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Shark Cartilage And Cancer: The Exciting Possibility Of A Cancer-Free State With A Natural Product

© Interview With Dr. I. William Lane
Interviewed By Richard A. Passwater Ph.D.

I. William Lane, Ph.D. received both his B.A. and M.A. in the field of Nutritional Science from Cornell University. He received his Ph.D. in Agricultural Biochemistry and Nutrition from Rutgers University. As a researcher, he studied and worked under two Nobel prize winners, Dr. James B. Sumner (1946) and Dr. Selman A. Waksman (1952).

Dr. Lane applied his research in poultry nutrition in association with Perdue Farms and Tyson Although his research in poultry-feed formulation brought him to my "neck of the woods, we did not meet at that time. Later he became a vice president for Grace and Company heading its Marine Resources Division. This experience in biochemistry and marine science provided Dr. Lane with a special background to pursue his research with shark cartilage.

Introduction: I am excited about your recent clinical studies showing that Shark cartilage is eliminating tumors in Stage III and IV terminal cancer patients. If additional and larger human clinical trials are confirmed by others, it truly will be the most important health news that I have ever heard.

We have chatted before about the theoretical mechanisms and the various University studies showing effectiveness in the laboratory, but at that time, you had no human clinical studies completed. When I saw that your book, "Sharks don't get cancer," was being introduced at the Nashville NNFA convention, I was hoping to get a chance to get updated. [1] But, alas, our schedules were too hectic.

I have been studying the cancer process for twenty years. Cancer is a multi-step process in which cells accumulate multiple genetic alterations as they progress to a more malignant mutation. Although there are many steps, they can be grouped into three distinct phases. My research has concentrated on preventing the first step, while your research has concentrated on preventing the third step, and more importantly, **eliminating cancer tumors** in advanced cancer patients.

The first step in the process is the damage caused by agents known as carcinogens. carcinogens can damage critical parts of genes called proto-oncogenes directly or by generating free radicals. Carcinogens may be chemicals, radiation or a viruses. Antioxidant nutrients protect against damage that can be caused by carcinogens.

The initiating the development process does not necessarily lead to cancer. This process alone will only produce a series of independent precancerous cells. In order for cancer to develop, the process must be propagated to the point where these precancerous cells will reproduce, associate and develop their own blood supply and defense system. If there is no propagation or if the immune system is activated and destroys these precancerous cells, then there will be no cancer developed.

The second step in cancer development, called "promotion," allows the precancerous cell to reproduce rapidly and change their membrane surface properties to those characteristic of malignant cells. Anything that promotes cell reproduction decreases the chance that repair enzymes will repair (deactivate) the activated oncogene.

Even with promotion, the proliferating cells will not necessarily develop into cancer. The cell mass must grow large enough to affect body metabolism and start their own blood supply and defense system. This is the third step called "progression." Progression leads to cancer, including the malignant tumors of carcinoma (consisting largely of epithelial cells) and adenocarcinoma (cancer of a gland), and eventually metastasis (the invasive spreading to other areas).

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Conventional therapies try to cure cancer by killing more cancer cells than healthy cells. You have found in your search why sharks don't get cancer, that the process that stops the third step in cancer development also can be used to eliminate existing cancers. You were the right man with the right background at the right place at the right time. Let's start near the beginning.

Passwater: Your book is entitled, "Sharks don't get cancer." I've never worked with a laboratory room full of sharks -- at least not the finned kind. Is your title an exaggeration to make a point and is it relevant whether or not sharks get cancer?

Lane: "Never" is a slight exaggeration to make an important point. Actually, as stated in the book, some cancer has been reported in sharks, but fewer than one in a million sharks show cancer -- less than one percent of the incidence of tumors reported for all other species of fish. What is relevant is that sharks rarely get cancer and that this fact has been tied specifically to their cartilage skeleton and the strong anti-tumor activity of shark cartilage.

Passwater: I have also been following the research of Dr. Robert Langer of the Massachusetts Institute of Technology and the preliminary research of Dr. John Prudden, a Harvard-trained physician, showing a factor in cartilage that inhibited tumors. [2-4] What is different about cartilage that would explain why this factor is present in cartilage?

Lane: In 1976, Dr. Robert Langer showed that shark cartilage contained an inhibitor of new blood vessels in tumors. When the body makes new blood vessels, the process is called "neovascularization" or "angiogenesis." Angiogenesis is the term most often used, and it is derived from "angio" meaning "pertaining to blood vessels" and "genesis" meaning "formation of," thus angiogenesis merely means the origin and development of blood vessels.

Earlier, Dr. Judah Folkman of Harvard had put forth the theory that one could prevent a tumor from exceeding one-to-two square millimeters (the size of a pencil point) if a blood network could be prevented from forming. [5] A blood network is needed to feed the tumor and remove waste products. This concept opened up a whole new strategy for controlling cancer and is the approach with which I have been working.

In 1983, Drs. Anna Lee and Robert Langer pinpointed the mechanism to this approach which I had been following. They reported that an extract of shark cartilage inhibited both new blood vessel growth and tumor development. [6] They also showed the inhibitor to be 1,000 times more concentrated in the shark cartilage than in the cartilage of other animals. Bovine cartilage, when processed to remove the fat as Dr. John Prudden did, is very low in blood vessel inhibiting activity. Rather, bovine cartilage relies primarily on its ability to stimulate the immune system with mucopolysaccharides (glycosaminoglycans, a class of complex carbohydrates) which is a positive, but weak, development, nowhere near the magnitude of importance or effectiveness of antiangiogenesis (preventing blood vessel development).

It was postulated that the logical place to look for such natural inhibitors of angiogenesis would be in tissue not having blood vessels (avascular). The most common avascular tissue is cartilage. The theory being that cartilage is avascular because it contains inhibitors of new vascularization, and that shark cartilage, pound for pound, is by far the most actively antiangiogenic.

Passwater: When we last spoke, you mentioned that several antiangiogenic factors have been discovered in cartilage, and that this is a distinct advantage of your whole cartilage food over a purified drug which is a single compound. What type of compounds are these antiangiogenic factors, and how sensitive are they to environmental factors such as processing?

Lane: It is believed that all of the antiangiogenic factors in shark cartilage are proteins. In late 1992, two separate proteins, both with major antiangiogenic properties have been identified, one, by Dr. Robert Langer, and a second, by Japanese researchers. [7,8] It is postulated that as many as five separate active antiangiogenic proteins are in shark cartilage. With the whole shark cartilage properly prepared, all would work synergistically. Proteins are easily denatured (inactivated) by heat, acids, alcohols, acetones, and many other chemicals. **Thus, proper processing to prevent denaturation is most important.**

The mucopolysaccharides and their ability to stimulate the immune system, as found in shark and other cartilage, are important, but I believe that most, if not all, of the activity I am showing comes from the antiangiogenic proteins.

Passwater: Can you verify and quantify your claim that shark cartilage has more antiangiogenic activity than bovine or other cartilage?

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Lane: Yes, the scientific literature documents this fact. Dr. Robert Langer of the Massachusetts Institute of Technology has studied various cartilages and reports in the highly respected peer-reviewed scientific journal **Science** that shark cartilage is 1,000 times more potent in antiangiogenic factor, all of which is in the protein fraction, than bovine or other mammalian cartilage. Based on this, I find it hard to understand how most "copy-cat" products stress their mucopolysaccharide content, and are very low on active protein and antiangiogenic activity.

These "copy-cat" products -- which based on assay and their own correspondence -- usually are not whole shark cartilage, and are often diluted with dextrans (hydrolysis products of starch) or sugars. When life or death is at stake, those offering them unproven and questionable "copy-cat" products should be run out of the industry, in my opinion. I have identified them most of them, including some well-known names. One has to wonder if they would offer a "copy-cat" and ineffective product in something this important -- how good can some of their other products be?

Passwater: How can we be sure that significant amounts of antiangiogenic factor are in shark cartilage products?

Lane: An standard assay method developed by Dr. Judah Folkman of the Harvard Medical School, Dr. Robert Langer of Massachusetts Institute of Technology, and others, called the CAM (short for chick Chorioallantoic Membrane) assay allows one to measure the angiogenesis inhibiting capability of a product. This assay involves adding the material to be tested to a fertilized chicken egg yolk sac and measuring the amount of new blood vessel development under standardized conditions.

Using the CAM assay, one can, and should control production lots. I know of only one commercial product in which this is done with all batches, and that is Cartilade(tm). I used the CAM assay early on in my research to improve production methods. I was able to materially increase inhibition activity using the CAM assay as a guide, and I continue to seek better processing methods constantly.

Passwater: Has commercial processed shark cartilage been effective against human cancers?

Lane: By all means -- all tests and clinical trials, except for the first one, have been on a commercially available product called Cartilade(tm). The first test was a more concentrated experimental product which is not yet produced commercially because of high cost.

All of these studies with only advanced cases -- usually stage III and stage IV terminal patients -- with shark cartilage as the only therapy have shown results which are most significant. In eight breast tumor cases where the tumors were all larger than golf balls in size, all eight women were tumor-free or approaching a tumor-free state in eleven weeks. In three other studies on breast cancer, the results have been the same. **With seventy-six cancer cases in the United States, a New Jersey physician has shown all seventy-six patients responding to the shark cartilage therapy. The shark cartilage therapy works on all solid tumors, but appears to be most effective with breast, liver, brain and esophageal tumors, where major changes within four-to-six weeks are noticeable. Lung and prostate cancers seem to respond more slowly, and we have seen good responses with pancreatic tumors at very high dosage levels.**

Passwater: How have these studies demonstrated that it was the shark cartilage and not some residual effect of other treatments that was effective?

Lane: Residual effect is always a possibility, however, in a clinical trial in Cuba on 27 advanced cancer victims, no patient was selected that had not been off other therapies for at least weeks, and in the three Mexican studies, all patients had been off all other therapies for extended periods. In practice, many patients not in clinical trials do take the shark cartilage along with other therapies like chemotherapy or radiation therapy. No one wants to suggest countermanding a physician's suggestions, but patients want the shark cartilage because they doubt the positive effects of much conventional therapy and have had good reports on the effect of shark cartilage.

Passwater: How do we know that the tumors are actually being destroyed?

Lane: In all clinical trials and with all patients of Dr. Martinez in New Jersey, a starting-point, mid-point and end-point scans by either MRI (magnetic resonance image) or CAT (computer-assisted tomography) are done to follow the progress of tumor tissue death (necrosis). These scans often show the development of air spaces in the tumors as the malignant tissue dies away due to lack of a blood supply as the therapy progresses. Many radiologists who are not used to seeing tumor necrosis in advanced cancer often are puzzled about the appearance of air spaces, and they often suspect abscesses. **I refer to the appearance of air spaces -- especially in large**

breast tumors as "the Swiss cheese effect."

Passwater: What clinical trials are now underway?

Lane: The clinical trial led by Dr. Martinez is ongoing, as is a twenty-seven patient study in Cuba. I expect another clinical trial to get underway in Cuba that will include breast, uterine/cervical, brain, and esophageal cancer patients, with thirty patients included in each cancer category. In Germany, four patients are being treated with shark cartilage by Dr. Helmut Keller, and in Austria, four patients each with Drs. Steinheller and Werkmann are just starting treatment.

In all of these studies, MRI scans, blood chemistries and photographs will be taken so that publications can be forthcoming. My problem has been the lack of funding for extensive clinical trials, especially in the United States.

Passwater: Have all of the completed human studies been done with, and will the new studies be done with the same material?

Lane: Yes! With the exception of the first study with Dr. Contreras, all studies have used a whole shark cartilage product called Cartilade(tm).

Passwater: Shark cartilage has been available since 1989; who produced the first shark cartilage in capsules and why?

Lane: I was responsible for the first shark cartilage capsules. In fact, early on, I encapsulated much of it in my kitchen for early arthritis research. In early studies on dogs and humans, I was working primarily with the mucopolysaccharide immune stimulation effect. My major cancer work only started in 1991, and was at high dosage use involving powder rather than capsules, although the active material is the same.

Passwater: Just how much shark cartilage is required to treat human cancers?

Lane: My first study in Mexico was based on the equivalent of 60 grams of whole shark cartilage per day based on body weight of under 140 pound patients. At this time in trials, we have gone as high as 120 grams daily with advanced cancer cases. An average of 60 to 80 grams daily is generally used, and **the success rate with solid tumors has been higher than 80 percent**. The shark cartilage is administered orally in juice or buttermilk at the rate of 15 to 20 grams each time, spread throughout the day and taken between meals. In some advanced cases, and in the Cuban study, all is administered rectally at the rate of 15 to 20 grams in four ounces of body-temperature water. These enemas are given four times daily as retention enemas.

After one becomes tumor-free (metastases and all), a preventative dose of ten to fifteen grams daily probably should be used for an extended time, but to date, I have no specific data on this.

Passwater: What other angiogenic diseases might be helped at that treatment level?

Lane: We have seen in clinical trials that not only are the original and metastasized tumors affected, but since the mechanism is systemic, other diseases such as psoriasis, fibroid tumors, diabetic retinopathy, Kaposi's sarcoma, and arthritic pain all seem to disappear -- often before the cancerous tumors are all gone.

Since there are so many hysterectomies performed each year -- and many are needless -- I will be looking into doing a fibroid tumor study.

Passwater: What do we know about the safety of Shark cartilage?

Lane: Shark cartilage -- like all active materials -- must be used properly. Since it inhibits new vascularization, those having suffered a recent coronary occlusion (heart attack), pregnant women and those wanting to conceive, and people recovering from recent surgery should all refrain from use for a logical time period.

We have experienced some stomach upsets -- primarily with those on a macrobiotic or vegetarian diet who also respond more slowly. We see some very limited allergic responses, but in general, most people can use shark cartilage with no problems at all.

The cost of the high-dosage therapy will generally be between \$2,000 to \$3,000 to reach a tumor-free state based on clinical experience covering a period under sixteen weeks. This is only a small fraction of the cost of conventional therapy, and based on the clinical studies conducted so far, the success rate is far superior.

Passwater: I remember what happened to the Pacific yews in Oregon when it was found that taxol (tamoxifen), the experimental drug being studied to treat breast cancer, could be extracted from their bark. Will Sharks be endangered by our need to cure human cancer?

Lane: About 10 million sharks are caught each year based on statistics of shark fin usage for the shark-fin soup market. If the heads and backbones, representing most of the cartilage were kept and used, there would be enough shark cartilage to treat 625,000 cancer patients a year without catching a single additional shark than are caught now. It would just be greater utilization of material now thrown away unused. Hopefully, synthesis of the active components will follow shortly as well.

Passwater: My research was presented to the National Cancer Institute in 1978, but it has only been recently that they became interested in it. Didn't you present your research to them also?

Lane: Yes! I did present my research to the National Cancer Institute in 1991. I gave a seminar for Dr. Robert Gallo and thirty of his top research scientists, and they gave me a standing ovation and an immediate offer to collaborate. However, within three months, the offer to work with me was withdrawn and no acceptable excuse was given. I assume it was because there was a resistance to work with a natural product. They have followed my research, however, and it has even been written up in the July 1992 **Journal of the National Cancer Institute**. However, no offer to renew collaboration was ever made to my knowledge, even though I am told that patients phoning the National Cancer Institute and asking about shark cartilage are given encouraging comments in general.

Passwater: Did your research lead to any patents?

Lane: On Christmas Eve (December 24, 1991), I was granted United States Patent # 5,075,112 covering the use of shark cartilage to inhibit angiogenesis. This patent was fully supported by CAM assay and showing the inhibition of angiogenesis by shark cartilage. A second patent covering the processing techniques used in manufacture has been applied for.

Passwater: Dr. Lane, I don't know what to say. This is the most exciting development that I have ever experienced. I will be looking for the results from your next round of studies.

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