

## REPORT

### Modified Citrus Pectin

A commercially available supplement has been shown to inhibit cancer cell metastasis, lower cholesterol, and remove toxic metals from the body.

By Romy Fox



The health-enhancing properties of citrus fruits have been known for centuries. In 1593, Great Britain's Sir Richard Hawkins suggested that something in lemons and oranges prevented the scurvy that bedeviled sailors on long voyages. That medicinal ingredient was identified as vitamin C in the 1920s, and since then we have learned that citrus fruits contain many other vitamins, minerals, and health-enhancing substances. One of these is the pectin found in the fruit's rinds. A soluble fiber, pectin is known to help counteract diarrhea and reduce cholesterol levels.<sup>1</sup> But its effects are limited to the intestinal tract, as it is not readily absorbed into the bloodstream.

Medical researchers recently have learned how to "chop" citrus pectin into smaller "pieces," and to subtly change its structure to make it much more absorbable. And they have discovered that once in the bloodstream, this modified citrus pectin, known as MCP, may help combat cancer and rid the body of certain toxic substances. It also may reduce several forms of blood cholesterol better than

"regular" pectin.

### MCP for Prostate Cancer

Prostate cancer is among the most frightening diagnoses a man can receive. Many men are not even aware they have a prostate—the small gland wrapped around the urethra, just below the bladder—until they have pain or difficulty with urination or ejaculation. If they are "lucky," they will be told that they have an enlarged or inflamed prostate. If they are unlucky, the diagnosis may be prostate cancer. According to the American Cancer Society, more than 220,000 men received this diagnosis in 2003, and close to 29,000 died of the disease. It is the second most common form of cancer in men (after skin cancer), and the second most deadly (after lung cancer). One in six men will develop prostate cancer during his lifetime, and 1 in 32 will die of it.<sup>2</sup>

Physicians have a variety of treatments for prostate cancer, ranging from drugs that block the male sex hormones that "feed" the cancer, to surgeries that excise the diseased tissues, to radiation designed to destroy the cancer cells. These cancer-fighting medicines and other techniques are improving, and if the cancer is caught while it is still in the prostate or nearby, the odds of survival are good. But if the cancer has spread, there is only one chance in three that a man will survive five years past the diagnosis, no matter what treatment his doctor offers.<sup>2</sup>

Theories on the nature of cancer are evolving. Scientists used to think cancer cells were individual actors, and that even a single cell escaping from the main tumor would likely start a new colony elsewhere in the body. But now we are learning that cancer is more of a "group activity." Just as a platoon of soldiers is more powerful than a single rifleman, cancer cells are more dangerous when they assemble and clump together. To do this, they must communicate with and bind to one another. That cell-to-cell interaction is made possible by special molecules that sit on the outer surfaces of the cancer cells. For certain types of cancer cells—such as breast, colon, melanoma, lymphoma, and prostate cells—one group of these "interaction molecules" is called the galectins. And one of these, known as galectin-3, plays a key role in the spread, or metastasis, of cancer. There appears to be more galectin-3 on metastatic cells than on the original tumor cells.<sup>3,4</sup> And with certain types of cancer, the more advanced the cancer stage, the more galectin-3 is found.<sup>4</sup> With more galectin-3 available, cancer cells find it easier to bind to one another or to stick to noncancerous tissues elsewhere in the body. Indeed, it seems as though galectin-3 and other interaction molecules prepare the way for cancer to grow and spread.

Galectins and other interaction molecules work like a car's key and ignition. Only the correct key will fit into the ignition and activate the engine. Some other keys will fit, but they will not be quite right—they will only jam the ignition and prevent it from working. So it is with the interaction molecules that sit on the outer surfaces of cancer cells. Think of them as being the "molecular ignition" to the cancer cells. The right "molecular keys" will slip in, "turn on" the cells, and allow them to perform their deadly actions. But several "almost-right" molecular keys, similar to the real thing but not quite the right shape, will jam the molecular ignition. A jammed ignition is a bad thing in a car, but it can be a good thing in a cancer cell, which we do not want to "turn on." We want the molecular ignition to jam up so the cancer cells cannot clump together or stick to healthy tissues.



Where cancer is concerned, a broken ignition is good, and it appears that modified citrus pectin can break it. Not literally, of course. Instead, MCP is like an imperfect version of the molecular key. It fits into the ignition and jams it, preventing the right key from getting in. In other words, it gums up the works. With their molecular ignitions jammed, cancer cells find it harder to stick to other cancer cells or to healthy tissues. In short, they are rendered less likely to metastasize.

### Research on MCP vs. Cancer

Dr. Kenneth Pienta and his team published in the Journal of the National Cancer Institute the results of the first study on oral modified citrus pectin.<sup>5</sup> For this study, prostate cancer cells were implanted in laboratory animals. Half of the animals were given water with MCP added, half drank regular water. The cancer spread to the lungs of 93% of the animals that drank regular water, compared to only 50% of those given the water containing MCP. This study showed that not only was the cancer less likely to spread in those taking MCP, but also that if it did spread, it

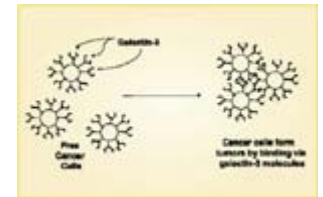
established smaller colonies.

In 1999, researchers examined the effects of MCP on prostate cancer in humans.<sup>6</sup> Seven men suffering from the disease who had not been helped by conventional treatment were given 15 grams of a modified citrus pectin called Pecta-Sol® every day for three months or longer. The researchers looked at the effects of Pecta-Sol® on a measurement called the PSA doubling time.

PSA, or prostate specific antigen, is a substance produced by the prostate. It is easy to measure in the blood. A healthy prostate manufactures relatively little PSA: a standard blood test will find less—often much less—than 2.0 ng/ml in the blood of a healthy man. When prostate cancer develops, PSA begins to rise. Depending on one's age, levels between approximately 2.5 and 6.5 should be considered suspect, and anything above that should be considered alarming.

Besides looking at the absolute PSA reading, researchers also watch the PSA doubling time, or the amount of time it takes the PSA level to jump, for example, from 2 to 4, or from 4 to 8. The faster the rate of doubling, the more dangerous the situation. PSA doubling time is considered an important tool for tracking the growth of prostate cancer. Slowing the doubling time is a positive sign. Stopping the increase in PSA altogether is an even better sign, and a falling PSA level is the best sign of all.

The results for the seven men in the 1999 study were very encouraging. Four of the seven enjoyed a positive response—that is, it took significantly longer for their PSA levels to double. For a fifth man, it took slightly longer for the level to double, and in a sixth, the PSA remained about the same, which raised the possibility that his cancer did not progress at all. This small preliminary study suggested that modified citrus pectin does indeed “gum up the works” on prostate cancer cells, slowing the rate at which the cancer grows or spreads.

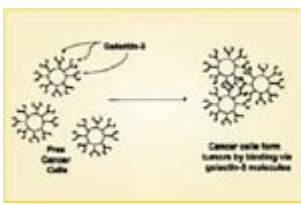


enlarge diagram

MCP was put to the test again in a 2003 study.<sup>7</sup> Ten men with prostate cancer, all of whom had undergone standard treatment but had not been cured, were used to test the efficacy of the MCP called Pecta-Sol®. Each participant had “low but progressively rising PSA levels.” Each was given 14.4 grams of Pecta-Sol® daily. A year later, seven of the 10 recorded a statistically significant slowing of their PSA doubling time. This is a positive result, for as the researchers point out, “Intuitively, it seems that increasing the time it takes for the PSA to double, if sustained, would mean that the cancer progression would be slower and would conceivably result in a prolongation of life.”

Data from the Pecta-Sol® prostate cancer studies produced another interesting finding: in a few men, the PSA level dropped. This may have been a random occurrence, or the MCP may have triggered it. Isaac Eliaz, MD, one of the researchers, notes that until recently it was thought that modified citrus pectin works by “gumming up the works” on the surface of cancer cells, preventing the galectins from helping the cells link up with other cancer cells or with healthy tissues.<sup>8</sup> If that were the case, one would expect the PSA to climb more slowly or to stop rising altogether when MCP is administered. But one would not expect MCP to make the PSA drop. Only a cancer-killing agent—one that destroys cancer cells and stops them from producing PSA—should do that. Could modified citrus pectin be a cancer killer?

If so, it might be through its effects on galactin-3. Galactin-3 may do more than just help cancer cells interact—it may also play a role in angiogenesis, or the growth of new blood vessels needed to feed tumors. Like other body cells and tissues, cancer cells and tumors need plenty of fresh blood. To ensure that they get it, they secrete substances that force the body to construct new blood vessels for their use. It is as though cancer hijacks the body's internal “road-building” machinery and forces it to build blood vessels exactly where it needs them.



enlarge diagram

If galactin-3 is indeed involved in this process, then modified citrus pectin, which interferes with galactin-3, might be a cancer killer. By interfering with galactin-3 and preventing the building of new blood vessels, it could literally cause the cancer cells to starve to death. This hypothesis is supported by the results of a 2002 study published in the *Journal of the National Cancer Institute*, in which researchers found that MCP does reduce angiogenesis.<sup>9</sup>

“Strangling” cancerous tissues by preventing them from getting an adequate supply of blood means that modified citrus pectin could be useful in treating cancers other than prostate. Indeed, Dr. Eliaz

notes, “It is important to emphasize that the benefits of MCP and the galectin-3 mechanism of action are not specific to prostate cancer, but apply to a wide variety of cancers such as breast, colon, melanoma, ovarian, lung, nasopharyngeal, leukemias, glioblastomas, and others.”

More and larger studies are needed before definite conclusions can be drawn. But the early evidence strongly suggests that modified citrus pectin helps to keep prostate cancer and other cancer cells from joining together and from sticking to healthy tissues. This makes it a potentially powerful weapon in the fight against prostate cancer and other forms of cancer.

## REPORT

### Modified Citrus Pectin

A commercially available supplement has been shown to inhibit cancer cell metastasis, lower cholesterol, and remove toxic metals from the body.

By Romy Fox

#### MCP for Detoxification

Cancer is not the only thing that can grow silently inside the body for some time before causing symptoms or being accidentally detected. Toxic elements such as cadmium, tungsten, lead, arsenic, mercury, and aluminum also can be ticking time bombs within the body.

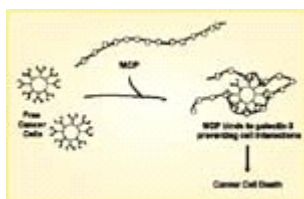
The toxic effects of lead, which has been used in numerous processes and products for thousands of years, are well known. An overload of this metal damages many body systems, causing brain damage, seizures, coma, and other problems, including, in extreme cases, death. In the US, "lead poisoning is said to be the most common environmental illness of children."<sup>10</sup>

Used in a variety of chemical and industrial processes, cadmium is another dangerous metal that finds its way into the human body via food and water. Once inside the body, it travels through the bloodstream to the liver, kidneys, and other tissues. If too much accumulates, it can trigger abdominal pain, vomiting, diarrhea, kidney damage, and even death.<sup>11</sup>

Practically everyone is exposed to metals at work, at home, through their diet (fish), and in the air. It is safe to assume that almost everyone has ingested or inhaled many metallic particles. Some metals, such as iron and cadmium, can trigger powerful and eventually obvious symptoms, while others may produce vague problems that can plague us for years and cannot be solved until the offending metals are removed from the body.

Pectin, which binds up radioactive and toxic metals, has been used in human detoxification as well as in environmental clean-up efforts. Unfortunately, its use in humans is limited by the fact that it is not absorbed well. But modified citrus pectin, smaller and structurally modified, can pass into the bloodstream and bind up these unwanted substances.

At the Fifth Annual Conference of Environmental Health Scientists, Dr. Isaac Eliaz and Dorena Rode described what happened when modified citrus pectin was given to a man as part of his treatment for prostate cancer.<sup>12</sup> His urine was collected over a six-hour period before he began taking MCP, and again after he had taken it for 10 months. Analysis of the urine allowed the researchers to estimate the amount of toxic minerals in his body, and showed that his levels of arsenic, lead, mercury, and nickel had dropped dramatically.



enlarge diagram

At the same conference, the two researchers presented the results of a study of seven people, each of whom were given 15 grams of Pecta-Sol® for five days and 20 grams on the sixth day.<sup>12</sup> Their urine was collected and analyzed before they began taking Pecta-Sol®, and again on the first and sixth days of the study. The results were striking. Within 24 hours, excretion of arsenic and tungsten increased significantly, and the amount of mercury and cadmium eliminated from their bodies also rose. By the sixth day, the amount of cadmium and tungsten eliminated from their bodies had increased significantly, as had the amount of lead excreted.

These results led Eliaz and Rode to conclude: "This preliminary work suggests that the nutritional supplement MCP may assist in the elimination of toxic elements from the body."<sup>13</sup>

#### MCP for Cholesterol Control

The idea of using pectin to control cholesterol levels is not new. Several studies published in the 1990s in the *Journal of Nutrition*, the *American Journal of Clinical Nutrition*, and other journals have examined its effects in animals and humans.<sup>14</sup> Pectin binds to cholesterol, which enables it to be excreted. But because it is not readily absorbed into the body, it does this only in the intestines. This is helpful but, by definition, limited.

Modified citrus pectin, however, can be absorbed from the intestines into the body, allowing it to bind to cholesterol in the bloodstream. This may give it more direct and powerful cholesterol-lowering properties. It may prove to be a powerful weapon in the battle against atherosclerosis, an important risk factor for heart attack and stroke.

#### MCP Is Well Tolerated



When we think of cancer-fighting agents, we almost automatically think of their terrible side effects. It is natural to imagine that all cancer fighters trigger such problems, but that is not the case with modified citrus pectin. Remember, MCP does not do battle with cancer cells—it does not try to destroy anything. It simply “gums up the works,” hindering the harmful cells as they attempt to join together or latch on to healthy tissues, and possibly preventing them from hijacking the body’s blood supply for their own needs. In a sense, MCP gently disarms cancer cells, leaving them to wither on the vine. Thus, it is well tolerated. Side effects are not common, but may include loose stools on occasion.



### Choosing a Brand and Dosage

You can purchase both citrus pectin and modified citrus pectin. But beware, for “modified” can mean different things, and it may only mean that vitamin C, soy, or something else has been added to the citrus pectin. Adding something may technically “modify” the citrus pectin, but not in such a way that it can be absorbed into the body.

Only citrus pectin that has been properly shortened and structurally altered so as to be absorbable will have the effects described earlier. And only one brand of commercially available MCP—Pecta-Sol®—meets the chemical specifications used in all of the scientific studies. It also is the only brand that has been used and validated in clinical trials.

Dr. Isaac Eliaz, who designed Pecta-Sol® and conducted several of the studies on its use, suggests the dosages in table 1 below.

As he looks back on the MCP studies and modified citrus pectin’s use in patients and potential for the future, Dr. Eliaz notes: “For the past 20 years, I have been treating people using integrative methods. MCP is one of the most versatile supplements I have encountered for supporting health in a wide variety of conditions. I expect research to continue to confirm its benefits.” For further information on modified citrus pectin, turn to the next page.

TABLE 1

MCP Application	Use (take on an empty stomach)
Active Cancer	15 grams/day (5 grams three times a day)
Biopsy	15 grams/day (5 grams three times a day) Take one week before procedure and two weeks after.
Heavy Metal Chelation	High body burden levels: 15 grams/day (5 grams three times a day) Lower body burden levels: 15 grams/day for 5 days a month, 5 grams/day the rest of the month

View additional commentary on modified citrus pectin by prostate oncologist Stephen Strum, MD.

---

## References

1. Natural Medicines Comprehensive Database. Jellin J, ed. Stockton, CA: Natural Medicines Comprehensive Database;2000:811.
2. American Cancer Society. Detailed guide: prostate cancer. What are the key statistics about prostate cancer?” Available at: [http://www.cancer.org/docroot/CRI/content/CRI\\_2\\_4\\_1X\\_What\\_are\\_the\\_key\\_statistics\\_for\\_prostate\\_cancer\\_36.asp?sitearea=](http://www.cancer.org/docroot/CRI/content/CRI_2_4_1X_What_are_the_key_statistics_for_prostate_cancer_36.asp?sitearea=). Accessed December 9, 2003.
3. Raz A, Lotan R. Endogenous galactoside- binding lectins: a new class of functional tumor cell surface molecules related to metastasis. *Cancer Metastasis Rev.* 1987;6(3):433-52.
4. Bresalier RS, Yan PS, Byrd JC, Lotan R, Raz A. Expression of the endogenous galactose- binding protein galectin-3 correlates with the malignant potential of tumors in the central nervous system. *Cancer.* 1997 Aug 15;80(4):776-87.
5. Pienta KJ, Naik H, Akhtar A, et al. Inhibition of spontaneous metastasis in a rat prostate cancer model by oral administration of modified citrus pectin. *J Natl Cancer Inst.* 1995 Mar 1;87(5):348-53.

6. Strum S, Scholz M, McDermed J, McCulloch M, Eliaz I. Modified citrus pectin slows PSA doubling time: a pilot clinical trial. Paper presented at: International Conference on Diet and Prevention of Cancer; May 1999; Tampere, Finland.

7. Guess BW, Scholz MC, Strum SB, Lam RY, Johnson HJ, Jenrich RI. Modified citrus pectin (MCP) increases the prostate-specific antigen doubling time in men with prostate cancer: a phase II pilot study. *Prostate Cancer Prostatic Dis.* 2003;6(4):301-4.

8. Eliaz I. Modified citrus pectin in the prevention and treatment of cancer: recent promising results. *Better Health Pub. Research Update*; Feb 2003.

9. Nangia-Makker P, Hogan V, Honjo Y, et al. Inhibition of human cancer cell growth and metastasis in nude mice by oral intake of modified citrus pectin. *J Nat'l Cancer Inst.* 2002 Dec 18;94(24):1854-62.

10. Marcus S. Toxicity, lead. eMedicine website. Available at: <http://www.emedicine.com/emerg/topic293.htm>. Accessed December 2, 2003.

11. Risk Assessment Information System. Toxicity profiles: toxicity summary for cadmium. Available at: <http://risk.lsd.ornl.gov/tox/profiles/cadmium.shtml>. Accessed December 2, 2003.

12. Eliaz I, Rode D. MCP lowers body burden of toxic metals. Paper presented at: Fifth Annual Conference of Environmental Health Scientists: Nutritional Toxicology and Metabolomics; August 2003; University of California, Davis.

13. Eliaz I, Rode D. The effect of modified citrus pectin on the urinary excretion of toxic elements. Paper presented at: Fifth Annual Conference of Environmental Health Scientists: Nutritional Toxicology and Metabolomics; August 25, 2003; University of California-Davis.

14. Fernandez ML, Sun DM, Tosca MA, McNamara DJ. Citrus pectin and cholesterol interact to regulate hepatic cholesterol homeostasis and lipoprotein metabolism: a dose-response study in guinea pigs. *Am J Clin Nutr.* 1994 Apr;59(4):869-78.

All Contents Copyright © 1995-2009 Life Extension Foundation All rights reserved.

**LifeExtension®**

These statements have not been evaluated by the FDA. These products are not intended to diagnose, treat, cure or prevent any disease. The information provided on this site is for informational purposes only and is not intended as a substitute for advice from your physician or other health care professional or any information contained on or in any product label or packaging. You should not use the information on this site for diagnosis or treatment of any health problem or for prescription of any medication or other treatment. You should consult with a healthcare professional before starting any diet, exercise or supplementation program, before taking any medication, or if you have or suspect you might have a health problem. You should not stop taking any medication without first consulting your physician.