

REPORT

Fighting Cancer Metastasis and Heavy Metal Toxicities With Modified Citrus Pectin

By Joanne Nicholas

Despite billions of research dollars spent every year, cancer remains the second leading killer of Americans. One reason cancer is so lethal is its tendency to metastasize to essential organs throughout the body.

Certain malignancies (like brain tumors) kill by infiltrating into healthy tissues, but the vast majority of cancer deaths occur when tumor cells enter the blood and lymphatic systems and travel to the liver, lungs, bones, and other distant parts of the body.

Unfortunately, there have been few effective approaches to preventing cancer metastasis. The encouraging news is that a specialized fruit polysaccharide called **modified citrus pectin** has demonstrated unique properties in blocking cancer cell aggregation, adhesion, and metastasis.¹

Clinical research shows that modified citrus pectin helps limit disease progression in men with advanced prostate cancer.² In addition to its cancer-inhibiting effects, modified citrus pectin shows promise in chelating toxic heavy metals that can be so damaging to overall health.³

Here, we'll explore how this novel compound offers such distinctive and protective effects.

WHAT IS MODIFIED CITRUS PECTIN?

The American Cancer Society recommends that adults eat five servings of fruits and vegetables each day in order to help reduce cancer risk.⁴ One way to get some of the benefits of citrus fruits such as oranges and grapefruits is with *modified citrus pectin*.

Pectin is a naturally occurring substance found in the cell walls of most plants and especially concentrated in the peel and pulp of citrus fruits (lemons, limes, oranges, and grapefruits), plums, and apples. It was first identified in 1825, but home cooks had long used fruits with high levels of pectin in jams and marmalades because of their gelling properties. While pectin provides little nutritional content, this carbohydrate acts as a beneficial type of soluble dietary fiber.

Researchers attempted to find a process to alter pectin to create a food supplement that would allow the body to benefit from its various health-promoting properties. Recently, scientists have been able to use pH and temperature modifications to break down pectin's long, branched chains of polysaccharides into shorter, unbranched lengths of soluble fiber molecules that dissolve easily in water. The result, *modified citrus pectin* (MCP), is a substance that is rich in galactose residues, which are easily processed by the digestive system and absorbed into the bloodstream.⁵ Scientists continue to refine MCP in their quest for a more active and effective agent.

PREVENTING CANCER METASTASIS

Modified citrus pectin is thought to be useful in the prevention and treatment of metastatic cancer, especially in solid tumors like melanoma and cancers of the prostate, colon, and breast. Scientists believe that MCP works by inhibiting two key processes involved in cancer progression: angiogenesis and metastasis.^{6,7}



Angiogenesis is the process in which cancer cells establish their own blood supply to fuel their growth. *Metastasis* occurs when cancer cells break away from the original tumor, enter the bloodstream or lymphatic system, and form a new tumor in a different organ or other parts of the body.⁸ Secondary or metastatic cancers often pose more life-threatening circumstances than the original tumor.



As scientists begin to decipher the process of how cells receive, interpret, and relay the signals that recruit them to form new tumors,⁹ they are focusing their attention on molecules called galactose-binding lectins, or *galectins*. Galectins are overexpressed adhesion and blood vessel-attracting surface molecules that are thought to be involved in the spread of cancer.⁶ A growing number of small studies in humans and animals have reported that MCP interferes with the cancer cell's interactions with other cancer cells by acting as a galectin-3 *antagonist*—that is, an agent that blocks the normal activity of galectins.

Via the mechanism of *galectin-3 antagonism*, MCP appears to disrupt the processes that allow cancer cells to communicate with one another. When the MCP molecules bind to receptors on the surface of cancer cells, they block galectin-3 and other molecules from penetrating into nearby healthy tissue to create a new tumor and establish the tumor's blood supply (angiogenesis). In this way, MCP seems to play a role in preventing cancerous tumors from metastasizing and spreading to other organs—one of the main causes of death from cancer.

When MCP interferes with cancer cells trying to form a new tumor, the cancer cells circulate in the bloodstream until they die. By working to inhibit the spread of cancer, MCP keeps the body's immune system from becoming overwhelmed by an increasing cancer cell load.¹⁰

MODIFIED CITRUS PECTIN'S EFFECTS IN PROSTATE CANCER

Prostate cancer is the most common cancer diagnosed in men in the United States. One in six American men will be diagnosed with prostate cancer during his lifetime. The American Cancer Society (ACS) estimates that 28,660 men die of prostate cancer annually, with only lung cancer more lethal to men.¹¹ The ACS estimates a five-year survival rate of nearly 100% for men whose prostate cancer is diagnosed and treated at an early stage. But for those men with late stage, metastatic prostate cancer, the treatment options are very limited.

One of the first promising studies to show the potential of MCP to inhibit prostate cancer metastasis was published in the *Journal of the National Cancer Institute* in 1995. Laboratory rats were injected with human prostate cancer cells and divided into four groups. The control group received plain water and the other groups received water with varying concentrations of MCP. After 30 days, only 50% of the rats that drank water with MCP (0.1% weight/volume) had any metastases, while 94% of the rats that drank regular water had cancer metastasize to their lungs. The researchers called for further study to determine both "*the role of galectin-3 in normal and cancerous prostate tissues*" and "*the ability of modified citrus pectin to inhibit human prostate metastasis in nude mice.*"¹²



In 1999, Dr. Stephen Strum, an oncologist specializing in prostate cancer and a respected member of Life Extension's Scientific Advisory Board, and his colleagues were the first to show the positive effects of MCP on humans with advanced prostate cancer. In a paper presented at an International Conference on Diet and Prevention of Cancer, they reported that five of seven men with advanced prostate cancer and unable to benefit from conventional treatment had a positive response after taking MCP every day for three months or longer. The response was measured by an increase in prostate-specific antigen doubling time (PSADT), which measures the rate at which blood levels of prostate-specific antigen (PSA) rise. Since PSA is a marker of prostate cancer progression or recurrence, longer PSA doubling time is associated with slower disease progression and is thus desirable. One of the five patients had no increase to his PSA level at all.¹³

A more recent study led by Brad Guess and Drs. Mark Scholz and Stephen Strum also found that MCP increases the PSA doubling time. In this phase II pilot study of 10 men whose prostate cancer had returned after an initial treatment with surgery or radiation, PSADT increased in eight (80%) of the 10 men after taking MCP for 12 months.¹⁴

Dr. Strum told *Life Extension*, "My clinical experience using MCP in prostate cancer has been that it slows PSA doubling time in the majority of patients taking the standard dose of 5 grams three times per day. Because this treatment is well tolerated, I use MCP in situations where sustained increases in PSA may occur." In a study published in 2007, 49 patients with advanced prostate cancer and few treatment options were given oral doses of MCP powder diluted in water and juice three times a day at eight-hour intervals for a four-week cycle. After two cycles of treatment with MCP, 21% of the patients had a clinical benefit of disease stabilization or improved quality of life; 12% had stable disease for more than 24 weeks. One patient with stage IV

metastatic prostate cancer showed a 50% decrease in serum PSA level after 16 weeks of treatment, improving his quality of life and also decreasing pain. *“MCP seems to have positive impacts especially regarding clinical benefit and life quality for patients with far advanced solid tumors,”* the researchers concluded.²

WHAT YOU NEED TO KNOW: MODIFIED CITRUS PECTIN

- Pectin is a complex carbohydrate that is abundantly present in citrus fruits. Modified citrus pectin (MCP) is composed of short, non-branched carbohydrate chains derived from the peel and pulp of citrus fruits.
- Compelling research suggests that modified citrus pectin may help block the growth and metastasis of solid tumors such as breast, colon, and prostate cancers.
- Intriguing clinical studies suggest that supplementation with MCP stabilizes disease progression and lengthens PSA doubling times in men with prostate cancer.
- Modified citrus pectin may represent a safe, non-toxic d of chelating toxic metals—without the need for intravenous infusions.
- Supplementation with MCP has been shown to increase excretion of dangerous metals such as mercury, arsenic, lead, and cadmium—without removing essential minerals like calcium, magnesium, and zinc from the body.
- A clinical study showed that supplementation with an MCP-alginate complex reduced total body toxic heavy metal burden in patients with a variety of health concerns.
- MCP is considered safe and well tolerated. Dosages range from 6 to 30 grams per day in divided dosages; a typical dose is 5 grams three times daily.

MODIFIED CITRUS PECTIN AND CHELATION

Beyond its benefits in fighting cancer metastasis, MCP may have applications in mitigating the health dangers posed by toxic heavy metals. Chelation therapy is a chemical process in which a substance is used to bind molecules, such as heavy metals or minerals, and hold them tightly so that they can be removed from a system, such as the body. Chelation can help rid the body of excess or toxic metals, but it is not known if this reduces artery disease risk. Chelation is used to treat lead and mercury poisoning.^{15,16}

In most instances, chelation therapy involves the infusion of compounds via a catheter placed in an arm vein. This procedure must be done in a clinical setting over a specified course of treatments. In contrast, chelation therapy using MCP is done via the oral route and can be administered to the patient in almost any clinical setting, since the supplement can be ingested anywhere.

A pilot trial evaluating MCP’s chelating effects provided evidence that orally administered MCP significantly increases urinary excretion of toxic metals. In a study published in 2006, eight healthy individuals were given 15 grams of MCP daily for five days and 20 grams of MCP on day six. Twenty-four hour urine samples were collected on days one and six and analyzed for toxic and essential elements. The investigators reported that significant urinary excretion of arsenic, mercury, cadmium, and lead increased within one to six days of MCP treatment. There was a 150% increase in the excretion of cadmium and a 560% increase in lead excretion on day six.³ Essential minerals such as calcium, zinc, and magnesium were not seen to increase in the urine analysis, indicating that MCP treatment did not deplete these nutrients.



In a case study report, five patients with different illnesses were given MCP (PectaSol®) alone or as an MCP/alginate combination (PectaSol® Chelation Complex™) for up to seven months. Each one had a gradual decrease of total heavy metal burden, which is believed to have played an important role in the patients’ recovery and health maintenance. The patients had a 74% average decrease in toxic heavy metals after treatment. The authors report this is the “first known documentation of evidence” of a possible correlation of positive clinical outcomes and a reduction of toxic heavy metal load using MCP alone or as an MCP/alginate complex. They recommend “further studies be performed to confirm the effectiveness of this gentle non-toxic chelating system as an alternative to harsher chelators in the treatment of patients with a heavy metal body burden.”¹⁷

Lead toxicity is an ongoing concern worldwide, and the long-lasting effects of lead exposure in children are especially troubling. A

2008 pilot study at the Children's Hospital of Zhejiang University, Hangzhou, China looked at whether MCP® could mitigate lead toxicity in children with high blood levels of lead. Seven children hospitalized with toxic lead levels, aged five to 12, were given 15 grams of MCP (PectaSol®) per day in three divided dosages. Blood serum and 24-hour urine excretion analysis were performed on days 0, 14, 21, and 28. Two patients were released after two weeks, three patients were released after three weeks, and two patients were released after four weeks when their blood lead levels had dropped below the criterion. All of the children had a significant increase in urinary excretion of lead. The authors recommend further studies to confirm the effectiveness and safety of MCP as a lead chelator.¹⁸

Scientists believe that the ability of MCP (PectaSol®) to chelate toxic metals arises from a low molecular weight pectin that contains 10% *rhamnogalacturonan II* molecular side groups, which are known to selectively bind heavy metals with a strong affinity. Subsequently, these metal-pectin complexes are eliminated in the urine.³

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USING MODIFIED CITRUS PECTIN

Research indicates that MCP may hold health applications in significantly increasing the urinary excretion of metals^{3,17,18} and in inhibiting tumor growth and metastasis.¹⁹⁻²¹

Side effects from citrus pectin are rare and occur primarily in patients with citrus fruit allergies.¹⁰



According to the Natural Standards Monograph on MCP, “some experts caution that neither citrus pectin nor all ‘modified’ citrus pectins have the same effects as MCP. Citrus pectin does not have the short polysaccharide chains as MCP, and ‘modified’ pectin could indicate that the pectin has been altered in some way, but not necessarily have the shorter polysaccharide chains.”²²

MCP provides superior benefits to unmodified citrus pectin because its shorter, galactose-rich polysaccharide chains allow for better absorption and utilization by the body. Further, its galactose-rich side chains allow MCP to bind galactose-binding lectins on the surface of certain cancer cells to help impede cancer adhesion and metastasis.¹

Make sure that the MCP you are using is one that has been researched and studied in the various clinical trials discussed in this article.

Nutritional scientists recommend taking MCP on an empty stomach. Dosages range from 6 to 30 grams daily in divided doses. A typical daily dosage is 5 grams, three times daily.

UNDERSTANDING GALECTIN-3

Modified citrus pectin’s cancer-fighting potential may arise from its ability to interact with specialized proteins called galectins.¹

Galactose-binding lectins, or galectins, are carbohydrate-binding proteins detected within some cancer cells that help the cells clump or cluster together more easily. This may facilitate the growth and spread of certain types of cancer. Among the galectins, scientists believe that galectin-3 may be particularly important in numerous processes involved in cancer, such as cancer adhesion, migration, progression, and metastasis.²³

A growing number of studies suggest that increased levels of galectin-3 in the blood or tissue are associated with more frequent cancer metastasis or an increased stage of tumor progression.²⁴ There is still some controversy in this area, as other data indicate that low or absent galectin-3 levels correlate with more aggressive tumors.^{25,26} Other findings suggest that intracellular galectin-3 exerts an anti-apoptotic effect, protecting cancer cells against programmed cell death by affecting mitochondrial function.^{23,27}

At this time, scientists believe that MCP may help fight certain cancers by binding with galectin-3 to help decrease cancer cell aggregation, adhesion, and metastasis.¹

Further research is needed to determine if MCP can likewise block galectin-3’s anti-apoptotic effects. Such a finding would represent a breakthrough in cancer therapy, pointing to a potentially synergistic role of MCP in combination with other cancer therapies that target mitochondrial function.

CONCLUSION

Modified citrus pectin is an intriguing substance that continues to be studied in an effort to determine its full therapeutic potential. It appears to be a promising agent that can keep some advanced cancers in check by limiting the growth of new tumors, and by affecting the primary cancer as well. MCP also appears to show some promise as a natural, non-toxic chelating agent that binds to heavy metals like cadmium, lead, mercury, and arsenic and helps the body excrete them in the urine.



Not all citrus pectin products are alike. Be sure to utilize modified citrus pectin (MCP) containing short polysaccharide chains such as the preparations utilized in the clinical studies discussed in this article. Scientists continue to refine MCP preparations, which may also result in greater efficacy.

If you have any questions on the scientific content of this article, please call a Life Extension Health Advisor at 1-800-226-2370.

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