

Cancer: Questions and Answers

Key Points

- The survival rate for many types of cancer has improved in recent years; however, cancer is still the second leading cause of death in the United States (see paragraph 1).
- Cancer occurs when cells continue to grow and divide and do not die when they should. Cancer cells can damage or destroy nearby tissues and can metastasize (spread) to distant parts of the body through the bloodstream or lymphatic system (see Question 1).
- Cancer is the result of changes in the genes that control normal cell growth and death. These changes may be inherited, or may result from environmental or lifestyle factors (see Question 2).
- People can reduce their risk of cancer by adopting a healthy lifestyle. Also, screening exams can detect some precancerous conditions and early-stage cancer (see Question 3).
- Cancer can cause a variety of symptoms (see Question 4).
- Cancer can be treated with surgery, radiation therapy, chemotherapy, hormones, and/or biological therapy (see Question 5).
- Clinical trials (research studies with people) are an option for people interested in prevention, screening, diagnosis, and treatment of cancer (see Question 6).

About 1.4 million new cases of cancer will be diagnosed in the United States in 2005, and more than 550,000 people will die of the disease (1). Cancer is the second leading cause of death in this country. However, improvements in cancer detection, diagnosis, and treatment have increased the survival rate for many types of cancer. About 64 percent of all people diagnosed with cancer will be alive 5 years after diagnosis (1).

1. What is cancer?

Cancer is a group of many related diseases that begin in cells, the body's basic building blocks. To understand cancer, it is helpful to know what happens when normal cells become cancerous.

The body is made up of many types of cells. Normally, cells grow and divide to produce more cells as they are needed to keep the body healthy. Sometimes, this orderly process goes wrong. New cells form when the body does not need them, and old cells do not die when they should. The extra cells form a mass of tissue called a growth or tumor. Not all tumors are cancerous; tumors can be benign or malignant.

Benign tumors are not cancer. They can often be removed and, in most cases, they do not come back. Cells in benign tumors do not spread to other parts of the body. Most important, benign tumors are rarely a threat to life.

Malignant tumors are cancer. Cells in malignant tumors are abnormal and divide without control or order. Cancer cells invade and destroy the tissue around them. Cancer cells can also break away from a malignant tumor and enter the bloodstream or lymphatic system.

Blood vessels include a network of arteries, capillaries, and veins through which the blood circulates in the body. The lymphatic system carries lymph and white blood cells through lymphatic vessels (thin tubes) to all the tissues of the body. By moving through the bloodstream or lymphatic system, cancer



can spread from the primary (original) cancer site to form new tumors in other organs. The spread of cancer is called metastasis.

2. What causes cancer?

Scientists have learned that cancer is caused by changes in genes that normally control the growth and death of cells. Certain lifestyle and environmental factors can change some normal genes into genes that allow the growth of cancer. Many gene changes that lead to cancer are the result of tobacco use, diet, exposure to ultraviolet (UV) radiation from the sun, or exposure to carcinogens (cancer-causing substances) in the workplace or in the environment. Some gene alterations are inherited (from one or both parents). However, having an inherited gene alteration does not always mean that the person will develop cancer; it only means that the chance of getting cancer is increased. Scientists continue to examine the factors that may increase or decrease a person's chance of developing cancer.

Although being infected with certain viruses, such as the human papillomavirus (HPV), hepatitis B and C (HepB and HepC), and human immunodeficiency virus (HIV), increases the risk of some types of cancer, cancer itself is not contagious. A person cannot catch cancer from someone who has this disease. Scientists also know that an injury or bruise does not cause cancer.

3. Can cancer be prevented?

Although there is no guaranteed way to prevent cancer, people can reduce their risk (chance) of developing cancer by:

- not using tobacco products
- choosing foods with less fat and eating more vegetables, fruits, and whole grains
- exercising regularly and maintaining a lean weight
- avoiding the harmful rays of the sun, using sunscreen, and wearing clothing that protects the skin
- talking with a doctor about the possible benefits of drugs proven to reduce the risk of certain cancers

Although many risk factors can be avoided, some, such as inherited conditions, are unavoidable. Still, it is helpful to be aware of them. It is also important to keep in mind that not everyone with a particular risk factor for cancer actually gets the disease; in fact, most do not. People who have an increased likelihood of developing cancer can help protect themselves by avoiding risk factors (see Question 2) whenever possible and by getting regular checkups so that, if cancer develops, it is likely to be found and treated early. Treatment is often more effective when cancer is detected early. Screening exams, such as sigmoidoscopy or the fecal occult blood test, mammography, and the Pap test, can detect precancerous conditions (which can be treated before they turn into cancer) and early-stage cancer.

The NCI is conducting many cancer prevention studies to explore ways to reduce the risk of developing cancer. These studies are evaluating dietary supplements, chemopreventive agents, nutrition, personal behaviors, and other factors that may prevent cancer. More information about cancer prevention trials is available in the following NCI resources:

- *Breast Cancer Prevention Studies*
(<http://www.cancer.gov/cancertopics/factsheet/Prevention/breast-cancer>)
- *Selenium and Vitamin E Cancer Prevention Trial (SELECT): Questions and Answers*
(<http://www.cancer.gov/cancertopics/factsheet/Prevention/SELECT>)
- *The Study of Tamoxifen and Raloxifene (STAR): Questions and Answers*
(<http://www.cancer.gov/cancertopics/factsheet/STARresultsQandA>)

See Question 6 for additional information about clinical trials related to the prevention, screening, diagnosis, and treatment of cancer.

4. What are some of the common signs and symptoms of cancer?

Cancer can cause a variety of symptoms. Possible signs of cancer include the following:

- new thickening or lump in the breast or any other part of the body
- new mole or an obvious change in the appearance of an existing wart or mole
- a sore that does not heal

- nagging cough or hoarseness
- changes in bowel or bladder habits
- persistent indigestion or difficulty swallowing
- unexplained changes in weight
- unusual bleeding or discharge

When these or other symptoms occur, they are **not** always caused by cancer. They can be caused by infections, benign tumors, or other problems. It is important to see a doctor about any of these symptoms or about other physical changes. Only a doctor can make a diagnosis. A person with these or other symptoms should **not** wait to feel pain because early cancer usually does not cause pain.

If symptoms occur, the doctor may perform a physical examination, order blood work and other tests, and/or recommend a biopsy. In most cases, a biopsy is the only way to know for certain whether cancer is present. During a biopsy, the doctor removes a sample of tissue from the abnormal area. A pathologist studies the tissue under a microscope to identify cancer cells.

5. How is cancer treated?

Cancer treatment can include surgery, radiation therapy, chemotherapy, hormone therapy, and biological therapy. The doctor may use one method or a combination of methods, depending on the type and location of the cancer, whether the disease has spread, the patient's age and general health, and other factors. Because treatment for cancer can also damage healthy cells and tissues, it often causes side effects. Some patients may worry that the side effects of treatment are worse than the disease. However, patients and doctors generally discuss the treatment options, weighing the likely benefits of killing cancer cells and the risks of possible side effects. Doctors can suggest ways to reduce or eliminate problems that may occur during and after treatment.

Surgery is an operation to remove cancer. The side effects of surgery depend on many factors, including the size and location of the tumor, the type of operation, and the patient's general health. Patients have some pain after surgery, but this pain can be controlled with medicine. It is also common for patients to feel tired or weak for a while after surgery.

Patients may worry that having a biopsy or other type of surgery for cancer will spread the disease. This is a very rare occurrence because surgeons take special precautions to prevent cancer from spreading during surgery. Also, exposing cancer to air during surgery does not cause the disease to spread.

Radiation therapy (also called radiotherapy) uses high-energy rays to kill cancer cells in a targeted area. Radiation can be given externally by a machine that aims radiation at the tumor area. It can also be given internally; needles, seeds, wires, or catheters containing a radioactive substance are placed directly in or near the tumor. Radiation treatments are painless. The side effects are usually temporary, and most can be treated or controlled. Patients are likely to feel very tired, especially in the later weeks of treatment. Radiation therapy may also cause a decrease in the number of white blood cells, which help protect the body against infection. With external radiation, it is also common to have temporary hair loss in the treated area and for the skin to become red, dry, tender, and itchy.

There is no risk of radiation exposure from coming in contact with a patient undergoing external radiation therapy. External radiation does not cause the body to become radioactive. With internal radiation (also called implant radiation), a patient may need to stay in the hospital, away from other people, while the radiation level is highest. Implants may be permanent or temporary. The amount of radiation in a permanent implant goes down to a safe level before the person leaves the hospital. With a temporary implant, there is no radioactivity left in the body after the implant is removed.

Chemotherapy is the use of drugs that kill cancer cells throughout the body. Healthy cells can also be harmed, especially those that divide quickly. The doctor may use one drug or a combination of drugs. The side effects of chemotherapy depend mainly on the drug(s) and the dose(s) the patient receives. Hair loss is a common side effect of chemotherapy; however, not all anticancer drugs cause loss of hair. Anticancer drugs may also cause temporary fatigue, poor appetite, nausea and vomiting, diarrhea, and mouth and lip sores. Drugs that prevent or reduce nausea and vomiting can help with some of these side effects. Normal cells usually recover when chemotherapy is over, so most side effects gradually go away after treatment ends.

Hormone therapy is used to treat certain cancers that depend on hormones for their growth. It works by keeping cancer cells from getting or using the hormones they need to grow. This treatment may include the use of drugs that stop the production of certain hormones or that change the way hormones work. Another type of hormone therapy is surgery to remove organs that make hormones. For example, the ovaries may be removed to treat breast cancer, or the testicles may be removed to treat prostate cancer.

Hormone therapy can cause a number of side effects. Patients may feel tired, or have fluid retention, weight gain, hot flashes, nausea and vomiting, changes in appetite, and, in some cases, blood clots. Hormone therapy may also cause bone loss in premenopausal women. Depending on the type of hormone therapy used, these side effects may be temporary, long lasting, or permanent.

Biological therapy uses the body's immune system, directly or indirectly, to fight disease and to lessen some of the side effects of cancer treatment. Monoclonal antibodies, interferon, interleukin-2, and colony-stimulating factors are some types of biological therapy.

The side effects caused by biological therapy vary with the specific treatment. In general, these treatments tend to cause flu-like symptoms, such as chills, fever, muscle aches, weakness, loss of appetite, nausea, vomiting, and diarrhea. Patients also may bleed or bruise easily, get a skin rash, or have swelling. These problems can be severe, but they go away after the treatment stops.

6. Are clinical trials (research studies) available? Where can people get more information about clinical trials?

Yes. Clinical trials are an important treatment option for many cancer patients. To develop new, more effective treatments, and better ways to use current treatments, the NCI is sponsoring clinical trials in many hospitals and cancer centers around the country. Clinical trials are a critical step in the development of new methods of treatment. Before any new treatment can be recommended for general use, doctors conduct clinical trials to find out whether the treatment is safe for patients and effective against the disease.

People interested in taking part in a clinical trial should talk with their doctor. Information about clinical trials is available from the NCI's Cancer Information Service (CIS) (see below) at 1-800-4-CANCER and in the NCI booklet *Taking Part in Cancer Treatment Research Studies*, which is available at <http://www.cancer.gov/publications> on the Internet. This booklet describes how research studies are carried out and explains their possible benefits and risks. Further information about clinical trials is available at <http://www.cancer.gov/clinicaltrials> on the NCI's Web site. The Web site offers detailed information about specific ongoing treatment trials as well as trials focused on prevention, screening, and diagnosis by linking to PDQ®, the NCI's comprehensive cancer information database. The CIS also provides information from PDQ.

7. Does cancer always cause pain?

Having cancer does **not** always mean having pain. Whether a patient has pain may depend on the type of cancer, the extent of the disease, and the patient's tolerance for pain. Most pain occurs when the cancer grows and presses against bones, organs, or nerves. Pain may also be a side effect of treatment. However, pain can generally be relieved or reduced with prescription medicines or over-the-counter drugs recommended by the doctor. Other ways to reduce pain, such as relaxation exercises, may also be useful. Pain should not be accepted as an unavoidable part of having cancer. It is important for patients to talk about pain so steps can be taken to help relieve it. The fear of addiction or "losing control" should not stop patients from taking pain medication. Patients who take medications for cancer pain, as prescribed by their doctor, rarely become addicted to them. In addition, changing the dose or type of medication can usually help if the patient has troublesome side effects.

Selected Reference

1. American Cancer Society, Inc. *Cancer Facts and Figures 2005*. Atlanta: American Cancer Society, Inc., 2005. Also available at <http://www.cancer.org/downloads/STT/CAFF2005f4PWSecured.pdf> on the Internet.

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Related NCI materials and Web pages:

- National Cancer Institute Fact Sheet 2.11, *Clinical Trials*
(<http://www.cancer.gov/cancertopics/factsheet/Information/clinical-trials>)
- National Cancer Institute Fact Sheet 4.18, *Breast Cancer Prevention Studies*
(<http://www.cancer.gov/cancertopics/factsheet/Prevention/breast-cancer>)
- National Cancer Institute Fact Sheet 4.20, *Selenium and Vitamin E Cancer Prevention Trial (SELECT)*
(<http://www.cancer.gov/cancertopics/factsheet/Prevention/SELECT>)
- National Cancer Institute Fact Sheet, *The Study of Tamoxifen and Raloxifene (STAR): Questions and Answers* (<http://www.cancer.gov/cancertopics/factsheet/STARresultsQandA>)
- *Biological Therapy*
(<http://www.cancer.gov/cancerinfo/biologicaltherapy>)
- *Chemotherapy and You: Support for People With Cancer*
(<http://www.cancer.gov/cancertopics/chemotherapy-and-you>)
- *Pain Control: Support for People With Cancer*
(<http://www.cancer.gov/cancertopics/paincontrol>)
- *Radiation Therapy and You: Support for People With Cancer*
(<http://www.cancer.gov/cancertopics/radiation-therapy-and-you>)
- *What You Need To Know About™ Cancer*
(<http://www.cancer.gov/cancertopics/wyntk/overview>)

How can we help?

We offer comprehensive research-based information for patients and their families, health professionals, cancer researchers, advocates, and the public.

- **Call** NCI's Cancer Information Service at 1-800-4-CANCER (1-800-422-6237)
- **Visit** us at <http://www.cancer.gov> or <http://www.cancer.gov/espanol>
- **Chat** using LiveHelp, NCI's instant messaging service, at <http://www.cancer.gov/livehelp>
- **E-mail** us at cancergovstaff@mail.nih.gov
- **Order** publications at <http://www.cancer.gov/publications> or by calling 1-800-4-CANCER
- **Get help** with quitting smoking at 1-877-44U-QUIT (1-877-448-7848)

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