



# Cartilage (Bovine and Shark) (PDQ®)—Patient Version

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## Overview

**NOTE: The information in this summary is no longer being updated and is provided for reference purposes only.**

- Cartilage is a type of tough, flexible connective tissue (see [Question 1](#)).
- Cartilage from cows (bovine cartilage) and sharks has been studied as a treatment for people with cancer and other medical conditions for more than 30 years (see [Question 2](#)).
- Laboratory and animal studies have looked at whether bovine and shark cartilage products can kill cancer cells, make the immune system more active against cancer, and prevent the body from making the new blood vessels that a tumor needs to grow (see [Question 5](#)).
- The results have been mixed in the human studies of cartilage as a treatment for cancer reported to date (see [Question 6](#)).
- The US Food and Drug Administration (FDA) has not approved cartilage as a treatment for cancer (see [Question 8](#)).

## Questions and Answers About Cartilage (Bovine and Shark)

### 1. What is cartilage?

Cartilage is a type of tough, flexible connective tissue that forms parts of the skeleton in many animals. Cartilage contains cells called chondrocytes, which are surrounded by collagen (a fibrous protein) and proteoglycans, which are made of protein and carbohydrate.

Products containing cartilage are sold in the United States as dietary supplements. Companies that make cartilage products may not have a process in place to check that all batches they make are exactly the same. This means different batches of a cartilage product may contain different amounts or strengths of ingredients. Different binding agents (substances that make loose mixtures stick together) and fillers may be used in different batches. Therefore, the results of a particular clinical trial may be true only for the batch that was used in the study.

### 2. What is the history of the discovery and use of cartilage as a complementary or alternative treatment for cancer?

Cartilage from cows (bovine cartilage) and sharks has been studied as a treatment for cancer and

other medical conditions for more than 30 years. It was once believed that sharks, whose skeletons are made mostly from cartilage, do not develop cancer. This caused interest in cartilage as a possible treatment for cancer. Although malignant tumors are rare in sharks, cancers have been found in these animals.

Early studies used extracts of bovine cartilage.

- In the 1960s, it was first reported that bovine cartilage decreased inflammation (redness, swelling, pain, and feeling of heat).
- In the 1970s, it was first reported that bovine cartilage contains a substance that blocks angiogenesis (the forming of new blood vessels). If blood vessel growth into a tumor can be blocked, the tumor will stop growing or shrink.
- In the 1980s, researchers first described laboratory and animal studies and clinical trials (research studies in people) testing bovine cartilage as a treatment for cancer.

Interest in using shark cartilage grew because it was believed that shark cartilage may be more active than bovine cartilage in preventing new blood vessels from being formed. Since a shark's skeleton is made mostly of cartilage, shark cartilage is more plentiful than bovine cartilage.

- In the 1980s, it was first published that shark cartilage contains a substance that blocks blood vessel growth.
- In 1998 and 2005, there were published reports of clinical trials of shark cartilage as a treatment for cancer.

(See [Question 5](#) for more information about the laboratory and animal studies. See [Question 6](#) for more information about the clinical trials.)

### 3. **What is the theory behind the claim that cartilage is useful in treating cancer?**

Three theories have been suggested to explain how cartilage acts against cancer:

- As cartilage is broken down by the body, it releases products that kill cancer cells.
- Cartilage increases the action of the body's immune system to kill cancer cells.
- Cartilage makes substances that block tumor angiogenesis (the growth of new blood vessels that feed a tumor and help it grow).

Based on laboratory and animal studies, the third theory may be most likely. Cartilage does not contain blood vessels, so cancer cannot easily grow in it. It is suggested that a cancer treatment using cartilage may keep blood vessels from forming in a tumor, causing the tumor to stop growing or shrink.

### 4. **How is cartilage administered?**

In animal studies, cartilage products have been given by mouth; injected into a vein or the abdomen; applied to the skin; or placed in slow-release plastic pellets that were surgically implanted (put into the body).

In studies with people, cartilage products have been given by mouth; applied to the skin; injected under the skin; or given by enema (injected as a liquid into the rectum). The dose and length of time the cartilage treatment was given was different for each study, in part because different types of products were used.

## 5. **Have any preclinical (laboratory or animal) studies been conducted using cartilage?**

A number of preclinical studies have been done with cartilage. Preclinical studies in a laboratory or using animals are done to find out if a drug, procedure, or treatment is likely to be safe and useful in humans. These preclinical studies are done before testing in humans is begun. Some research studies are published in scientific journals. Most scientific journals have experts who review research reports before they are published, to make sure that the evidence and conclusions are sound.

Preclinical studies of cartilage looked at whether bovine and shark cartilage products can kill cancer cells in the laboratory, make the immune system more active against cancer, and prevent blood vessels from forming.

### **Powdered cartilage**

The following have been reported from preclinical studies of the effect of powdered cartilage on cancer cells in vitro (outside of the body):

- In a published laboratory study, a powdered form of bovine cartilage called Catrx slowed the growth of human cancer cells by half or more. It is not clear if Catrx had this effect only on cancer cells, because its effect the growth of normal cells was not tested. It is also not known if the dose used in the laboratory study could safely be used in people.
- In a published laboratory study of powdered shark cartilage, there was no effect on the growth of human astrocytoma cells (cancer cells that begin in the brain or spinal cord).

The following have been reported from preclinical studies of the effect of powdered cartilage on the immune system:

- One published study reported that Catrx injected into mice caused their immune systems to be more active. This effect did not happen when Catrx was given by mouth.
- A laboratory study on the effect of shark cartilage on a tumor model reported an increase in tumor-fighting immune cells in the tumor but not in the blood.
- A study on the effect of shark cartilage on immune system response in mice reported a number of different effects, both helpful and harmful. It increased antibody response but decreased the activity of natural killer cells (tumor-fighting white blood cells). The study also reported a decrease in blood vessel growth.

A large number of laboratory and animal studies on the effect of powdered cartilage on angiogenesis have been published. The following have been reported from these studies:

- Powdered shark cartilage given by mouth to rats decreased the growth of abdominal tissue cells.
- Powdered shark cartilage given by mouth to rats decreased the growth of gliosarcomas, a type of brain cancer.
- Two powdered shark cartilage products (Sharkilage and MIA Shark Powder) given by mouth to mice did not stop the growth or spread of squamous cell skin cancer.
- Three substances that prevent blood vessel growth were found in bovine cartilage. These substances have not shown an effect on the growth of normal cells or tumor cells.
- Two substances that prevent blood vessel growth were found in shark cartilage. These substances have not shown an effect on the growth of normal cells or tumor cells.

### **Liquid cartilage**

The following have been reported from preclinical studies of liquid cartilage products:

- In a laboratory study, a liquid form of shark cartilage called AE-941 /Neovastat was reported to stop the growth of a number of cancer cell types. The results have not been published in a scientific journal.
- Several studies have shown that AE-941/Neovastat blocks the growth of new blood vessels.
- AE-941/Neovastat given by mouth to mice slowed the growth of breast cancer cells and the spread of lung cancer. In the lung cancer study, AE-941/Neovastat increased the effect of the anticancer drug cisplatin.
- A substance made from human cartilage slowed the spread of pancreatic cancer cells in an animal study and prevented blood vessel growth in both animal and laboratory studies.

## **6. Have any clinical trials (research studies with people) been conducted using cartilage?**

Clinical trials are a type of research study that tests how well new drugs or other treatments work in people. Since the 1970s, there have been at least a dozen clinical studies of cartilage as a treatment for cancer.

There has been one randomized clinical trial of cartilage as cancer treatment published in a peer-reviewed scientific journal. This trial compared treatment using a form of shark cartilage to treatment using a placebo (an inactive substance that looks the same as, and is given the same way as, the substance being tested). Patients also received standard care. In 83 patients having either advanced breast or advanced colon cancer, there was no difference in the quality of life or survival rate between the group that received the shark cartilage product and the group that received the placebo.

## Powdered cartilage

The following have been reported from clinical trials of powdered cartilage products:

- Case series (a collection of detailed information about individual patients) of 31 patients who were treated with Catrix by injection and/or by mouth:

The cancer went into remission (signs and symptoms of cancer went away) in 19 patients and then recurred (came back) in about half of them. Some of these patients also received standard cancer treatment and there was no control group (a group of patients who do not receive the treatment being studied, to show if the treatment being studied makes a difference). For these reasons, the effectiveness of cartilage as a cancer treatment is not proven by this case series.

- A clinical trial of Cartilade by mouth in 60 patients with advanced cancer:

All but 1 patient had been treated with standard therapy before the trial. The cancer stopped growing in 10 of the patients for 12 weeks or more and then began to grow again. The cancer did not shrink or go into remission in any of the patients.

## Liquid cartilage

The following have been reported from clinical trials of liquid cartilage products:

- A clinical trial of Catrix in 9 patients whose cancers did not respond to radiation therapy and/or chemotherapy:

Catrix was given by injection. One patient's cancer went into remission for more than 39 weeks and the other 8 patients did not respond to treatment with Catrix.

- Clinical studies on the safety of the liquid shark cartilage product AE-941/Neovastat have reported that it has little harmful effect.
- A randomized clinical trial studied the effect of AE-941/Neovastat on blood vessel growth related to wound healing after surgery. This study reported that one of the ingredients that prevents blood vessel growth can be absorbed and used by the body when taken by mouth.
- A clinical trial of oral AE-941/Neovastat in 379 patients with advanced non-small cell lung cancer reported that there was no difference in how long patients lived between the group receiving the shark cartilage product and chemoradiotherapy compared to the group receiving the placebo and chemoradiotherapy. Both kinds of treatment were well tolerated.

For more detailed information about these clinical trials and others that are ongoing or have not fully reported, see the [health professional version](#).

## 7. Have any side effects or risks been reported from cartilage?

The side effects of cartilage treatment are usually mild or moderate.

**The most common side effects of treatment with the bovine cartilage product Catrix include the following:**

- Inflammation at the injection location.
- A bad taste in the mouth.
- Feeling very tired.
- Nausea.
- Upset stomach.
- Fever.
- Feeling dizzy.
- Swelling of the scrotum (the sac that contains the testicles).

**The most common side effects of treatment with the shark cartilage include the following:**

- Nausea.
- Vomiting.
- Abdominal cramps and/or bloating.
- Constipation.
- Lower than normal blood pressure.
- Higher than normal blood sugar.
- General weakness.
- A higher than normal level of calcium in the blood.

Nausea, vomiting, and upset stomach are the side effects reported most often from treatment with the shark cartilage product AE-941/Neovastat.

There has been one report of hepatitis occurring in a person who used shark cartilage.

**8. Is cartilage approved by the US Food and Drug Administration (FDA) for use as a cancer treatment in the United States?**

The US Food and Drug Administration (FDA) has not approved cartilage as a treatment for cancer. A number of cartilage products are sold in the United States as dietary supplements. Dietary supplements are products meant to be added to the diet. They are not drugs and are not meant to treat, prevent, or cure diseases. The manufacturer is responsible for ensuring that the product is safe and that the label claims are truthful and not misleading. The FDA does not approve dietary supplements as safe or effective before they are sold.

## About This PDQ Summary

### About PDQ

Physician Data Query (PDQ) is the National Cancer Institute's (NCI's) comprehensive cancer information database. The PDQ database contains summaries of the latest published information on cancer prevention, detection, genetics, treatment, supportive care, and complementary and alternative medicine. Most summaries come in two versions. The health professional versions have detailed information written in technical language. The patient versions are written in easy-to-understand, nontechnical language. Both versions have cancer information that is accurate and up to date and most versions are also available in [Spanish](#).

PDQ is a service of the NCI. The NCI is part of the National Institutes of Health (NIH). NIH is the federal government's center of biomedical research. The PDQ summaries are based on an independent review of the medical literature. They are not policy statements of the NCI or the NIH.

### Purpose of This Summary

This PDQ cancer information summary has current information about the use of cartilage (bovine and shark) in the treatment of people with cancer. It is meant to inform and help patients, families, and caregivers. It does not give formal guidelines or recommendations for making decisions about health care.

### Reviewers and Updates

Editorial Boards write the PDQ cancer information summaries and keep them up to date. These Boards are made up of experts in cancer treatment and other specialties related to cancer. The summaries are reviewed regularly and changes are made when there is new information. The date on each summary ("Date Last Modified") is the date of the most recent change.

The information in this patient summary was taken from the health professional version, which is reviewed regularly and updated as needed, by the [PDQ Integrative, Alternative, and Complementary Therapies Editorial Board](#).

### Clinical Trial Information

A clinical trial is a study to answer a scientific question, such as whether one treatment is better than another. Trials are based on past studies and what has been learned in the laboratory. Each trial answers certain scientific questions in order to find new and better ways to help cancer patients. During treatment clinical trials, information is collected about the effects of a new treatment and how well it works. If a clinical trial shows that a new treatment is better than one currently being used, the new treatment may become "standard." Patients may want to think about taking part in a clinical trial. Some clinical trials are open only to patients who have not started treatment.

Clinical trials are listed in PDQ and can be found online at [NCI's website](#). Many cancer doctors who take part in clinical trials are also listed in PDQ. For more information, call the Cancer Information Service 1-800-4-CANCER (1-800-422-6237).

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## Disclaimer

The information in these summaries should not be used to make decisions about insurance reimbursement. More information on insurance coverage is available on Cancer.gov on the [Managing Cancer Care](#) page.

## Contact Us

More information about contacting us or receiving help with the Cancer.gov website can be found on our [Contact Us for Help](#) page. Questions can also be submitted to Cancer.gov through the website’s [E-mail Us](#).

## General CAM Information

Complementary and alternative medicine (CAM)—also called integrative medicine—includes a broad range of healing philosophies, approaches, and therapies. A therapy is generally called complementary when it is used in addition to conventional treatments; it is often called alternative when it is used instead of conventional treatment. (Conventional treatments are those that are widely accepted and practiced by the mainstream medical community.) Depending on how they are used, some therapies can be considered either complementary or alternative. Complementary and alternative therapies are used in an effort to prevent illness, reduce stress, prevent or reduce side effects and symptoms, or control or cure disease.

Unlike conventional treatments for cancer, complementary and alternative therapies are often not covered by insurance companies. Patients should check with their insurance provider to find out about coverage for complementary and alternative therapies.

Cancer patients considering complementary and alternative therapies should discuss this decision with their doctor, nurse, or pharmacist as they would any type of treatment. Some complementary and alternative therapies may affect their standard treatment or may be harmful when used with conventional treatment.

## Evaluation of CAM Therapies

It is important that the same scientific methods used to test conventional therapies are used to test CAM therapies. The National Cancer Institute and the National Center for Complementary and Integrative Health (NCCIH) are sponsoring a number of clinical trials (research studies) at medical centers to test CAM therapies for use in cancer.

Conventional approaches to cancer treatment have generally been studied for safety and effectiveness through a scientific process that includes clinical trials with large numbers of patients. Less is known about the safety and effectiveness of complementary and alternative methods. Few CAM therapies have been tested using demanding scientific methods. A small number of CAM therapies that were thought to be purely alternative approaches are now being used in cancer treatment—not as cures, but as complementary therapies that may help patients feel better and recover faster. One example is acupuncture. According to a panel of experts at a National Institutes of Health (NIH) meeting in November 1997, acupuncture has been found to help control nausea and vomiting caused by chemotherapy and pain related to surgery. However, some approaches, such as the use of laetrile, have been studied and found not to work and to possibly cause harm.

[The NCI Best Case Series Program](#) which was started in 1991, is one way CAM approaches that are being used in practice are being studied. The program is overseen by the NCI's Office of Cancer Complementary and Alternative Medicine (OCCAM). Health care professionals who offer alternative cancer therapies submit their patients' medical records and related materials to OCCAM. OCCAM carefully reviews these materials to see if any seem worth further research.

## Questions to Ask Your Health Care Provider About CAM

When considering complementary and alternative therapies, patients should ask their health care provider the following questions:

- What side effects can be expected?
- What are the risks related to this therapy?
- What benefits can be expected from this therapy?
- Do the known benefits outweigh the risks?
- Will the therapy affect conventional treatment?
- Is this therapy part of a clinical trial?
- If so, who is the sponsor of the trial?
- Will the therapy be covered by health insurance?

## To Learn More About CAM

### ***National Center for Complementary and Integrative Health (NCCIH)***

The National Center for Complementary and Integrative Health (NCCIH) at the National Institutes of Health (NIH) facilitates research and evaluation of complementary and alternative practices, and provides information about a variety of approaches to health professionals and the public.

NCCIH Clearinghouse

Post Office Box 7923 Gaithersburg, MD 20898-7923

Telephone: 1-888-644-6226 (toll free)

TTY (for deaf and hard of hearing callers): 1-866-464-3615

E-mail: [info@nccih.nih.gov](mailto:info@nccih.nih.gov)

Website: <https://nccih.nih.gov>

### ***CAM on PubMed***

NCCIH and the NIH National Library of Medicine (NLM) jointly developed [CAM on PubMed](#), a free and easy-to-use search tool for finding CAM-related journal citations. As a subset of the NLM's PubMed bibliographic database, CAM on PubMed features more than 230,000 references and abstracts for CAM-related articles from scientific journals. This database also provides links to the websites of over 1,800 journals, allowing users to view full-text articles. (A subscription or other fee may be required to access full-text articles.)

### ***Office of Cancer Complementary and Alternative Medicine***

The NCI Office of Cancer Complementary and Alternative Medicine (OCCAM) coordinates the activities of the NCI in the area of complementary and alternative medicine (CAM). OCCAM supports CAM cancer research and provides information about cancer-related CAM to health providers and the general public via the [NCI website](#).

### ***National Cancer Institute (NCI) Cancer Information Service***

U.S. residents may call the NCI Cancer Information Service toll free at 1-800-4-CANCER (1-800-422-6237) Monday through Friday from 8:00 am to 8:00 pm. A trained Cancer Information Specialist is available to answer your questions.

### ***Food and Drug Administration***

The Food and Drug Administration (FDA) regulates drugs and medical devices to ensure that they are safe and effective.

Food and Drug Administration

10903 New Hampshire Avenue  
Silver Spring, MD 20993  
Telephone: 1-888-463-6332 (toll free)  
Website: <http://www.fda.gov>

### **Federal Trade Commission**

The Federal Trade Commission (FTC) enforces consumer protection laws. Publications available from the FTC include:

- *Who Cares: Sources of Information About Health Care Products and Services*
- *Fraudulent Health Claims: Don't Be Fooled*

Consumer Response Center  
Federal Trade Commission  
600 Pennsylvania Avenue, NW  
Washington, DC 20580  
Telephone: 1-877-FTC-HELP (1-877-382-4357) (toll free)  
TTY (for deaf and hard of hearing callers): 202-326-2502  
Website: <http://www.ftc.gov>

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