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Male Fertility and Cancer

Cancer and its treatment can sometimes affect a man's ability to have children. Learn how cancer surgery and treatment can affect fertility, ways to help preserve fertility, and possible fertility options available after treatment.

- [How Cancer and Cancer Treatment Can Affect Fertility in Males](#)
- [Preserving Fertility in Males with Cancer](#)

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How Cancer And Cancer Treatment Can Affect Fertility in Males

Male fertility and infertility

Fertility refers to having the ability to conceive, or being able to have a child. For males, fertility means they are able to father a child through normal sexual activity. A person's fertility depends on their reproductive organs working as they should and other factors, such as when and how often they are having sex, certain hormones, and if their partner has any problems with fertility.

When a person cannot have a child, this is called **infertility**, or being infertile. For males, infertility means they are not able to father a child through normal sexual activity. Doctors usually consider a person infertile when they have not been able to conceive a

child after 12 or more months of regular sexual activity.

Problems with fertility can also be called **reproductive problems or alterations**. They happen when certain hormone levels are abnormally low or high or if reproduction organs are removed or aren't working properly. Some people never find out why they are having fertility problems. Many experts believe stress and anxiety can cause changes that play a part in infertility.

People with certain types of cancer or who are getting treatment for cancer may have fertility problems. Children and teenagers who have cancer are often of special concern. You can read more about specific adult and childhood cancers in [Cancer A to Z¹](#) and can learn more about how fertility might be affected in [How Cancer and Cancer Treatment Can Affect Fertility²](#).

This information is for males with cancer. **If you are a gay man or transgender person**, please talk to your cancer care team about any needs that are not addressed here.

Why fertility problems might develop

When a couple makes (conceives) a baby, this is called **conception or reproduction**. When a baby is conceived naturally, a lot of things must take place for it to happen.

Any change in how an organ works or a change in a hormone that's needed for sperm development can block conception. In other words, there can be a "body system malfunction" that can change a man's fertility and affect his ability to father a child. Certain health problems, including cancer, can affect these things. Here are some things that can happen in a man:

- A tumor or other problem might block or press on an organ and cause it to not work properly.
- Hormones that are needed to help with conception can be disrupted.
- Testicles may not make healthy sperm or might make fewer or no sperm at all.
- The process of sperm ejaculation can be disrupted.

In many cases, cancer surgery or treatment can be more likely than cancer itself to interfere with some parts of the reproductive process and affect your ability to have children. Different types of surgeries and treatments can have different effects. The risk of infertility varies, depending on:

- The patient's age and stage of development; for example, before or after puberty, in

- young adulthood, in older adulthood, etc.
- The type and extent of [surgery](#)³
- The [type of treatment](#)⁴ given (radiation therapy, chemotherapy, hormone therapy, targeted therapy, immunotherapy, stem cell transplant)
- The dose of treatment

It's very important to talk to your cancer care team to know how a cancer surgery or treatment that's being recommended for you may affect fertility **before** having the surgery or starting treatment. If these concerns aren't talked about before surgery or treatment, it's important that they are brought up as soon as possible after surgery or when treatment starts. **Don't assume your doctor or nurse will ask you about fertility concerns. You might have to start the conversation yourself.** Read more about talking with your health care team in [How Cancer and Cancer Treatment Can Affect Fertility](#)⁵. You need to be sure to get enough information, support, or resources to help you deal with any doubts, feelings, and expected fertility problems.

Cancer treatments and fertility

Surgery

Surgery might be needed for a tumor that's in or near an organ, such as a testicle, or the penis, bladder, or rectum. It might also be needed for a tumor that's in or near the nervous system, such as the brain or spinal cord. These surgeries may affect a man's fertility.

Testicular cancer surgery

The surgical removal of a testicle is called an **orchietomy**. This is a common treatment for [testicular cancer](#)⁶. As long as a man has one healthy testicle, he continues to make sperm after surgery. But some males with testicular cancer have poor fertility because the remaining testicle is not working well. For this reason, sperm banking before the testicle is removed is now recommended for patients interested in saving their fertility. This is called **fertility preservation**. Read more in [Fertility and Hormone Concerns in Boys and Men with Testicular Cancer](#)⁷.

Prostate cancer surgery

Some men with prostate cancer that has spread beyond the prostate into nearby tissues may have both testicles removed to stop testosterone production and slow the growth of

prostate cancer cells. This surgery is called a **bilateral orchiectomy**. These males cannot father children unless they banked sperm before surgery. You can learn more in [Surgery for Prostate Cancer](#)⁸.

For men who have prostate cancer that has not spread beyond the prostate gland, surgery to remove the prostate gland and seminal vesicles is one of the treatment options. This is called a **radical prostatectomy**. The prostate and seminal vesicles are the body parts that together produce semen. Surgery removes the prostate gland and leaves men with no semen production and no ejaculation of sperm after the surgery. With sexual stimulation, men can still have orgasm, but no fluid comes out of the penis. Prostate surgery to remove the prostate also can damage the nerves that allow a man to get an erection, causing erectile dysfunction (ED). This means he might not be able to get an erection sufficient for sexual intercourse. You can learn more in [Surgery for Prostate Cancer](#)⁹

Even if a patient can get an erection, if there's no semen coming from the penis during orgasm, he cannot conceive a child through sex. The testicles still make sperm, but the tubes (vas deferens) that deliver sperm from the scrotum to the urethra are cut and tied off during removal of the prostate gland. This results in a blockage to the flow of sperm. However, even after removing the prostate gland, there still are ways to get sperm from the testicle. See Testicular sperm extraction and epididymal sperm aspiration in [Preserving Fertility in Men With Cancer](#) to learn more.

Bladder cancer surgery

Surgery to treat some bladder cancers is much like a radical prostatectomy, except the bladder is also removed along with the prostate and seminal vesicles. This procedure is called **radical cystectomy**.

Because this surgery removes the bladder and prostate gland, there is no semen production and no ejaculation of sperm after the surgery. With sexual stimulation, males can still have orgasm, but no fluid comes out of the penis. Surgery to remove the bladder also can damage the nerves that allow a man to get an erection, causing erectile dysfunction (ED). This means he cannot get an erection sufficient for sexual penetration. Get more information in [Bladder Cancer Surgery](#)¹⁰.

Even if you can get an erection, if there's no semen coming from the penis during orgasm, you cannot conceive a child during sex. The testicles still make sperm, but the tubes that carry the sperm (vas deferens) are cut and tied off during removal of the bladder and prostate gland. This results in a blockages to the flowpath of sperm. However, even after removal of the bladder and prostate gland, there are ways to [remove sperm from the testicle](#) or its sperm storage area and use them to fertilize eggs.

Other surgeries

To learn more about the body parts, sex organs, and sex function discussed here, read [Sex and the Adult Male with Cancer](#)¹¹.

A few types of cancer surgery can damage nerves that are needed to ejaculate semen. They include removing lymph nodes in the belly (abdomen), which may be part of the surgery for testicular cancer and some [colorectal cancers](#)¹². Nerves can be damaged when lymph nodes are being removed, and this can cause problems with ejaculation. Sometimes surgery can permanently damage the nerves to the prostate and seminal vesicles that normally cause these organs to squeeze and relax to move the semen out of the body.

When these operations affect the nerves, semen is still produced, but it doesn't come out of the penis during orgasm (climax). Instead it can flow backward into the bladder (called **retrograde ejaculation**) or does not go anywhere. In cases of retrograde ejaculation, medicines can sometimes restore normal ejaculation of semen.

Fertility specialists can sometimes collect sperm from males using several types of treatments including electrically stimulating ejaculation (see Electroejaculation or sperm aspiration surgery in [Preserving Fertility in Men With Cancer](#)).

Radiation therapy

Radiation treatments use high-energy rays to kill cancer cells. Radiation that's aimed directly at testicles, or to nearby pelvic areas, can affect a male's fertility. This is because radiation at high doses kills the stem cells that produce sperm.

Radiation therapy for testicular cancer

Radiation is aimed directly at the testicles to treat some types of [testicular cancer](#)¹³ and might be used to treat [childhood leukemia](#)¹⁴. Young males with **seminoma** (a type of cancer of the testicle) may need radiation to the groin area after a testicle has been removed. The radiation is aimed very close to the remaining testicle, damaging it. Even when a man gets radiation to treat a tumor in his abdomen (belly) or pelvis, his testicles may still end up getting enough radiation to harm sperm production.

Sometimes radiation to the brain affects the hypothalamus and pituitary gland. The hypothalamus and pituitary gland work together to produce two important hormones called LH and FSH. These hormones are released into the bloodstream and signal the testicles to make testosterone and also to produce sperm. When cancer or cancer treatments interfere with these signals, sperm production can be decreased and

infertility can occur.

A male may still be fertile while getting radiation treatments, but the sperm may be damaged by exposure to the radiation. For this reason, it is important to find out how long you should wait to resume unprotected sexual activity or to try for a pregnancy. Your doctor will be able to consider your circumstances and give you specific information about how long you should wait.

You can get more details about this type of treatment in [Radiation Therapy](#)¹⁵.

Radiation for prostate cancer

Seed implants for prostate cancer (**brachytherapy**) do not give a large dose of radiation to the testicles, and many males will remain fertile or recover sperm production. However, it's important to be sure you understand important instructions to follow during and after brachytherapy, such as:

- Avoiding sexual intercourse, and for how long
- Using birth control, and for how long
- Limiting close contact with pregnant woman and children for a certain amount of time.

Radiation for prostate cancer from a machine outside the body is more likely to cause permanent infertility, even if the testicles are shielded. (See Radiation shielding in [Preserving Fertility in Men With Cancer](#))

Chemotherapy

During puberty the testicles start making sperm, and they normally will keep doing so for the rest of a man's life. Certain chemotherapy drugs given during childhood, however, can damage testicles and affect their ability to produce sperm. Certain types of chemotherapy later in life can also affect sperm production.

Cells start out as offspring of other cells that have divided. When cells are new, they are immature and not functioning fully. [Chemotherapy](#)¹⁶ (chemo) works by killing cells in the body that are dividing quickly. Since sperm cells divide quickly, they are an easy target for damage by chemo. Permanent infertility can result if all the immature cells in the testicles that divide to make new sperm (spermatogonial stem cells) are damaged to the point that they can no longer produce maturing sperm cells.

After chemo treatment, sperm production slows down or might stop altogether. Some

sperm production might return, but can take many years, and sometimes does not return at all.

Chemo drugs that are linked to the **risk of infertility** in males include:

- Busulfan
- Carboplatin
- Carmustine
- Chlorambucil
- Cisplatin
- Cyclophosphamide
- Cytarabine
- Cytosine arabinoside
- Dactinomycin
- Doxorubicin
- Ifosfamide
- Lomustine
- Melphalan
- Nitrogen mustard (mechlorethamine)
- Procarbazine
- Thiotepa
- Vinblastine
- Vincristine

Higher doses of these drugs are more likely to cause permanent fertility changes, and combinations of drugs can have greater effects. The risks of permanent infertility are even higher when males are treated with both chemo and radiation therapy to the abdomen (belly) or pelvis.

Some other chemo drugs, such as those listed here, have a **lower risk** of causing infertility in males:

- 5-fluorouracil (5-FU)
- 6-mercaptopurine (6-MP)
- Amsacrine
- Bleomycin
- Dacarbazine
- Daunorubicin
- Epirubicin

- Etoposide (VP-16)
- Fludarabine
- Methotrexate
- Mitoxantrone
- Thioguanine (6-TG)

Talk to your doctor about the chemo drugs you will get and the fertility risks that come with them.

Targeted therapy and immunotherapy

Targeted therapy and immunotherapy drugs attack cancer cells differently from standard chemo drugs. Little is known about their effects on fertility or problems during pregnancy.

Males taking thalidomide or lenalidomide have a high risk of causing birth defects in a fetus exposed to these drugs, which can stay in semen for a few months after treatment ends. Oncologists recommend that males and any sexual partner who is able to get pregnant use extremely effective forms of birth control, for example a condom for the man and a long-acting hormone contraceptive or IUD for the woman.

See [Targeted Therapy](#)¹⁷ and [Immunotherapy](#)¹⁸ to learn more about these cancer treatments.

Hormone therapy

Some [hormone therapies used to treat prostate](#)¹⁹ or other cancers can affect hormones that help to develop sperm. Sperm production and numbers can be lower. This can affect your ability to have a child. These drugs can also cause sexual side effects, such as a lower sex drive and problems with erections, while patients are taking them. The decrease in sperm production and the sexual side effects tend to improve once these drugs are stopped.

Bone marrow or stem cell transplant

Having a bone marrow or stem cell transplant usually involves receiving high doses of [chemo](#)²⁰ and sometimes [radiation](#)²¹ to the whole body before the procedure. In most cases, these procedures have the side effect of permanently preventing a male's ability to make sperm. This results in lifelong changes to fertility. (See [Chemotherapy](#)²² and [Radiation Therapy](#)²³ for more on these parts of the transplant process.) If you'd like

to learn more, see [Stem Cell Transplant](#)²⁴.

Hyperlinks

1. www.cancer.org/cancer/all-cancer-types.html
2. www.cancer.org/treatment/treatments-and-side-effects/physical-side-effects/fertility-and-sexual-side-effects/how-cancer-treatment-affects-fertility.html
3. www.cancer.org/treatment/treatments-and-side-effects/treatment-types/surgery.html
4. www.cancer.org/treatment/treatments-and-side-effects/treatment-types.html
5. www.cancer.org/treatment/treatments-and-side-effects/physical-side-effects/fertility-and-sexual-side-effects/how-cancer-treatment-affects-fertility.html
6. www.cancer.org/cancer/testicular-cancer.html
7. www.cancer.org/cancer/testicular-cancer/after-treatment/fertility.html
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24. www.cancer.org/treatment/treatments-and-side-effects/treatment-types/stem-cell-transplant.html

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Preserving Fertility in Males with Cancer

Certain cancers and their treatment can affect fertility in males and females. When a person with cancer wants to have children after treatment ends, some planning is needed. Sometime this involves **fertility preservation**. Fertility preservation saves or protects eggs, sperm, or reproductive tissue so that a person can use them to have children in the future.

This information is for males with cancer. **If you are a gay man or transgender person**, please talk to your cancer care team about any needs that are not addressed here.

Why males with cancer might need fertility preservation

In males who were fertile before treatment and who get certain types of treatment, the body may not be changed or may recover naturally after treatment. In these men, it may be possible to keep or restore normal sperm production. Whether this happens depends on the patient's age, stage in life, type of cancer, type and dose of treatment, and other health problems he may have. Be sure to know if fertility problems are a risk based on your treatment plan and health status.

But for some males, this is not the case. Certain types of cancer surgery can remove organs needed for reproduction, and certain treatments might change hormone levels or cause DNA damage to sperm. This can result in some males being unable to father a child after treatment for cancer. In some cases, a male is not able to fertilize a female's egg (conceive a pregnancy). Or, sometimes there are sperm-related problems that affect the health of a pregnancy and cause it to not last long enough, meaning it might end in miscarriage. It's also possible for a child who is conceived by sperm with damaged (abnormal) DNA to inherit the abnormal DNA, sometimes resulting in serious and even life-threatening birth defects. Read more in [How Cancer and Cancer Treatment Can Affect Fertility in Males](#). Some men may choose to take steps that might

help preserve their fertility so they can try to have children after treatment.

It's best that discussions about preserving fertility take place before cancer surgery happens or before treatments begin. **Don't assume your doctor or nurse will ask you if fertility is important to you.** They don't always remember to bring this up, so you might have to bring it up yourself.

It's also very important to talk to your cancer care team about unprotected sex both during and after cancer treatment. They may recommend waiting several months or longer before trying to have a child by natural means or until resuming unprotected sexual intercourse.

Experts recommend doctors who are part of the cancer care team be involved in talking about fertility with patients, including medical oncologists, radiation oncologists, gynecologic oncologists, urologists, hematologists, pediatric oncologists, surgeons, nurses, and others. The experts recommend the following:

- The cancer care team should talk about any possible fertility problems that might happen due to treatment as early as possible, either before surgery or before treatment starts.
- Patients who are interested in fertility preservation, might be thinking about it, or want to learn more, should be referred to a reproductive specialist.
- The cancer care team should start talking about preserving fertility as early as possible, too, meaning before treatment starts.

Learn more about how you can start talking about fertility with your cancer care team in [How Cancer and Cancer Treatment Can Affect Fertility](#)¹ and in [How Cancer and Cancer Treatment Can Affect Fertility in Males](#).

Types of fertility preservation for adult males with cancer

Sperm collecting and banking

Sperm banking is an effective method of fertility preservation for males. It's a fairly easy and successful way for men who have passed puberty to store sperm for future use. It's usually offered before cancer treatment to males who might want to have children in the future but sometimes doctors might not mention this option. By storing sperm, male cancer patients can decide this issue later and leave their options open. If you know you might want to father a baby later, ask about it. Your doctor can refer you to a reproductive urologist for sperm banking, or the cancer care team might arrange it. You

might be able to find a sperm bank yourself with an online search.

In sperm banking, a male provides one or more samples of his semen. Once the sperm bank gets the sample, they test it to see how many sperm cells it contains (this is the sperm count), what percentage of the sperm are able to swim (which is called motility), and what percentage have a normal shape (called morphology). The sperm cells are then frozen and stored. A sample can be provided by the following ways:

- **Ejaculation.** Semen collection done by masturbation is usually done in a private room at a sperm bank facility, or arrangements are made for the patient to bring a sample collected at home into the lab.
- **Electroejaculation.** Some males are unable to ejaculate due to stress, anxiety, or other psychological causes. Additionally, some young males who may have had no prior experience with masturbation might not be able to produce a semen sample. Other health conditions in adult males might cause the inability to ejaculate, too. For these patients, electroejaculation can be used to successfully stimulate the pelvic nerves that cause the release of sperm. The semen that is collected by an electroejaculation procedure can either be used immediately or cryopreserved for future use.
- **From urine.** Sometimes nerves that are needed to ejaculate semen or close the valve at the entrance to the bladder are damaged during cancer surgery or radiation treatment. When this happens, the male might still make semen, but it might not come out of his penis at orgasm. Instead, it might flow backward into his bladder (called **retrograde ejaculation**). Fertility specialists can try to collect sperm from the urine of these males and use these sperm to help achieve a pregnancy. These sperm can sometimes be placed into the female partner's uterus at the time of ovulation using a small flexible tube called a catheter.
- **Sperm extraction and aspiration procedures.** These procedures are options for collecting sperm from men who do not have sperm in their semen, either before or after cancer treatments. There are a few ways this can be done, including: percutaneous epididymal sperm aspiration (PESA), microsurgical epididymal sperm aspiration (MESA), testicular sperm extraction (TESE), and micro-TESE.

Limitations to sperm banking

It's important to know sometimes sperm banking might not be an option. Here are some examples of those situations:

- **Fast-growing cancers:** If you have a fast-growing cancer like [acute leukemia](#)² (AML or ALL), you may be too ill to produce semen samples before starting cancer treatment, and cancer treatment usually starts quickly for these leukemias. If you can manage it, having even one semen sample banked could allow you to have a biological child in the future.
- **Infectious diseases:** Many sperm banks do not accept samples from men who have HIV (the virus that causes AIDS) or hepatitis. There are many risks involved with this. But some sperm banks may have special storage areas for a higher storage fee.
- **Costs:** The average cost of storing sperm (about 3 samples) in a sperm bank is about \$1,500 to \$2,500 for 3 years. Insurance coverage may be available and banking costs vary greatly, so it's important to compare different centers. Many sperm banks offer financing and payment plans for people with cancer. If ejaculation is not possible and other ways to collect sperm are needed, costs will be higher.

Successes using frozen sperm

The success rates of infertility treatments using frozen sperm vary and depend on the quality of the sperm after it's thawed, as well as the health and age of the female who receives it. In general, sperm collected before cancer treatment is just as likely to start a pregnancy as sperm from men without cancer. It's important to stay hopeful because sperm banking has resulted in many pregnancies. Once sperm is stored, it's usually good for decades.

Keeping in touch with your sperm bank

It's important to stay in contact with the sperm bank so that yearly storage fees are paid and your address is updated. Some sperm banks will destroy and discard sperm samples when patients lose contact with them.

When you're ready to use stored sperm

Once a couple is ready to try getting pregnant, the frozen sperm can be sent to the fertility specialist working with the couple. Depending on tests to confirm the health of a female and the quality of the sperm, the thawed sperm can potentially be used. Some procedures include:

- **Intrauterine insemination (IUI)** in which the thawed sperm is inserted into a female's uterus using a long catheter during her most fertile time during a month. The fertility specialist works with the couple to figure out the best time to do the procedure.
- ***In vitro* fertilization (IVF)** and *in vitro* fertilization with intracytoplasmic sperm injection (IVF-ICSI) are more involved than IUI. A female takes hormones and her eggs must be retrieved. With IVF, they are put in a sterile lab dish with several thousand sperm. The goal is for one of the sperm to fertilize the egg. With IVF-ICSI, a single sperm is injected directly into an egg to fertilize it. In both procedures, if the egg is fertilized, the embryo can be frozen or put back into the female's uterus to achieve a pregnancy.

Radiation shielding

Patients receiving radiation therapy should talk with their cancer team about the risks of infertility with the radiation treatment and the length of time they will need to avoid unprotected sexual activity afterward.

Radiation treatment can cause infertility through the permanent destruction of the sperm stem cells in the testicle. Testicular tissue damage is unavoidable if both testicles need to be directly radiated. When the radiation is directed at other structures in the pelvic area, the x-rays can often scatter and thus result in indirect testicular injury.

Fertility may sometimes be preserved in these males by covering the testicles with a lead shield. You might hear this called **gonadal shielding** or **gonadal preservation**. If radiation is aimed at one testicle (as for some testicular cancers), the other testicle should be shielded if possible. Some boys with leukemia need radiation directly to both testicles to destroy the cancer cells. Shielding is usually not possible for these patients.

The cost of radiation shielding is usually included in the cost of your treatments.

If you are getting radiation near your testicles, your cancer care team may also advise you to avoid unprotected sex (intercourse) and to not try to achieve a pregnancy for a certain length of time after treatment ends. If you are getting radiation to the pelvic or genital area, it's best to talk to your doctor about options, including sperm banking, if you wish to avoid the waiting period.

Options for men who are not fertile after cancer treatment

Use of donor sperm

Using donor sperm (also called **donor insemination**) is a way for men who are infertile after cancer treatment to become a parent. Major sperm banks in the United States collect sperm from volunteers who are young men and go through a detailed screening of their physical health, family health history, educational and emotional history, and even some genetic testing. Donors are also tested for sexually transmitted diseases, including HIV and hepatitis viruses. Couples may be able to choose a donor who will remain anonymous, one who provides personal information but does not want to make his identity known, or one who is willing to have contact with the child later in life.

The IUI procedures (see above) is usually done when donor sperm is used.

The cost of donor sperm and the IUI procedure varies. If you're interested in this approach, check with your insurance company about coverage and ask the fertility specialist what costs are involved with the process. Be sure to ask for a list of all fees and charges, since these differ from one center to another.

Adoption

Adoption is usually an option for many people who want to become a parent. Adoption can take place within your own country through a public agency or by a private arrangement, or internationally through private agencies. Foster care systems specialize in placing children with special needs, older children, or siblings.

Many adoption agencies or foster care systems state that they do not rule out cancer survivors as potential parents. But they may require you to be done with treatment, and likely will need some information about your type of cancer and quality of life. You may be able to find an agency that has experience working with cancer survivors. Cancer survivors have some legal protections (including against discrimination during adoption proceedings) under the [Americans with Disabilities Act \(ADA\)](#)³.

There's a lot of paperwork to complete during the adoption process, and at times it can seem overwhelming. Many couples find it helpful to attend adoption or parenting classes before adopting. These classes can help you understand the adoption process and give you a chance to meet other couples in similar situations. The process takes different lengths of time depending on the type of adoption you choose.

Costs of adopting vary greatly, from around \$6,000 (for a public agency, foster care, or special needs adoption) and \$35,000 to \$50,000 (for private U.S. and some international adoptions, including travel costs).

Child-free living

Many couples, with or without cancer, decide they prefer not to have children. Child-free living allows a couple to pursue other life goals, such as career, travel, or volunteering in ways that help others. If you are unsure about having children, talk with your spouse or partner. If you are having trouble agreeing on the future, talking with a counselor or mental health professional may help you both think more clearly about the issues and make the best decision.

Hyperlinks

1. www.cancer.org/treatment/treatments-and-side-effects/physical-side-effects/fertility-and-sexual-side-effects/how-cancer-treatment-affects-fertility.html
2. www.cancer.org/cancer/leukemia.html
3. www.ada.gov/

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