



Mistletoe Extracts (PDQ®)

Overview

- Mistletoe is a semiparasitic plant that grows on several types of common trees such as apple, oak, pine, and elm. Mistletoe extract has been used since ancient times to treat many ailments (see [Question 1](#)).
- Mistletoe is one of the most widely studied complementary and alternative medicine therapies in people with cancer. In certain European countries, preparations made from European mistletoe are among the most prescribed drugs for patients with cancer (see [Question 1](#)).
- Mistletoe extract has been shown to kill cancer cells in the laboratory and to affect the immune system. However, there is limited evidence that mistletoe's effects on the immune system help the body fight cancer (see [Question 2](#) and [Question 3](#)).
- Mistletoe extracts are usually given by injection under the skin or, less often, into a vein, into the pleural cavity, or into the tumor. (see [Question 4](#)).
- Animal studies have suggested that mistletoe may be useful in decreasing the side effects of standard anticancer therapy, such as chemotherapy and radiation (see [Question 5](#)).
- A large number of human studies using mistletoe to treat cancer have been done since the early 1960s, but major weaknesses in many of these have raised doubts about their findings (see [Question 6](#)).
- Very few harmful side effects have been reported from the use of mistletoe extract (see [Question 7](#)).
- The U.S. Food and Drug Administration (FDA) has not approved mistletoe as a treatment for cancer or any other medical condition (see [Question 8](#)).
- The FDA does not allow injectable mistletoe to be imported, sold, or used except for clinical research (see [Question 8](#)).

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Questions and Answers About Mistletoe

1. What is mistletoe?

Mistletoe is a semiparasitic plant that grows on several types of trees, including apple, oak, maple, elm, pine, and birch. It has been used for centuries to treat medical conditions such as epilepsy, hypertension, headaches, menopausal symptoms, infertility, arthritis, and rheumatism.

Mistletoe is one of the most widely studied complementary and alternative medicine therapies for cancer. In certain European countries, extracts made from European mistletoe are among the most prescribed therapies for cancer patients. These products are made and sold under brand names including:

- Iscador (also called Iscar).
- Helixor.
- Iscucin.
- Lektinol (also called Plenosol).
- abnobaVISCUM.

Brand names including Eurixor, Isorel, and Vysorel are no longer sold.

This summary discusses research done mainly with the European mistletoe species.

The chemical makeup of mistletoe products varies, depending on many factors, including:

- The type of host tree on which the mistletoe plant grows.
- The time of year the plant is harvested.
- The exact species of mistletoe.
- Whether the extract is fermented or unfermented.
- Whether the extract is prepared with homeopathic methods.
- The company that makes the product.

Mistletoe extracts are prepared as water-based solutions or solutions of water and alcohol. Mistletoe products may be named according to the type of host tree on

which the plant grows. For example, IscadorM is from apple trees, IscadorP comes from pine trees, IscadorQu is from oak trees, and IscadorU comes from elm trees. Some users believe that the type of mistletoe extract chosen should depend on the type of tumor and the sex of the patient.

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

Mistletoe was used by the Druids and the ancient Greeks, and appears in legend and folklore as a panacea or "cure -all". Modern interest in mistletoe as a possible treatment for cancer began in the 1920s.

Extracts of mistletoe have been shown to kill cancer cells in the laboratory and to boost the immune system (the complex group of organs and cells that defends the body against infection or disease). For this reason, mistletoe has been classified as a type of biological response modifier (a substance that stimulates the body's response to infection and disease). Extracts of mistletoe have also been shown in the laboratory to prevent the growth of new blood vessels needed for tumors to grow.

Ingredients in mistletoe that have been studied for their usefulness in treating cancer include:

- Alkaloids.
- Viscotoxins.
- Polysaccharides.
- Lectins.

3. What is the theory behind the claim that mistletoe is useful in treating cancer?

Mistletoe extract is studied as a possible anticancer agent because it has been shown to:

- Have effects on the immune system.
- Kill mouse, rat, and human cancer cells in the laboratory.
- Protect the DNA in white blood cells in the laboratory, including cells that have been exposed to DNA-damaging chemotherapy drugs.

See the PDQ health professional summary on [Mistletoe Extracts](#) for more information on theory.

4. How is mistletoe administered?

Mistletoe extracts are usually given by injection under the skin (subcutaneous). Less common ways to give mistletoe include by mouth, into a vein (intravenous or IV), into the pleural cavity, or into the tumor. In most reported studies, injections under the

skin were given 2 to 3 times a week for various lengths of time.

5. What preclinical (laboratory or animal) studies have been conducted using mistletoe?

Many laboratory and animal studies have been done with mistletoe, either alone or combined with other agents. Laboratory studies have suggested that mistletoe may support the immune system by increasing the number and activity of various types of white blood cells. One type of European mistletoe (IscadorQu) used in a 2004 laboratory study showed a strong anticancer effect on certain types of cancer cells but no anticancer effect on other types of cancer cells. While one laboratory study reported that mistletoe extract caused several types of human cancer cells to grow faster, this was not found in other recent lab studies.

Studies testing mistletoe's ability to stop cancer cell growth in animals have yielded mixed and inconsistent results, depending on the extract used, the dose tested, the way it was given, and the type of cancer studied. Results of a few animal studies have suggested that mistletoe may be useful in decreasing the side effects of standard anticancer therapy, such as chemotherapy and radiation therapy, and that it counteracts the effects of drugs used to suppress the immune system, such as cortisone.

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

Most clinical trials using mistletoe to treat cancer have been done in Europe. Most study results have been published in German. Although many of these trials have reported mistletoe to be effective, there are major weaknesses in almost all that raise doubts about their findings. Weaknesses have included small numbers of patients, incomplete patient data, lack of information about mistletoe dose, and problems with study design.

Many studies involve using mistletoe as adjuvant therapy in patients with cancer. One retrospective cohort study done in Europe between 1993 and 2000 looked at the use of a mistletoe extract (Iscador) as long-term adjuvant therapy in 800 patients treated with chemotherapy and/or radiation therapy for colorectal cancer that had not spread. The study found that patients treated with Iscador had fewer adverse events, better symptom relief, and improved disease-free survival compared to patients who did not receive Iscador as adjuvant therapy.

A European study published in 2013 looked at the use of IscadorQu in advanced or metastatic pancreatic cancer. Patients received best supportive care and were randomly assigned to receive either Iscador Qu or no anticancer therapy. Results in 220 patients showed that those treated with Iscador had improved survival and less severe disease-related symptoms (including pain, weight loss, fatigue, nausea,

diarrhea, and anxiety) compared with those who did not receive IscadorQu.

A European study done between 1978 and 1987 looked at the use of IscadorU and IscadorQu in non-small cell lung cancer that could not be treated with surgery. Patients were randomly assigned to receive one of 3 treatments: (1) Iscador injections; (2) Polyerga Neu injections (a sheep spleen preparation said to stimulate the immune system and have antitumor effects); or (3) placebo injections of a vitamin B mixture. Results in 312 patients showed no differences among the 3 groups in survival or tumor response. It was noted that more patients in the Iscador group reported an improved sense of well-being compared with patients in the other groups.

Before researchers can conduct clinical drug research in the United States, they must file an Investigational New Drug (IND) application with the Food and Drug Administration (FDA). The FDA does not make information public about IND applications or approvals; this information can be made public only by the applicants. In the last decade, at least two U.S. investigators were given approval to conduct clinical trials of mistletoe as a treatment for people with cancer. These clinical trials are now closed.

In 2002, the National Center for Complementary and Integrative Health (NCCIH), in cooperation with the National Cancer Institute (NCI), began enrolling patients for a phase I clinical trial of a mistletoe extract (Helixor A) and gemcitabine in patients with advanced solid tumors. This combination showed low toxicity and no botanical -drug interactions were reported.

Reviews of many clinical trials combined

Findings from over 50 clinical trials using mistletoe extracts in patients with cancer have been published. Recent reviews of many studies taken together have looked at the effects of mistletoe on quality of life, survival, and symptom relief in different types of cancer:

- Quality of life was measured in a review that included 26 randomized clinical trials. Of these, 22 trials showed patients had improved quality of life. All 10 nonrandomized, controlled clinical trials reviewed also reported the same benefits. Chemotherapy-related fatigue, nausea and vomiting, depression, emotional well-being, and concentration improved. Some of the studies were well designed, while others had weaknesses.
- Tumor response, quality of life, and psychological distress were measured in a review of 21 randomized clinical trials in patients with different types of cancer. A variety of mistletoe extracts were used either alone, with chemotherapy, or with radiation therapy. Most of the studies reported benefits for patients, although this review had weaknesses in design and size.

- Quality of life and survival were measured in a review of 10 randomized clinical trials which used a variety of mistletoe extracts in patients with different types of cancer. There was no difference in survival or quality of life measures in patients who received mistletoe compared to those who did not.

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

Very few serious side effects have been reported from the use of mistletoe extract products. Common side effects include soreness and inflammation at injection sites, headache, fever, and chills.

One review surveyed many animal and human studies that used European mistletoe and mistletoe lectins. Different doses and ways to give mistletoe were used. Treatment was not found to lessen immune system responses. High doses of mistletoe lectins damaged the liver in some cases; this damage was correctable. Another review of clinical trials reported adverse effects that included increased circulatory problems, thrombophlebitis, swelling of lymph nodes, and allergic reactions.

A few cases of severe allergic reactions, including anaphylactic shock, have been reported.

8. Is mistletoe approved by the U. S. Food and Drug Administration (FDA) for use as a cancer treatment in the United States?

The United States Food and Drug Administration (FDA) has not approved the use of mistletoe as a treatment for cancer or any other medical condition. The FDA does not allow injectable mistletoe extracts to be imported or used except for clinical research.

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