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Second Cancers

This information focuses on second cancers in adults. For information about second cancers after treatment of childhood cancers, see [Children Diagnosed With Cancer: Late Effects of Cancer Treatment](#)

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What Are Second Cancers?

Advances in cancer early detection and treatment mean that more and more people are surviving cancer. Some survivors may live cancer free for the remainder of their life after treatment, but others may be affected by a number of non-cancer related problems and treatment side effects.

Often, a cancer survivor's greatest concern is facing cancer again . It's important for all cancer survivors to know it's possible to get another (new) cancer, even after surviving the first. This is called a **second cancer**.

A second cancer is a new cancer that's unrelated to any previous cancer diagnosis. It's a completely different type of cancer.

- Sometimes the new cancer is in the same organ or area of the body as the first cancer. For example, someone who was treated for a certain type of [colorectal cancer](#)¹ can get another type of colorectal cancer as a second cancer.
- Or, a second cancer might develop in another organ or tissue. A second cancer is different from a [cancer recurrence](#)² which is when the same type of cancer that a person had before comes back.

Because it can take many years for cancers to develop, second cancers have been studied in types of cancers for which successful treatments have been around the longest. That's why we know more about certain second cancers than others.

Who is at risk for second cancers?

It isn't always clear what causes a second cancer or who is most at risk. Some second cancers seem to have the same or similar risk factors as a first cancer. But, the risk is known to be higher for people with certain types of cancer, who had [certain types of cancer treatment](#), or if they have a [family cancer syndrome](#)³. But for other people, the risk for a second cancer may be lower or simply isn't known.

Risk factors for a second cancer include some of the same things that are a risk for a first cancer: a healthy lifestyle and environment, using tobacco products, family history and genetics, being overweight or obese, drinking too much alcohol, or the lack of good follow-up care or cancer screening after a first cancer.

When you have a first cancer can matter too. For example, survivors of childhood cancers can develop second cancers from some effects of treatment or because of hereditary or genetic problems. And, because a person's risk for cancer generally goes up as they age, an unrelated new cancer may develop later in a cancer survivor's life.

Sometimes there are specific lifestyle recommendations and monitoring needed if a person has certain non-cancer health problems that might affect them after treatment. There might also be specific cancer screening guidelines based on a person's level of risk or if they have a family cancer syndrome. But, in general, the same [cancer screening guidelines](#)⁴ should be followed as for people who have not had cancer.

Hyperlinks

1. www.cancer.org/cancer/colon-rectal-cancer.html
2. www.cancer.org/treatment/survivorship-during-and-after-treatment/understanding-recurrence.html

3. www.cancer.org/cancer/cancer-causes/genetics/family-cancer-syndromes.html
4. www.cancer.org/healthy/find-cancer-early/cancer-screening-guidelines.html

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Second Cancers Related to Treatment

It's not possible to predict who might get a second cancer, but sometimes having cancer

treatment can put a person at higher risk for second cancers. As more new treatments emerge and standard treatments continue to be used, studies continue to look at how [genetics](#)¹ and different cancer treatments interact, as well as links between the treatments, lifestyle habits, and known cancer-causing agents.

Risk of developing second cancers after radiation therapy

[Radiation therapy](#)² was recognized as a possible cause of cancer many years ago. In fact, much of what we know about the health effects of radiation has come from studying survivors of atomic bomb blasts in Japan. We also have learned from workers in certain jobs that included radiation exposure, and patients treated with radiation therapy for cancer and other diseases.

Leukemia and myelodysplastic syndrome

Past radiation exposure is one risk factor for most kinds of [leukemia](#)³, including acute myelogenous leukemia (AML), chronic myelogenous leukemia (CML), and acute lymphoblastic leukemia (ALL). [Myelodysplastic syndrome \(MDS\)](#)⁴, a bone marrow cancer that can turn into acute leukemia, has also been linked to past radiation exposure. The risk of these diseases after radiation treatment for cancer depends on a number of factors, such as:

- How much of the bone marrow was exposed to radiation
- The amount of radiation that reached the bone marrow
- The radiation dose rate (how much was given in each dose, how long it took to give the dose, and how often it was given)

Most often, these cancers develop within several years of a person's radiation treatment. Then the chance of developing a new cancer slowly declines over the following years.

Solid tumors

There is also a risk for other cancers, which are mostly solid tumors, after having radiation therapy. Most of these cancers develop 10 years or more after radiation therapy. The effect of radiation on the risk of developing a solid tumor cancer depends on factors such as:

- The **age of the patient** when they were treated with radiation. For example, the risk of developing breast cancer after radiation is higher in those who were treated

when they were young compared with those given radiation as adults. The chance of developing breast cancer after radiation seems to be highest in those exposed as children. Risk decreases as the age at the time of radiation increases; women who had radiation after the age of 40 have a lower risk of breast cancer. Your age when you get radiation treatment has a similar effect on the development of other solid tumors, including lung cancer, thyroid cancer, bone sarcoma, and gastrointestinal or related cancers (stomach, liver, colorectal, and pancreatic).

- The **dose of radiation**. In general, the risk of developing a solid tumor after radiation treatment goes up as the dose of radiation increases. Some cancers require larger doses of radiation than others, and certain treatment techniques use more radiation.
- The **area treated**. The area treated is also important, since these cancers tend to develop in or near the area that was treated with radiation. Certain organs, such as the breast and thyroid, seem to have a higher risk for developing cancers after exposed to radiation than other organs.

Risk of developing second cancers after chemotherapy and targeted therapy

Chemotherapy

Some types of [chemotherapy \(chemo\) drugs](#)⁵ have been linked with different kinds of second cancers. The cancers most often linked to chemo are myelodysplastic syndrome (MDS) and acute myelogenous leukemia (AML). Sometimes, MDS occurs first, then turns into AML. Acute lymphocytic leukemia (ALL) has also been linked to chemo. Chemo is known to be a greater risk factor than radiation therapy in causing leukemia.

The risk gets higher with **higher drug doses**, **longer treatment time**, and **higher dose-intensity** (more drug given over a short period of time). Chemotherapy agents that have an increased risk for second cancers include:

- Alkylating agents (mechlorethamine, chlorambucil, cyclophosphamide, melphalan, lomustine, carmustine, busulfan)
- Platinum-based drugs (cisplatin, carboplatin)
- Anthracycline topoisomerase II inhibitors (etoposide or VP-16, teniposide, mitoxantrone)

Targeted therapy drugs

Some drugs used to treat cancer are called targeted therapy drugs because they were designed to find and attack certain genes or proteins that are in specific types of cancer. Targeted therapies are newer, so not a lot is known about the risk for second cancer yet. More will be known as more patients get these types of drugs and become survivors who are monitored for future health problems and second cancers.

Vemurafenib (Zelboraf[®]) and dabrafenib (Tafinlar[®]) are drugs that target the BRAF protein. They are used to treat melanoma and are being studied for use in other cancers. People taking these drugs have a higher risk of [squamous cell carcinomas of the skin](#)⁶.

Hyperlinks

1. www.cancer.org/cancer/cancer-causes/genetics.html
2. www.cancer.org/treatment/treatments-and-side-effects/treatment-types/radiation.html
3. www.cancer.org/cancer/leukemia.html
4. www.cancer.org/cancer/myelodysplastic-syndrome.html
5. www.cancer.org/treatment/treatments-and-side-effects/treatment-types/chemotherapy.html
6. www.cancer.org/cancer/basal-and-squamous-cell-skin-cancer.html

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Second Cancer Risks Related to Lifestyle and Environment

Although it's not possible to predict who might get a second cancer, certain lifestyle behaviors or habits can put a person at higher risk for some second cancers. Studies continue to look at the links between [genetics](#)¹, lifestyle habits, and [known cancer-causing agents](#)².

For some cancers, it's not clear if lifestyle may play a role in their development. For others, the cancer can be linked to things considered to be modifiable risk factors, or things that can potentially be changed to help lower cancer risk. In fact, more than 40% of cancer cases and about 45% of cancer deaths in the US are attributed to potentially modifiable risk factors. These risk factors include:

- [Smoking](#)³
- [Excess body weight](#)⁴
- [Alcohol](#)⁵
- [Physical inactivity](#)⁶
- [Poor nutrition](#)⁷
- [Too much sun or ultraviolet \(UV\) exposure](#)⁸
- [HPV \(human papillomavirus\) infection](#)⁹.

Exposure to some carcinogens in the environment or workplace ([radon](#),¹⁰

[asbestos](#),¹¹ [secondhand smoke](#)¹²) can also put a person at higher risk for cancer.

Sometimes development of a second cancer is linked to the same lifestyle habit as a first cancer. For example, smoking is linked to an increased risk for bladder cancer. People who have had bladder cancer have an increased risk of some other cancers linked to smoking, such as cancers of the lung, oral cavity, larynx, pharynx, esophagus, pancreas, cervix, kidney, bladder, stomach, colon and rectum, liver, and myeloid leukemia.

Hyperlinks

1. www.cancer.org/cancer/cancer-causes/genetics.html
2. www.cancer.org/cancer/cancer-causes.html
3. www.cancer.org/cancer/cancer-causes/tobacco-and-cancer.html
4. www.cancer.org/cancer/cancer-causes/diet-physical-activity/body-weight-and-cancer-risk.html
5. www.cancer.org/cancer/cancer-causes/diet-physical-activity/alcohol-use-and-cancer.html
6. www.cancer.org/cancer/cancer-causes/diet-physical-activity/diet-and-physical-activity.html
7. www.cancer.org/treatment/survivorship-during-and-after-treatment/staying-active/nutrition.html
8. www.cancer.org/cancer/cancer-causes/radiation-exposure.html
9. www.cancer.org/cancer/cancer-causes/infectious-agents/hpv.html
10. www.cancer.org/cancer/cancer-causes/radiation-exposure/radon.html
11. www.cancer.org/cancer/cancer-causes/asbestos.html
12. www.cancer.org/cancer/cancer-causes/tobacco-and-cancer/secondhand-smoke.html

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Second Cancer Risks Related to Family History and Genetics

It's not possible to predict who might get a second cancer, but certain [gene changes](#)¹ or hereditary (family) cancer syndromes can put a person at higher risk for some second cancers. However, most cancers are not clearly linked to the genes we inherit from our parents. Studies continue to look at the links between genetics, lifestyle habits, and known cancer-causing agents.

[Family cancer syndromes](#)² are caused by abnormal gene changes (variants or mutations) that are often inherited from a parent. These syndromes can be linked to a higher risk for one or more kinds of cancer. For example, women with hereditary breast and ovarian cancer (HBOC) syndrome, which is most often caused by mutations in the genes *BRCA1* and *BRCA2*, have a high risk of breast, ovarian, and some other cancers. Another example is [hereditary non-polyposis colorectal cancer syndrome \(HNPCC\)](#)³, also known as **Lynch syndrome**, which is linked to a high risk for colorectal, endometrial, ovarian, bladder, stomach, pancreatic, and some other cancers.

[Genetic counseling and testing](#)⁴ with trained genetic professionals may be useful and

recommended for people who have a family cancer syndrome or a higher risk for more than one kind of cancer because of family history.

A certain kind of genetic testing is called **pharmacogenetics**. Pharmacogenetics might be used for certain types of gene variations. The test looks at how a person's variations in genes might affect how they react to cancer treatment.

Talk to your cancer care team about whether genetic testing is right for your situation, as well as its cost, pros, and cons.

Hyperlinks

1. www.cancer.org/cancer/cancer-causes/genetics/genes-and-cancer.html
2. www.cancer.org/cancer/cancer-causes/genetics/family-cancer-syndromes.html
3. www.cancer.org/cancer/colon-rectal-cancer/causes-risks-prevention/genetic-tests-screening-prevention.html
4. www.cancer.org/cancer/cancer-causes/genetics/understanding-genetic-testing-for-cancer.html

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Lowering the Risk of Getting a Second Cancer

While it's not possible to predict who might get a second cancer, it's very important that cancer survivors understand their risk for future health problems and second cancers. Talk with your health care team about what problems you might need to watch for more closely. Ask if there are things you can do that might lower your risk, or if there are recommended follow-up tests and screening tests that look for problems. This post-treatment follow-up is often called **surveillance**.

Importance of follow-up

Once treatment is completed, or if you're on extended treatment such as hormonal therapy, be sure to keep any follow up appointments. Let your health care team know if you have any new symptoms or problems, because they could be caused by a new or existing cancer or non-cancer related problem.

A [survivorship care plan](#)¹ should be offered to all cancer survivors. This document summarizes treatment, and helps to coordinate care and give information to the patient and their entire health care team about what is needed after cancer treatment is complete.

Health and cancer screenings

A survivorship care plan should include the need for long-term follow-up care and that screens and monitors for post-treatment symptoms, recurrence, and second cancers. It should list what doctor will do the monitoring and ordering of tests. For example, sometimes there are specific lifestyle recommendations and monitoring needed if a person has certain non-cancer health problems that might affect them after treatment.

To monitor for second cancers, a survivor might have special cancer screening guidelines based on their level of risk or if they have a [family cancer syndrome](#)². But, in general, survivors should continue to follow the [American Cancer Society guidelines for the early detection of cancer](#)³.

Healthy habits

To help maintain good health, survivors should also:

- Know their medical and family history and risks.
- Get regular follow-up care and cancer screening.
- [Stay away from tobacco](#)⁴.
- Get to and/or stay at a [healthy weight](#).⁵
- Get moving with regular physical activity, and limit the time you spend sitting or lying down.
- Follow a [healthy eating pattern](#)⁶ that includes plenty of fruits, vegetables, and whole grains. Also avoid or limit red or processed meats, highly processed foods, and sugary drinks.
- It's best not to drink alcohol. If you do drink, have no more than 1 drink per day for women or no more than 2 drinks per day for men.

These steps may also help lower the risk of some other health problems.

For more information about follow-up care and second cancers after treatment for specific types of cancer, see [each cancer type](#)⁷.

Hyperlinks

1. www.cancer.org/treatment/survivorship-during-and-after-treatment/survivorship-care-plans.html
2. www.cancer.org/cancer/cancer-causes/genetics/family-cancer-syndromes.html
3. www.cancer.org/healthy/find-cancer-early/cancer-screening-guidelines.html
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7. www.cancer.org/cancer/all-cancer-types.html

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