of the conditions covered in this book, such as longevity, stress, pain. Not only do we need to mount a healthy response to invading microbes or other interlopers (splinters, poisons), but we do not want to overdo it, leading to autoimmune (meaning "self immune") conditions such as allergy, Crohn's disease, or type 1 diabetes. We need to keep a balance between defending and not overdoing it. As we will see, the autonomic nervous system plays a key role in keeping the immune system from overheating and attacking ourselves. Remember that the immune system is so powerful that the body makes certain areas off-limits to the immune system, such as the brain and the eyes.

*"An unchecked immune system can grow so zealous that it turns as dangerous as any foreign disease, this is called autoimmunity."*

 *It[autoimmunity] is on the rise. Fully 20 % of the American population or 50million Americans develops an autoimmune disorder with conditions like rheumatoid arthritis, lupus, Crohn's disease, and irritable bowel syndrome. ..Together****, autoimmunity is the third most common disease category in the United States after cardiovascular disorders and cancer****. Diabetes, the 7th leading killer in the country, is caused by the immune system's going to war against the pancreas.".*

*In* An Epidemic of Absence[[6]](#endnote-5)*, Moise Vasquez-Manoff ponders the following scenario* if he had the supernatural powers to see immune dysfunction.

*"Walking down Broadway in New York City, for instance, one of every 10 children passing by would have asthma; one in six would have an itchy rash and sometimes blisters – eczema. One of every five passerby eyes would have hay fever. If I could see allergic antibodies directly – immunoglobulin E – I'd note that half the crowd around me was sensitized to dust mites, tree pollen, and peanuts, among other basically harmless proteins. I'd see pockets full of inhalers, and bags stuffed with allergy medicines. In the satchels of the most severely afflicted, I'd see pills of powerful immune suppressants, such as prednisone. I'd even see a few soon to be corpses; about 3500 people die yearly from asthma attacks. Americans spend perhaps $10 billion yearly on asthma related drugs and doctor visits. Direct and indirect costs of asthma combined reach about $56 billion. I'd see these funds flowing from allergenic and asthmatic wallets to doctors and drug companies. And I'd observe money not flowing from days missed at work, diminished overall productivity, and opportunities lost over a lifetime."[[7]](#endnote-6)*

Manoff's book delves deeply into problem of allergy and autoimmunity and tells the story of his quest for hookworm inoculation, a radical solution to his own autoimmune issues. We will consider his story a bit later.

On the other extreme too little immune response can result in cancer. *"Cancer can play a nasty trick on this elegant defense. Cancer can tell the immune system to "stand down." It then uses the immune system to protect the cancer.*"[[8]](#endnote-7)

# What is the Immune system?

## Recognizing Friend from Foe

The immune system is one of the most sophisticated and extensive feedback loops we have in our bodies. To have a healthy immune system is to have deep resilience. The immune system has the heroic task of detecting invaders and attacking them, but also welcoming foreign substances such as food and beneficial bacteria. The surveillance that is provided by the immune system and its various squadrons of cells and messengers that live in the skin, tissues, lymph organs, plasma are at the same time discerning and extremely powerful. Keep in mind our vital microbiome that resides in our skin, mouth, nose, and GI tract, about four pounds of bacteria that serve us in many ways, need to be welcome and not eradicated.

 It is a testament to the immune system's success that we all are still alive at all.

The classis Immunology textbook by Abbas, used by medical students, grad students and anyone interested in the minutiae of immunology states Immune principles best.

***"Every individual's immune system is able to recognize, respond to, and eliminate many foreign (nonself) antigens but does not usually react against that individual's own (self) antigens and tissues***. Different mechanisms are used by the innate and adaptive immune systems to prevent reactions against healthy self cells.

***Because of the ability of lymphocytes and other immune cells to circulate among tissues, immunity is systemic***, meaning that even if an immune response is initiated in one site it can provide protection at distant sites. This feature is, of course, essential for the success of vaccination—a *vaccine* administered in the subcutaneous or muscle tissue of the arm can protect from infections in any tissue.

***Immune responses are regulated by a system of positive feedback loops that amplify the reaction and by control mechanisms that prevent inappropriate or pathologic reactions***. When lymphocytes are activated, they trigger mechanisms that further increase the magnitude of the response. This positive feedback is important to enable the small number of lymphocytes that are specific for any microbe to generate a large response needed to eradicate that infection. Many control mechanisms become active during immune responses, which prevent excessive activation of lymphocytes that could cause collateral damage to normal tissues, and also prevent responses against self antigens.[[9]](#endnote-8)"

I would like to emphasize these final principles. The immune system uses positive and negative feedback systems to keep it running smoothly, keeping it under control. Nonlinear systems are involved in the immune system, just as in acupuncture.

# How does the Immune system work?

## A bit of history: Metchnikoff

In the summer of 1882, a Russian zoologist named Elie Metchnikoff was visiting his sister in northeast Sicily. He was troubled by the political situation in Russia where Jewish farmers were facing intensifying persecution, so he left for Sicily. He was studying starfish larvae which have the virtue of being transparent, so he could easily observe their cell workings through a microscope. He saw cells moving through these tiny organisms and called them "wandering cells." He started to wonder if these "wanderers" might serve in the defense of the starfish larvae. He fetched rose thorns from the garden and introduced them under the skin of the larvae. Would the cells somehow swarm and protect? Indeed, he could not sleep that night for anticipation. He looked through the microscope the next morning and had the classic "aha" moment. As he described it, "The great event of my scientific life took place." The wandering cells swarmed around the splinter and ate away at the splinter and damaged tissues. With this simple experiment, he developed the "phagocyte" theory. Phagocytosis means "cell eating", a process of defense against invaders and a way to clean up damaged tissues. [[10]](#endnote-9) [[11]](#endnote-10) He subsequently connected this phenomenon and the defense in humans that leads to pus in response to a splinter or injury and the generalized "inflammation" that occurs in response to injury. This reaction shows the struggle between the "self" and "other" and is curative if all goes well. "So at the moment of invasion, the body has an initial reaction that involves the swarming of eater cells, and the experience is not always pleasant. This reaction is what we call inflammation."[[12]](#endnote-11) This brilliant hunch leading to a major discovery was the beginning of the science and discipline of Immunology.

### Aspects of the immune system

Innate immune system

Skin is our first line of defense. The integrity of our skin keeps out many invaders by providing a protective barrier. But within our own skin we have "wandering cells" phagocytes, or cell eaters and in other tissues too[[13]](#endnote-12). They are our version of "wandering cells." They are there for our defense against invaders and are called neutrophils and macrophages. They are a standing army that lives in the tissues and cells throughout our bodies and are ready to charge into action in the presence of an invader and send out warning signals. They can defend against microbes by invoking inflammation, and sometimes even without it. These equivalents to "wandering cells" also sound the alarm with chemical messengers that cause dilation of the blood vessels near the injury and cause there to be an offramp near the site of injury so neutrophils (the most abundant type of circulating white blood cells) can assemble.

These reactions lead to inflammation (redness, heat, and pain) and neutrophils, i.e. pus.

But the skin has the standing army of sentinel phagocytic cells always on duty to react to invaders and nerve endings of all sorts, touch, pain, heat, that signal through the spinal canal to the central nervous system (brainstem and brain itself). Pain receptors send signals in response to injury and inflammation, and these signals transmit to the brainstem, and then the brain stem sends a message through the vagus nerve to limit inflammation. Without this signaling and homeostasis the body will over-react and spin out of control. If the immune system is not kept in check, we see various autoimmune diseases such as rheumatoid arthritis and allergic rhinitis. But we also see sepsis and the cytokine storm associated with Covid 19. We can now start to understand how the slight injury invoked by the needles can trigger a healing response through vagal enhancement, as we saw in the chapter on the stress response. As Abbas says, "that even if an immune response is initiated in one site it can provide protection at distant sites."

 "The innate immune response to microbes provides early danger signals that stimulate adaptive immune system"[[14]](#endnote-13)

Adaptive Immunity. Adaptive immunity, also called Specific immunity or Acquired immunity leverages the highly sophisticated mechanisms in the body where we are able to mount a specific reaction to a specific toxin, bacteria, or virus invader. This process involves a series of messengers that stimulate B cells to clone themselves and make specific antibodies to that specific invader, such as Covid 19. This takes 6 to 7 days but can be brutally effective. Vaccines exploit this system, introducing a small amount of a toxin or a portion of a virus to the body. By giving a small amount of a virus the body mounts a response and then crucially *has a memory* for that invader.

An early example of this principle was the story of Dr. Jenner in the late 1700s, who famously inoculated people with material from cowpox sores which conferred immunity to smallpox. Even earlier, the ancient Chinese had a custom of making children resistant to smallpox by having them breathe powders made from the skin lesions of patients recovering from the disease, a primitive by effective means of invoking the immune system.[[15]](#endnote-14)

 The tricky part of vaccines is to give just a piece of the virus so that it does not infect, but enough to mount a successful immune response when confronted with the virus again

If the actual invader breaches the defenses weeks, months, or even years later, the memory of that invader is present, and it can quickly clone antibodies and launch a defense much more rapidly than if it had no memory. The concept of antigens is essential to understanding the ability of the immune system to distinguish friend from foe.  *The immune system recognizes and destroys, or tries to destroy, substances that contain antigens*.[[16]](#endnote-15)

The rationale behind giving plasma from Covid 19 patients who have successfully recovered from the illness to people with severe cases of covid is to supply a temporary boost in immunoglobulins to lower the numbers of invaders until the patient's immune system takes over in the 6 to 7 days required to clone the antibodies. If you can react quickly and well, you avoid illness and can prevent damage to your system. The Covid 19 vaccines primes the body to respond quickly if exposed to Covid 19.

# 'Old Friends"

How to toughen up and keep resilient? We will consider a concept in Immunology called "Old Friends", or the Evolutionary Theory and its counterpart The Hygiene Hypothesis.

***“Our immune system needs a job. We evolved over millions of years to have our immune systems under constant assault. Now they don’t have anything to do.”***

In an interview, Dr. Meg Lemon a prominent [[17]](#endnote-16) dermatologist and internist, and expert in autoimmune disease, says "I tell people, when they drop food on the floor, please pick it up and eat it. Get rid of antibacterial soap. Immunize! … we have animals in our homes and they sleep with us. If your dog shits on the floor clean it up, of course, but don't use bleach…. You should not only pick your nose, you should eat it… Our immune system needs a job. We evolved over millions of years to have our immune systems under constant assault. Now they don't have anything to do." [[18]](#endnote-17)

## Allergies and the Hygiene Hypothesis

When the term allergy was first coined in Britain in the 1800s describing hay fever, allergy was seen as an affliction of the upper, monied classes. As it turns out, allergies are a function of the lack of "old friends." Why? Because it only afflicted those whose living conditions and environment were clean enough to avoid exposure to animal dander and dirt. But our immune systems evolved over millennia with exposure to animal dander and dirt, which primed the immune system to fight. There is nothing for the immune system to do if you take these away, as Dr. Lemon pointed out. It is still the case that allergy and autoimmune diseases are less frequent in the developing, less hygienic world. In the absence of Old Friends our have no "old friend" to fight so they attack and overreact to invaders like pollen or nuts. (Remember Manoff's numbers of passersby in New York City with autoimmune conditions?) The Hygiene Hypothesis refers to the counterintuitive conundrum that if we are too clean, we can suffer unintended consequences, such as allergies. [[19]](#footnote-2)

## Sardinia and Multiple Sclerosis: Lack of an old foe

 The "Old Friends" or Evolutionary Theory is similar to the Hygiene Hypothesis except that it addresses a similar phenomenon that occurs with parasites.

The northern part of Sardinia is a playground for the wealthy. It is the crème de la crème of vacations spots with millions of yachts and isolated beaches. But away from the beaches, there are ancient structures called *nurghe*, from the native *aaft* language spoken before the Romans arrived. *Nurghe* roughly translates to "a pile of stones." They were already 1500 years old when the Romans arrived 2000 years ago. They are hollow inside, shaped slightly like a medieval tower. Primitive but sturdy, there are still 7000 on the island. Perhaps they were built as status symbols or lookouts. But some have theorized that the towers provided an escape from the ever-present mosquito. The mosquito brings with it malaria or "bad air." In Cagliari, there is a Virgin Mary of the Bonaria or "good air."

Sardinians now have one of the highest levels of autoimmune disease in the world. They are 2 to 3 times more likely to develop multiple sclerosis [[20]](#endnote-18) than Italians or residents of neighboring islands. Since inhabitants of Sardinia are island dwellers and historically isolated, their genetic imprint is concentrated. A feature of their genetics protects against malaria, but that same code increases autoimmune disease. Sixty years ago, malaria was common; many succumbed to it, many survived, seemingly resistant to the parasite. After eradicating malaria in the 1950s, the incidence of autoimmune disease (multiple sclerosis and type 1 diabetes) has skyrocketed. The theory is that the Sardinians' immune systems need to be engaging with the malaria parasite otherwise, they attack their own tissues, tipping into autoimmunity. In other words, the genes that protected the population against the "old friend" malaria turned inward on the population once malaria was eliminated. This is perhaps one of the most dramatic examples of how our immune systems evolved over millenia and cannot suddenly adapt to a new reality within a generation or two.

## Remove worms and Allergies flourish[[21]](#endnote-19)

 Moise Velasquez Manoff, the author of "An Epidemic of Absence: A new way of Understanding Allergies and Autoimmune Diseases" before the age of 18, developed severe allergies and an autoimmune condition that caused him to lose all of his body hair

His book explains the concepts behind "Old Friends," how autoimmune diseases are more common where parasites have been eliminated. He took the radical step of traveling to Mexico to purchase and self-inoculate with hookworm. Hookworm is an "old friend" capable of disabling our immune systems so that we can coexist with its presence in our GI tracts. There had been some anecdotal evidence that reintroducing hookworm could trick a person's immune system into standing down and stop attacking the "self," calming down autoimmune disease and leaving the hair follicles, skin and lungs alone. Unfortunately, the therapy did not work for Moise. Still, the story is a fascinating one, and the book lays out the incredible science behind our complicated relationship with parasites, dirt and bacteria.

One aspect of his experience caught my attention and warrants emphasis for our understanding of immune response and possibly the role of acupuncture: the phenomenon called "hookworm high."

## Hookworm High

*An odd feeling of euphoria overtook him on the flight home. “I wanted to get up and do cartwheels,”*

*As Moise describes it, "Almost immediately, his skin "seemed a little less angry." An odd feeling of euphoria overtook him on the flight home. "I wanted to get up and do cartwheels," he says. Others who have self-inoculated have also described this "hookworm high."[[22]](#endnote-20)*

In *Epidemic of Absence*, they attribute this euphoria to a decrease in inflammation which improves mood. But this feeling might be the experience of the vagal aspect of the autonomic nervous system, as we see in the Neuroendocrineimmune response, which we will be discussing next. The triggering of healing that acupuncture causes provokes the "rest and digest" aspect of the autonomic nervous system leading to a feeling of wellbeing. This feeling of relaxation or "bliss" is commonplace as a side-effect of acupuncture treatment, a *feeling of calm and a sense of heaviness and sometimes euphoria. This* feeling *could very well indicate the triggering of the vagus in response to needling. This could also account for the improvement in immunity with tattoos.*

Most people won't be infecting themselves with worms or getting tattoos, so what can we do to boost immunity? Acupuncture and other hormetics, can help prime the immune system too.

# Science of Acupuncture

In the preface to this book I told the story of my dramatic response to acupuncture for allergies. I will excerpt some of that here.

*My Case History :. My teacher from Shang Hai looked at my swollen face and my red and tearing eyes. He gently replaced my large dark glasses on my nose and said, "You've finally expelled the perversive energy. You'll be fine now". He had been treating my allergies with acupuncture for weeks, but the trouble had started the previous night. I suddenly started sneezing, my eyes began to itch, my face began to swell, and my throat felt scratchy and irritated, and I was drooling uncontrollably. Once I was convinced that I was in no real danger, I refrained from taking any medication or going to the hospital. I was astonished the next day, when my teacher was so unconcerned about my dramatic allergic reaction.*

*And, he was right. Though I've had an occasional mild allergic reaction since that unforgettable night, I no longer am afflicted with allergies. That night was an initiation into seeing health, medicine, longevity, and science in a new way.*

So how can you explain this story? Is it just luck, a happy coincidence similar to tattoos?

Effect of acupuncture on nonspecific immunity

##### Metchnikoff noticed starfish larvae mounted a cellular response to the introduction of a rose thorn. This response is similar to what happens after the introduction of an acupuncture needle into the skin. A large difference, however, is that the skin is part of a complex web of a sophisticated reaction involving adjacent tissues, the bloodstream, lymphoid tissues, etc.. When a splinter is introduced in the skin, there is a local reaction that stimulates white blood cells to the region and local phagocytosis (cell eating-as we discussed before). There is research that shows an even more detailed response. The skin or epidermis is the site of many feedback systems[[23]](#endnote-21).

Acupuncture for the most part stimulates processes in this innate immune system, and though not specific, it stimulates feedback mechanisms that can be useful to keeping the immune system in balance.

## Meet the NEUROENDOCRINEIMMUNE RESPONSE.

The neuroendocrine-immune response is an intimidating name that means the signals from the skin are transmitted by nerves, hormonal systems, and the immune system. We know that the skin reacts to injury just like the starfish larvae. But nerves then signal the brainstem, and then the brain stem in turn sends message through the vagus nerve to limit inflammation. [[24]](#footnote-3) If you recall, the sentinel cells communicate with circulating cells to dilate the blood vessels so that neutrophils can swarm the area. If this reaction is not kept in check, we see the havoc wrought by severe covid 19 with clotting and severe inflammation of the lungs. For those interested in exactly how this happens, you can read [here](https://ksparrowmd.com/how-the-corona-virus-hacks-the-immune-system-the-new-yorker/). Sepsis, the overreaction to a bacterial infection, is also an example of this overreaction.

 The small injury evoked by the needles can trigger a healing response. If this is done a few times, as in tattooing, it keeps the immune system steady but alert. This evolutionary response to an injury keeps the body from spinning out of control, just as Dr. One knows. Abbas stressed "***Because of the ability of lymphocytes and other immune cells to circulate among tissues, immunity is systemic***, meaning that even if an immune response is initiated in one site it can provide protection at distant sites."

Acupuncture stimulates processes in the innate immune system. [[25]](#footnote-4)

##### "Our study found that an acupuncture needle could cause the muscle fibers fracture in the acupoint after inserting the needle into the acupoint, with a large number of red blood cells and fracture fragments in the muscle fiber gap and inflammatory cells infiltration .6, we believe that as a traumatic stimulus, acupuncture also can activate the NEI (neuroendocrineimmune) network, producing regulating effect." Cooper [86] in his studies, concluded that "*the mechanism of action by which acupuncture makes its immunomodulatory effects are associated with stimulation of the hypothalamic-pituitary-adrenal axis, showing links between the endocrine, nervous and immune systems." Our studies also showed that acupuncture could initiate mast cells to gather in the acupoint, secreting bioactive substances such as histamine, bradykinin, SP and serotonin. These secretions caused vasodilatation, increased local permeability and local reaction.*  (*If this sounds familiar, it is because this is the reaction that is described as the reaction to any physical invader that breeches the skin in immunology.)* These changes lead to a local inflammation in acupoints.6

In a comprehensive chapter on acupuncture's effect on the immune system Sandra Silverio Lopes [[26]](#endnote-22) identifies many immunomodulatory effects of needling. Among them the mobilization of corticosterone and endorphins and ACTH, as well as proinflammatory and anti-inflammatory effects.

"In patients or cancer models, as well as elderly, where usually has low of immunity defenses, the acupuncture and electroacupuncture demonstrated in this study that [acupuncture] increases the immunity, being a possibility of complementary therapeutic resource. In the acute or chronic inflammation and allergic processes manual acupuncture and/or electroacupuncture demonstrated modulation of the immune response, **decreasing the hyperresponsiveness of the pro – inflammatory markers** [48].

This would seem to be "too good to be true" that it can decrease what needs decreasing and increase what needs increasing, but as we have seen in other chapters, what Dr. One does is employ techniques that balance the system to keep it from spinning out of control. With acupuncture through the neuroendocrine-immune feedback system going to the brainstem and then feeding back at the cellular level through the vagus nerve, this keeps the system in balance.

There is more evidence for acupuncture's effect on the immune system in the context of immunoglobulins and acquired immunity which we will be considering in the next chapter on inflammation.

Acupuncture in Modern Medicine[[27]](#footnote-5)

A recent [article](https://ksparrowmd.com/acupuncture-reduces-dust-mite-associated-ige/) from Australia showed that acupuncture administered over an eight week period decreased IGE, an immunoglobulin linked to allergies to dust mites. Acupuncture also down regulated the pro-inflammatory neuropeptide substance P. "Nasal obstruction, nasal itch, sneezing, runny nose, eye itch, and unrefreshed sleep improved significantly in the real acupuncture group (postnasal drip and sinus pain did not) and continued to improve up to 4-week follow-up.[[28]](#endnote-23) This is in line with what Sandra Silverio Lopes found in her research. IgE and Il4 (an interleukin involved in IgE) were both decreased consistently with acupuncture across multiple studies.

This study helps explain the effectiveness of acupuncture on my own allergies, causing a decrease in IGE, and decreased substance P.

Key to all of this, and Moise's quest for hookworm, is that these parasites are masters of tricking the immune system into letting them stay in the host.

"Extensive research shows that parasitic worms have the ability to deactivate certain immune system cells, leading to a gentler immune response.[[2]](https://en.wikipedia.org/wiki/Effects_of_parasitic_worms_on_the_immune_system#cite_note-Cooke_2008,_pp._12-14-2)[[3]](https://en.wikipedia.org/wiki/Effects_of_parasitic_worms_on_the_immune_system#cite_note-Melendez_2007,_p._1375-3)[[4]](https://en.wikipedia.org/wiki/Effects_of_parasitic_worms_on_the_immune_system#cite_note-Bashir_2002,_p._3284-4)[[5]](https://en.wikipedia.org/wiki/Effects_of_parasitic_worms_on_the_immune_system#cite_note-Moreels_2004,_p._99-5)[[6]](https://en.wikipedia.org/wiki/Effects_of_parasitic_worms_on_the_immune_system#cite_note-Weinstock_2005,_pp._249-251-6)[[7]](https://en.wikipedia.org/wiki/Effects_of_parasitic_worms_on_the_immune_system#cite_note-7)[[8]](https://en.wikipedia.org/wiki/Effects_of_parasitic_worms_on_the_immune_system#cite_note-Correale_2007,_pp._98-99-8) Often, such a response is beneficial to both parasite and host, according to Professor of Medical Microbiology Graham Rook of University College London.[[9]](https://en.wikipedia.org/wiki/Effects_of_parasitic_worms_on_the_immune_system#cite_note-Rook_2008,_pp._3-4-9) This immune "relaxation" is incorporated throughout the immune system, decreasing immune responses against harmless [allergens](https://en.wikipedia.org/wiki/Allergens), [gut flora](https://en.wikipedia.org/wiki/Gut_flora), and the body itself.[[](https://en.wikipedia.org/wiki/Effects_of_parasitic_worms_on_the_immune_system#cite_note-Rook_2008,_pp._3-4-9)

 acupuncture may mimic some of these effects through the Neuroendocrine-immune response.

# *IT ALL SPINS TOGETHER*

## *It all spins together as we will see in the next chapter on inflammation.*  Because of the ability of immune cells to disseminate throughout the body, an immune response may be initiated at one site but may be active at distant locations. In other words, immunity is both local and systemic. from Abbas

<https://ksparrowmd.com/acupuncture-for-histamine-induced-itch-association-with-increased-parasympathetic-tone-and-connectivity-of-putamen-midcingulate-cortex/>

In this study we see that in patients who responded with less itch also had improvement in their vagal or parasympathetic tone. It all spins together.

In the next chapter on inflammation we discuss a few more ways to improve immunity and keep inflammation in check.

It would be arrogant and wrong to suggest that simple acupuncture is the answer to rheumatoid arthritis, multiple sclerosis, or even asthma. But given that it has a safe risk/benefit ratio and many explicit mechanisms, this response is more than just placebo. If we can study and hone the treatment so that it evokes more of the immuneregulatory response, it would be a medicine of the future. Ancient Made Modern. And perhaps man becomes an example of a modern self-correcting machine, rather than the mechanical one of the last century. Artificial Intelligence which aims for self correction, a constantly learning system, is very much in line with what the immune system seeks.

1. An elegant defense p.8 [↑](#endnote-ref-1)
2. Lynn CD, Dominguez JT, DeCaro JA. Tattooing to "Toughen up": Tattoo experience and secretory immunoglobulin A. Am J Hum Biol. 2016 Sep 10;28(5):603-9. doi: 10.1002/ajhb.22847. Epub 2016 Mar 4. PMID: 26946186. [↑](#endnote-ref-2)
3. [↑](#footnote-ref-1)
4. . <https://ksparrowmd.com/tattoos-hormesis-acupuncture-and-health/> [↑](#endnote-ref-3)
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7. Epidemic of Absence p.5 Moise Vasquez-Manoff Publisher: Scribner (September 4, 2012) ISBN13: 9781439199404 [↑](#endnote-ref-6)
8. An Elegant Defense: The Extraordinary new science of the Immune System A Tale in Four Lives by Matt Richtel New York, NY: William Morrow, [2019] [↑](#endnote-ref-7)
9. Cellular and Molecular Immunology, Ninth Edition 2019 Elsevier ISBN: 978-0-323-47978-3 Abdul K. Abbas, Andrew H. Lichtman, Shiv Pillai [↑](#endnote-ref-8)
10. Greek for “devourer of cells” [↑](#endnote-ref-9)
11. Cyte is Greek for cell. You will see the root of cyt frequently in physiology. Remember cyte=cell [↑](#endnote-ref-10)
12. An elegant defense” Matt Richtel [↑](#endnote-ref-11)
13. We have phagocytic cells (neutrophils, macrophages), dendritic cells (DC’s), mast cells, natural killer cells (NK cells) and other innate lymphoid cells, and mast cells. Abbas [↑](#endnote-ref-12)
14. Abbas [↑](#endnote-ref-13)
15. Abbas [↑](#endnote-ref-14)
16. Cellular and Molecular Immunology, Ninth edition 2018 Elsevier 1600 John F Kennedy Blvd. Ste 1800 Philadelphia, PA 19103-2899 [↑](#endnote-ref-15)
17. An elegant defense p235 [↑](#endnote-ref-16)
18. Elegant defense p.234 [↑](#endnote-ref-17)
19. *There are important parallels in the immunobiology of allergy and asthma, and of the human host's response to parasitic worms. Th-2 immune actions with ‘weep and sweep’ mucosal biology are common to both – pathological in the first and protective in the second. Common up-regulating genetic variants of Th-2 immunity, notably in* IL13 *and* STAT6*, predict increased risk of asthma and allergy, but diminished intensity of infection by* Ascaris *and* Schistosoma*. Endemic exposures of humans to parasitic worms may have been one evolutionary force selecting for genetic variants that promote asthma and allergy.* [↑](#footnote-ref-2)
20. Epidemic of Absence [↑](#endnote-ref-18)
21. Epidemic of absence p 87 [↑](#endnote-ref-19)
22. Epidemic of Absence p.272 [↑](#endnote-ref-20)
23. Slominski AT, Zmijewski MA, Skobowiat C, Zbytek B, Slominski RM, Steketee JD. Sensing the environment: regulation of local and global homeostasis by the skin's neuroendocrine system. *Adv Anat Embryol Cell Biol*. 2012;212:v-115. doi:10.1007/978-3-642-19683-6\_1 [↑](#endnote-ref-21)
24.  [↑](#footnote-ref-3)
25. Research has shown “that acupuncture can regulate the nonspecific immune function,19 including the following aspects: acupuncture can improve the number and function of phagocytes, increase the number and activity of natural killer (NK) cells, promote the synthesis, secretion and biological activities of cytokines and adjust the content of serum complement.” [↑](#footnote-ref-4)
26. <https://ksparrowmd.com/wp-content/uploads/immune-modulation-Sandra-Silverio-Lopes.pdf> brief look behind the immunity from the [↑](#endnote-ref-22)
27. *3.4.2.3. Immunoglobulins (Ig)*

The immunoglobulins or antibodies represent a glycoproteins family related structurally,

produced by the lymphocytes B, linked or secreted by cellular membrane [85].Among immunoglobulins, find IgA present in great quantity in mucosal. Akimoto [24]and Gleesen [87] show that IgA salivate decreases in exercises exhausting case, as well as the population of total lymphocytes predisposing especially athletes population the diseases of the respiratory treatment. The results expressed in the Table 6, they demonstrate that the acupuncture can increase IgA indices after exhaustion as in physical depletion cancer processes [24,50,60], signalling for acupuncture possible benefits in immunomodulation. Other immunoglobulin related in the papers was Ig E. According Abbas. [85], individuals with allergic process is found high levels of immunoglobulin IgE, in response to environment allergens, in the same way that IL4. In 100% of the papers that used IgE as markers, the results found after the acupuncture went of reduction in the serum levels [26,29,52,53].In the same way found a coherence in the citations of other authors, with respect to decrease to IL4 after the acupuncture. [↑](#footnote-ref-5)
28. McDonald JL, Smith PK, Smith CA, Changli Xue C, Golianu B, Cripps AW; Mucosal Immunology Research Group. Effect of acupuncture on house dust mite specific IgE, substance P, and symptoms in persistent allergic rhinitis. Ann Allergy Asthma Immunol. 2016 Jun;116(6):497-505. doi: 10.1016/j.anai.2016.04.002. Epub 2016 May 4. PMID: 27156748. [↑](#endnote-ref-23)