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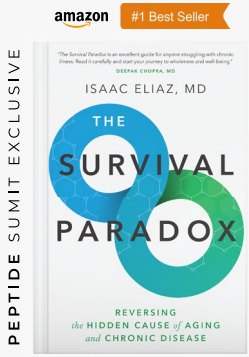

CHAPTER 5
SAMPLE

A GIFT FROM NATURE

MODIFIED CITRUS PECTIN

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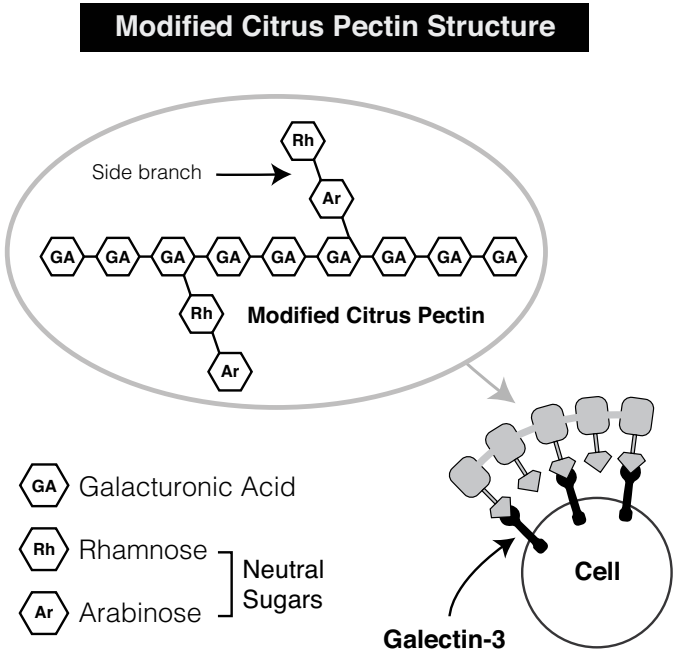
CHAPTER FIVE

A GIFT FROM NATURE: MODIFIED CITRUS PECTIN

Now that you understand how the survival response and galectin-3 operate within the body, we'll explore a bit of good news: a way to interrupt this response at the biochemical level.

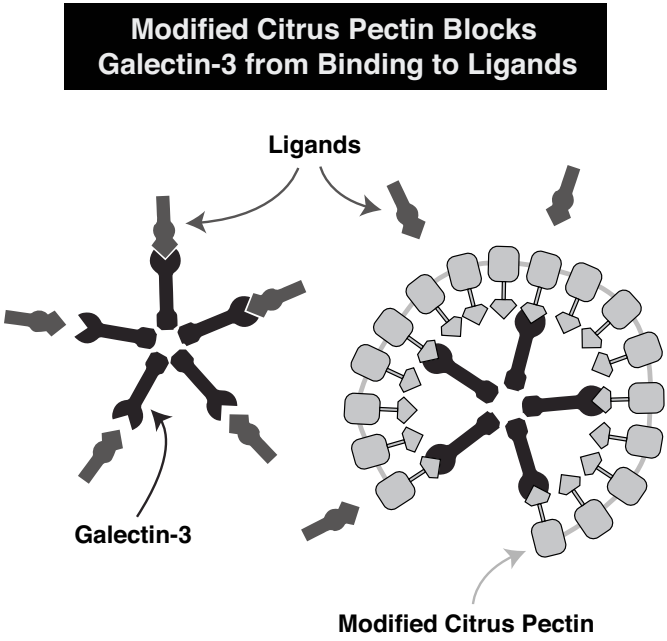
More than seventy published studies have demonstrated the ability of a very specific and humble compound to block the devastating effects of galectin-3. I say "humble" because it is derived from citrus fruits. This amazing gift from nature is a low-molecular-weight form of pectin called modified citrus pectin (MCP).

Let's take a moment to define *pectin* in general. It is a fiber. Structurally, pectin is a long chain of carbohydrates, mostly a specific one called galacturonic acid. This chain of galacturonic acid has a large molecular weight ranging between 200–300 kilodaltons. (For my technical readers: pectin also has side branches composed of different neutral sugars like arabinose, rhamnose, and xylose.) When the pectin comes from citrus, it is known as citrus pectin.



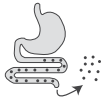
Importantly, regular pectin is not absorbed into the bloodstream and therefore cannot block galectin-3. There are still health benefits to it, as a fiber—since its carbohydrate chain is very long and isn't digested or absorbed, it remains in the gut, where it can improve gut health. However, in order for citrus pectin to block galectin-3, it must be modified into a substance with a low molecular weight.

Unlike pectin, these modified molecules are much, much smaller: 3–13 kilodaltons, compared to the 200–300 kilodaltons of regular pectin. The smaller-sized molecules allow the compound to enter the bloodstream through the digestive tract. Once there, because of its specific structure, it can bind to galectin-3 and block its devastating effects. Essentially, MCP connects to galectin-3's carbohydrate recognition domain, which has an affinity for the galacturonic acid present in MCP. In this way, MCP prevents galectin-3 from interacting with cells and tissues.



Frustratingly, there are forms of MCP on the supplement market which have molecules that are not small enough to enter the bloodstream—this is why I refer to the form of MCP I'm discussing as having a low molecular weight. In order for MCP to effectively block galectin-3, it must undergo very precise changes in its structure through a specific pH and heat-controlled enzymatic process. This not only reduces the pectin fiber to a tiny, absorbable size but also gives it the ability to bind to and block galectin-3. For this reason, I only recommend a form of researched MCP that has undergone this process. Fortunately, this form of low-molecular-weight MCP is an extremely safe compound, classified as GRAS (Generally Regarded as Safe) by the FDA. Now that you understand the molecular-weight distinction, for the sake of brevity, I will refer to the compound only as MCP.

Modified Citrus Pectin versus Regular Citrus Pectin

	Other Citrus Pectins	**Low Molecular Weight Modified Citrus Pectin**
Molecular Weight	150 - 300 kDa	**< 15 kDa**
Degree of Esterification	Varies	**< 10%**
Clinically Proven	No	**Yes**
How It Works	 Stays in GI Tract	 **Systemic Absorption**

MY PERSONAL INVOLVEMENT

Before we get into the science and research on MCP, I'd like to share my personal involvement in its development and why it is so near and dear to me.

I grew up in a suburban neighborhood in Ramat Gan, Israel. One evening in 1971, when I was twelve years old, my parents and I visited our neighbors, Drs. Leo and Ruth Cohen. Both were PhDs in organic chemistry and pioneers in the citrus industry of Israel—they were the head scientists at Israel's leading citrus production conglomerate.

During our visit that evening, we engaged in lively conversation. Suddenly, Ruth turned to me out of the blue and said, "Isaac, one day they will find a treatment for cancer in the peels of citrus fruits." For some reason, Ruth's statement stuck in my mind. Then, twenty-four years later in 1995, after I graduated from medical school and obtained my master's of science

in traditional Chinese medicine, a study in the *Journal of the National Cancer Institute* caught my attention. In the study, mice with prostate cancer were given MCP. Amazingly, there was a dramatic decrease in the number and size of lung metastasis in the mice that had consumed the MCP compared to the mice that hadn't. This was the result of the inhibition of galectin-3.

Intrigued, I called Dr. Ruth Cohen. I reminded her of what she told me twenty-four years earlier and shared the study results with her. I asked if she could help me make the most effective form of MCP, and Ruth delightedly connected me with some of the leading pectin scientists in the world. This began my journey with MCP, which was initially sparked on that pivotal day when I was twelve and has been unfolding ever since.

It has been a journey of discovery. If you looked at my medical charts twenty years ago, you would not have necessarily seen MCP at the top of my patients' suggested therapies. Sometimes it wasn't on the list at all. However, over the years, I've conducted extensive research on MCP, including its application in reducing the severity of cancer, enhancing the immune system, removing heavy metals, inhibiting and reducing inflammation and fibrosis by blocking galectin-3, and its ability to positively impact many chronic conditions and diseases.[15] I now recognize that it is perhaps the most important supplement we have in our efforts to treat and prevent chronic disease.

Today, the MCP I developed and researched is available for use as a dietary supplement. I often say that if it were a drug, I believe it would be widely prescribed. But since it's a natural product extracted from the peels of citrus fruits, it's a dietary supplement and, as such, receives much less attention. Many of my colleagues call it "the best-kept secret in integrative medicine." Although it's taken twenty-five years, low-molecular-weight MCP is finally starting to get the recognition and appreciation it deserves.

HOW DOES MCP WORK?

MCP interferes with the inflammatory process by binding to galectin-3's carbohydrate recognition domain—preventing galectin-3 from otherwise binding to ligands, interacting with cells, or forming lattice structures. By disrupting the cell-to-cell, cell-to-galectin-3, and galectin-3-to-galectin-3 interactions, MCP creates an environment that is inhospitable to inflammation, fibrosis, hypoxia, infection, and cancer cell growth.[16] In the case of cancer, for example, it removes the galectin-3 that "shields" the cancer, and blocks the galectin-3 that inhibits the immune response. This wakes up the immune cells and enhances the normal immune response, making the immune cells more effective.

While MCP blocks galectin-3 in places where it causes damage, tissues that require galectin-3 still express galectin-3 where it's needed. This is the wonderful thing about MCP: it doesn't *inhibit* healthy cellular function and injury repair but rather mitigates the harmful consequences of galectin-3.

And MCP's beneficial effects extend beyond galectin-3 binding. It can also bind to heavy metals and help remove them.[17] Further, it has a powerful immune-enhancing effect. This is because of a side structure in the MCP called *rhamnogalacturonan II*, which improves the immune response.

EVIDENCE OF MCP'S EFFECTIVENESS

Years ago, before I discovered the role of galectin-3 in inflammation and fibrosis, I witnessed an interesting phenomenon: MCP quickly reduced pain in my patients. They reported that their arthritis, back pain, and sometimes even pain from cancer had resolved or improved in just a few days.

I asked myself, "How can this be?" I thought maybe it was due to MCP's ability to remove heavy metals, but the resulting pain relief happened so

quickly, it was puzzling. Now, after years of research, we know that blocking galectin-3 reduces inflammation and fibrosis, and can therefore not only help relieve pain but also positively impact a wide spectrum of conditions.

It's especially striking to look at the benefits of MCP in inflammatory-driven cardiovascular conditions. There are close to twenty animal studies published in major journals reporting the consistent ability of MCP to stop and even reverse arteriosclerotic damage. Only one single study showed that MCP didn't work, and when you read it carefully, you can see that it didn't work because it was a *different type of MCP* with a higher molecular weight. This demonstrates the importance of using the correct MCP—MCP is only effective when it is properly modified.[18]

My research team and I have been collaborating with Dr. Avraham Raz from Wayne State University, head of the group that published the original landmark MCP research in the *Journal of National Cancer Institute* in 1995. I am grateful to Dr. Raz for his pivotal contribution to the field of galectin-3 and MCP. Through our collaboration, we've been able to utilize antibodies to identify MCP in the bloodstream. By using this method, we demonstrated for the first time that MCP is absorbed into the bloodstream, where it can exert its benefits.

Because of its ability to block galectin-3, MCP benefits multiple systems throughout the body. When it comes to the metabolic system, it can improve insulin resistance, diabetes, metabolic syndrome, and obesity. MCP also works as an antioxidant and promotes mitochondrial health. By reducing inflammation and fibrosis, it inhibits the driving force for autoimmune and degenerative diseases. The same mechanism helps with postinjury healing, protects the blood-brain barrier, and can help heal stroke-inflicted brain damage.

In addition, MCP facilitates the growth of beneficial bacteria in the GI tract and inhibits the adhesion of harmful pathogens in the gut and the lungs. By breaking down the galectin-3 lattice formation, MCP doesn't allow microorganisms to hide and evade the immune system. It can even have

an antimicrobial effect on pathogenic bacteria. To give an example, MCP demonstrates antimicrobial activity alone and in combination with cefotaxime, an antibiotic, against strains of methicillin-resistant *Staphylococcus aureus* (MRSA).[19]

These are just some of the highlights of MCP's effects. We'll discuss more about its influence on many conditions in the chapters to come.

JONATHAN'S STORY

After so many years spent working with MCP, I am still in awe of its effectiveness. The excitement I feel is renewed every time I live vicariously through a patient's wonder. My dear friend Jonathan was advised by his naturopath to start using MCP to help with the elimination of heavy metals and toxins. After a few months, Jonathan contacted me to ask about something that surely couldn't be possible—had MCP also resolved his long-term hypertension?

His blood pressure had been hovering at 140/90 for many years, and it was now 110/70. He didn't change anything with his diet or supplementation—he simply started taking MCP. I told Jonathan that, in fact, it was possible because MCP can block the harmful effects of galectin-3 on the cardiovascular system.

A few months later, I met with Jonathan again. This time, he told me that, although he'd been suffering from bleeding gums for years, the problem had suddenly resolved.

"Isaac," he asked, "it can't be possible that MCP has helped my gums, as well, can it?"

"Indeed," I replied, "it is certainly possible."

After that visit, his skepticism turned to supposition. When I saw him

next, he had more good news. He told me he had always come down with a number of colds accompanied by cough and bronchitis each winter. However, this past winter, his immune system was stronger than ever, and despite extensive international travels, he didn't get sick *at all*.

"It's because of the MCP," he announced.

I laughed and replied, "It's certainly possible."

ONE PART OF AN INTEGRATED APPROACH

By deactivating galectin-3 and breaking down its lattice formation, MCP uncovers the isolating microenvironments that can harbor damaging disease processes within us. From a symbolic point of view, galectin-3 is now raging in our country and on our planet. But there are tools to block the negative effects of division, isolation, and inflammation. On the physical level, we have tools such as diet and exercise. Now there is also MCP.

My approach in medicine is to see through symptoms to deeper causes and relationships. As such, I frequently advocate for a more multidimensional and sometimes complex approach to life and health. However, within the complexity, there are some very simple unifying principles. We cannot separate our cellular mechanisms from the larger cosmic forces that affect the world around us. Like the double helix of DNA, these strands are interwoven.

Keeping this in mind, if our survival response promotes isolation tendencies that can be so damaging, what can we do to counterbalance this? Is there a way for us to heal that is of larger scope, not only at the cellular level?

The answer lies in connecting with our essence and core, with who we truly are. Love is at the center of our creation. With some exceptions, humans are made in an act of love between their parents through a bond that has repeated itself generation after generation, dating back to all of our ancestors who are within our genetic makeup. This quality of love is present

in each and every one of our cells, but we've lost this connection throughout our survival struggles.

However, there is one organ in the body that functions differently and continuously reminds us what it means to give without judgment. It offers us the built-in physiological opportunity to transform our survival reactivity into unconditional love and compassion. It takes in "dirty" blood that contains unwanted by-products from our cells and organs, transforms the quality of the blood through breath, and gives out "clean" blood to its environment and the rest of the body without discrimination. This organ is the heart.

It's what I'll focus on next, because when we connect with our hearts, anything and everything becomes possible.

CLICK TO LEARN MORE ABOUT
DR. ELIAZ'S CLINICALLY RESEARCHED
MODIFIED CITRUS PECTIN