

# Fertility and Cancer Treatment: Information for Women

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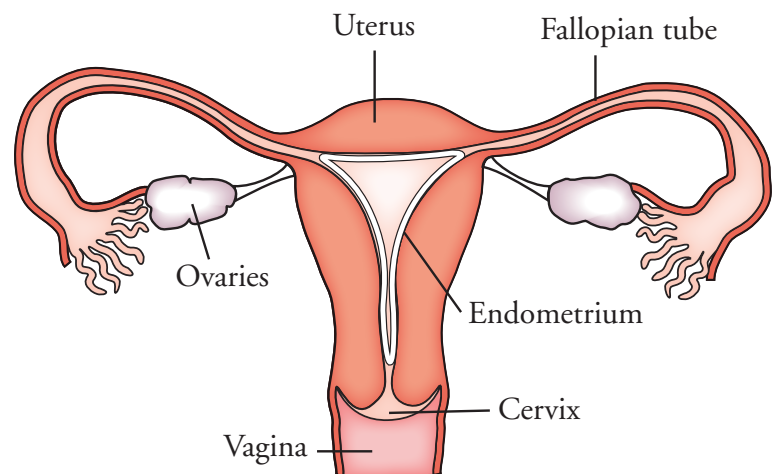
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You will be starting cancer treatment that may affect your fertility. As a result, you may not be able to become pregnant or maintain a pregnancy. We know this is a difficult time. Coming to terms with a cancer diagnosis and facing treatment is not easy. Some women find the threat of losing their fertility as hard to accept as the diagnosis of cancer. However, there are options available that may enable you to preserve your fertility.

## Natural Conception of a Child

Many structures of the body are involved in conceiving a child. These include the ovaries, fallopian tubes, and uterus in the pelvis. Also included are glands in the brain that secrete hormones.

When a woman is born, her ovaries contain 1 to 2 million follicles. Each follicle contains a single immature egg (oocyte). These eggs are surrounded by cells that secrete female hormones (estrogen). During a woman's lifetime, the follicles break down and gradually decline in number. Only about 300,000 follicles remain by the time a woman reaches puberty.



At puberty, hormones from the brain stimulate the monthly menstrual cycle to begin. This occurs about every 28 days. Usually, with each cycle, one follicle and egg mature. After about 14 days, the mature egg is released from the ovary (ovulation). The egg is picked up by the nearby fallopian tube. If a woman has sex without using birth control, a sperm may enter the egg. If the egg becomes fertilized by the sperm, it creates an embryo. The embryo passes through the fallopian tube into the uterus (womb).

During the 14 days while the follicle was maturing, hormones from the ovary cause the lining of the uterus to thicken. This prepares the lining so the embryo can implant or stick to the wall. It also prepares the uterus to support the

embryo as it grows. Once implanted, the cells continue to divide, and it becomes a fetus. During the nine months of pregnancy, the uterus expands to hold the growing fetus.

If there is no fertilization, or if an embryo does not implant in the wall of the uterus, the hormone levels drop. This causes the lining of the uterus to shed. This bloody discharge is seen each month with menstruation (menstrual period). The cycle then begins again.

## **Effects of Cancer Treatment on Fertility**

Cancer treatment can cause problems in a number of different ways.

- Surgery may require removal of organs of the body needed to get pregnant or maintain a pregnancy.
- Radiation therapy to the pelvis and some chemotherapy drugs may destroy follicles in the ovary. This reduces the number of healthy eggs, making it more difficult to become pregnant. In addition, monthly menstrual periods may stop. Periods may return after a number of months. However some women develop premature (early) menopause and no longer have monthly periods. With menopause, women stop ovulating and are not able to become pregnant. It is difficult to predict who will regain ovarian function after treatment is complete and who will not. Some chemotherapy is more harmful to the ovaries than others.
- Radiation therapy to the pelvis may cause changes in the uterus. As a result, an embryo may not be able to implant. Or, the uterus may not be able to expand to hold a growing fetus. This can result in complications during pregnancy. Examples are miscarriage, preterm (early) birth, or low birth weight babies.
- Surgery or radiation therapy to the brain may affect the body's ability to produce the hormones that stimulate the ovaries each month. As a result, there will be no ovulation.

Not all cancer treatments cause problems with fertility. It depends on:

- Your age.
- The number and quality of eggs you have before treatment.
- The type of surgery you have.
- The type and dose of chemotherapy you receive.
- The dose of radiation you receive and the area of the body that is irradiated.

Fertility problems caused by cancer treatment may be temporary or permanent. You may be able to produce healthy eggs and ovulate after treatment. If so, this generally takes up to one year. However, even if your fertility returns, you may develop premature menopause. You may not remain fertile for as long as you would expect. It is impossible to predict how you will be affected.

## **Fertility Preservation**

To preserve your fertility, you can have your eggs collected before you begin treatment. This procedure is performed by a reproductive endocrinologist. These eggs may be fertilized to create embryos. The embryos or eggs are then frozen and stored. This will increase your chance of being able to conceive a biologic child (using your own eggs) in the future. Collecting eggs can take anywhere from two to six weeks. The amount of time depends on where you are in your menstrual cycle when you first see the reproductive endocrinologist. This may delay your cancer treatment longer than is safe for you. Speak with your cancer doctor before making a decision about collecting eggs.

We hope that the questions and answers below will help you decide if pursuing fertility preservation before your treatment is the right choice for you.

## Frequently Asked Questions Before Treatment is Started

### *What will happen at my first visit with a reproductive endocrinologist?*

The reproductive endocrinologist will review your medical history and perform a physical examination. He or she will perform a transvaginal ultrasound to count the follicles in your ovaries. You will also have some blood tests done. These tests will help determine if you have enough healthy eggs to proceed. The doctor will then discuss the options with you and the likelihood that collecting eggs will be successful. This is based on your age, prior treatment, and medical health. The reproductive endocrinologist will also want to consult with your cancer doctor to make sure it is safe for you to proceed with egg collection.

A financial specialist at the center will review your insurance coverage. He or she will discuss the costs of the medications and treatment. Some centers have a social worker or psychologist who may meet with you. He or she can help you decide if egg collection is right for you. You may also meet with a nurse to teach you more about what is involved.

If you decide to proceed with egg collection, you will be asked to sign some forms. One may ask you to indicate who “owns” the frozen eggs or embryos. You will also be asked about what you plan to do with any that are not used. If you have embryos fertilized with sperm from your husband and you divorce, who would “own” the embryos? If you were to die unexpectedly, what would you want to do with your eggs or embryos? Would you want to appoint someone else to own them, or would you want them to be discarded? These are difficult decisions. It will be helpful to consider them before the visit.

### *How are my eggs collected?*

There are several steps involved in collecting eggs:

- On or around the second day of your period you will start giving yourself daily hormone injections. This medicine stimulates your ovaries to make more eggs than usual. You will continue this for one to two weeks. Sometimes medicine is given so you can start these injections earlier. In this case, you would not have to wait for your next menstrual period.
- While you are taking the daily injections, you will have blood tests and transvaginal ultrasounds. You will see your doctor every day or every other day for these tests. They let your doctor know how your body is responding to the injections. Day-to-day changes in the dose of your injection are made based on your response.
- Once your eggs have matured, you will give yourself a different injection to stimulate ovulation. You will be scheduled to have your egg retrieval (collection) within 36 hours of this injection.
- The egg retrieval is an outpatient procedure. It is done using anesthesia so you will be asleep. No surgical incision is needed. The eggs are collected using a very thin needle that is passed through your vagina.

While you are taking the injections, you may feel bloated and nauseated. These symptoms will go away when your hormone levels return to normal. This usually happens within two weeks after your eggs are collected. During this time, you can continue most of your usual activities. However, do not perform any vigorous exercise (for example, jogging). **If you are sexually active, you must use a barrier contraceptive so you do not get pregnant while you are taking the injections.**

### *How many collections do I need to make?*

The more healthy eggs you collect, the better your chances are of using them to have a child. However, each collection requires you to go through a menstrual cycle. If you collect for more than one cycle, you may be delaying your cancer treatment longer than is safe for you. Most patients only collect one cycle before their cancer treatment. Speak with your cancer doctor before deciding to collect a second cycle.

### ***How much will it cost to collect my eggs?***

Collecting eggs can be very expensive. The cost includes many different services and procedures, such as:

- An initial consultation with the reproductive endocrinologist.
- Blood tests.
- Transvaginal ultrasounds.
- Collection of the eggs.
- Analysis of the eggs.
- Fertilization of the eggs.
- Freezing of the embryos or eggs.
- Storage of the embryos or eggs.

Each fertility center charges different amounts for their services. The total cost of egg collection depends on the center. The cost in the New York area is generally about \$9,000 to \$10,000. In addition to this are the costs of the medicines you need to inject before egg collection. This is generally \$2,500 to \$5,000. There is also an annual cost to store the embryos or eggs. Lastly, when you are ready to thaw the embryos or eggs and use them there is a cost for this as well.

Many insurance companies do not cover any or all of these costs. Call your insurance company to find out about your coverage. Explain that your doctor has suggested collection of your eggs because of a cancer diagnosis. Having a letter of “medical necessity” from your doctor may also help.

You may be able to get financial assistance to help with these costs. The organization Fertile Hope has a program called Sharing Hope that may be able to help. To find out if you are eligible and to get an application, look on their web site [www.fertilehope.org](http://www.fertilehope.org).

There are other indirect costs to keep in mind. If collecting eggs delays your treatment at all, you may need new blood tests or scans before you start your cancer treatment. Your insurance company may not pay for these extra tests.

### ***What is done with my eggs after they are collected?***

If you are creating embryos, the collected eggs will be mixed with sperm in a laboratory. This is called *in vitro fertilization*. One method is to mix the eggs with thousands of sperm, allowing the sperm to enter the eggs on their own. Another method is to inject a single sperm into each egg. This is called *intracytoplasmic sperm injection* (ICSI). It is done when the sperm count is low or when the sperm are not able to move well or to penetrate the egg. Sperm used to fertilize the eggs are obtained either from your male partner or from a sperm donor. After the eggs are fertilized, they are monitored in the laboratory for three to five days. The embryos are then frozen. This is called *embryo cryopreservation*. When you are ready to use the embryos, one or two are thawed and transferred into your uterus. Thousands of babies have been born using this technique over the past 25 years.

An alternative to embryo cryopreservation is *egg (oocyte) cryopreservation*. This involves freezing eggs that have not been fertilized. When you are ready to use them, the eggs are thawed and fertilized with sperm. This newer technology is still considered experimental. This option may be preferred by women who do not have a male partner during this time. It also may be preferred by women who do not want to freeze embryos. Over 900 babies have been born using this technique over the past 10 years.

Whether you decide to freeze embryos or eggs, they will be stored until you are ready to use them. Some embryos and eggs are damaged during the freezing and thawing process. However, no known damage occurs while they are frozen. As far as we know, embryos and eggs can be frozen and stored for as long as you would like.

***If I am not able to collect eggs, are there other options for me to preserve my fertility?***

Two other experimental procedures are available. These both require surgery done under anesthesia. Pieces of the ovary or the entire ovary are removed. The tissue is frozen and stored until you are ready to use it. At that time, the tissue can be re-implanted into your body. As of 2009, very few babies have been born using these techniques. New technologies in the future may allow us to use this tissue more effectively. If you would like to learn more, ask your doctor or nurse to refer you to a reproductive endocrinologist who performs this procedure.

***I am starting treatment with radiation therapy to the pelvis. My doctor told me that ovarian transposition is an option for me. What is this?***

When the pelvis is irradiated, the ovaries may be in the field of treatment. As a result, they will be exposed to radiation. Based on the dose, the radiation can damage some or all of the follicles. Ovarian transposition moves the ovaries outside of the field of treatment. This is an outpatient surgical procedure. It is done using anesthesia so you will be asleep. The surgery is done laparoscopically through several small incisions on your abdominal wall. Even when the ovaries are moved outside of the field of treatment, they may still be exposed to some radiation. Some of the follicles may still be damaged. If you will also be getting chemotherapy, this can increase the likelihood that follicles will be destroyed. Because of this, you may also want to collect eggs before your treatment in addition to having this surgery. Doing both of these will give you the best chance of being able to have a biologic child.

***I need to have gynecologic surgery for my cancer treatment. Will I still be able to have a child after my surgery?***

For patients with early-stage gynecologic cancers it may be possible to do limited surgery. This means your doctor may be able to leave one or both of your ovaries and uterus intact. For example, some patients who have early cervical cancer can have their cervix removed while leaving the uterus in place. This may make it possible for you to get pregnant and carry a fetus. This procedure is called a radical trachelectomy. Not all patients are eligible for these limited surgeries. It depends on the location and size of your tumor. Ask your gynecologic surgeon if you are a candidate for one of these limited surgeries.

**Frequently Asked Questions After Treatment is Completed**

***How long must I wait after treatment to try to conceive a child?***

The amount of time you should wait is based on your diagnosis and the treatment you received. Please check with your doctor to find out how long he or she recommends that you wait.

Waiting is important for a number of reasons:

- It allows time for the follicles and eggs that have been damaged by your treatment to be cleared from your system.
- It ensures you have recovered from treatment and are in good health.

Once your doctor says it is okay to try to get pregnant, you may not want to wait too long before trying. Depending on your treatment, you may be at risk for premature (early) menopause. This can occur many years earlier than expected. Once you are in menopause, you will not be able to get pregnant naturally. You will have to use your frozen embryos or eggs or a donated egg. It is important to discuss this with your cancer doctor and your reproductive endocrinologist. They can help you to decide what is safe for you and what will give you the best chance of having a biologic child.

***If I collected eggs before treatment, should I use my frozen embryos or eggs, or should I first try to have a child naturally?***

This will depend on your age and personal situation. After you have waited the recommended amount of time, you may want to try to have a child naturally. Many women will be successful and never have to use their frozen embryos or eggs. However, if after three to six months you do not become pregnant, consider seeing your reproductive endocrinologist. He or she will evaluate your ovaries and hormone levels. Based on these results, he or she may recommend that you use your frozen embryos or eggs.

***How are my embryos or eggs used when I am ready to have a child?***

You may first need hormone injections to prepare your uterus for implantation. If you froze embryos, one or two of these will be thawed. If you froze eggs, some of these will be thawed and fertilized. Eggs may be fertilized using sperm from your male partner or from a sperm donor.

Once your uterus is ready for implantation, you will be scheduled for the embryo transfer. This is an outpatient procedure. Anesthesia or sedation is usually not needed. A very thin, soft catheter is placed through the opening of your uterus. One or two embryos are transferred through this catheter into your uterus.

You will be scheduled to return to the reproductive endocrinologist about one week later for blood tests. If you have a positive pregnancy test, an ultrasound is scheduled several weeks later. It will verify that the embryo has implanted and is growing correctly. If you are pregnant, you will then see an obstetrician.

***What is the chance I will be able to have a baby using frozen embryos or eggs?***

The success rates of these procedures vary based on a number of factors, including:

- Your age (success rates are higher in women under 35 years of age).
- The health of your partner's sperm.
- The experience of the fertility team you are working with.

The Society for Assisted Reproductive Technologies (SART) reports data about the success rates of the different fertility centers. Their Internet address is [www.sart.org](http://www.sart.org). Select "IVF Success Rate Reports" to see data for each center. These statistics are not specific to patients with cancer. However, they can give you some idea of the overall experience of the center.

Success rates are reported separately for fresh and frozen embryos. They are reported as percentages. Both the percentage of pregnancies and live births are reported since some pregnancies will miscarry. The percentages are based on either of the following:

- The number of cycles of ovarian stimulation used to retrieve eggs
- The number of embryos transferred into the uterus

Nationally, 21-34% of transferred thawed embryos resulted in a live birth in 2007. These rates will vary based on your age and the experience of the center. Discuss your chances of success with your reproductive endocrinologist.

***I had radiation to my pelvis. Will I be able to carry a child without any problems?***

Based on the dose used for your treatment, radiation may damage your uterus. The blood supply may be altered. Also, the muscles and other tissues may lose their elasticity. As a result, the embryo may not be able to implant in the wall of the uterus. This means you may not be able to get pregnant. If you do get pregnant, the uterus may not be able to expand fully to hold the growing fetus. You are more likely to have a miscarriage or go into premature labor. You also have a greater chance of having a baby with a low birth weight. Ask your radiation oncologist if you are at risk for these problems. If you are, you should work with an obstetrician who deals with high risk patients.

***If I cannot get pregnant or maintain a pregnancy, can I still have a child using my embryos?***

If your doctor feels it is unsafe for you to become pregnant, or you are not able to carry a pregnancy, there is another option for you. You can arrange for a gestational carrier. This is a woman who will carry your fetus. Your embryos can be transferred into her uterus. She will have no genetic relationship to the baby. The gestational carrier can be a relative, a friend, or someone you hire. State laws vary regarding the use of gestational carriers. New York State does not allow for payment to a woman for carrying a pregnancy. Costs vary widely and can be up to \$100,000. If you are considering this, it is important to work with an attorney that knows about reproductive law.

***If I am not able to have a child using my own embryos or eggs, are there other options for me to become a parent?***

Despite the new technologies available, you still may not be able to have a biologic child. Or, having a biologic child may not be important to you. There are other ways for you to become a parent.

You can use donor eggs to be fertilized by your partner's sperm. Eggs can be donated from someone you know, a friend or relative. Or, you can get eggs from a center that collects eggs from women willing to be donors. You can choose a donor based on similarities to you, such as appearance, abilities, or interests. Many donors want to be anonymous. The cost of a donor egg is generally \$15,000 to \$25,000.

You can arrange for a surrogate mother. That woman would be artificially inseminated with your partner's sperm. She would be genetically related to the child. After birth, you would arrange to adopt the baby. State laws vary regarding the use of surrogate mothers. In New York State, for example, surrogacy is not allowed. The costs vary widely and can be up to \$100,000.

Another option is adoption. Adoption laws vary from state to state. You can work with state agencies, private non-profit organizations, or private lawyers. Usually a certified social worker will assist you in the process. Many agencies require that you have completed treatment and been well for at least five years. The cost of adoption varies from \$2,500 to \$50,000.

***Will a child born using frozen embryos or eggs be healthy?***

Cancer survivors who use frozen embryos or eggs to have a child may worry about the health risks to the child. Research done thus far shows that these children are just as healthy as children that are born naturally. The rate of birth defects and the risk of most cancers is the same. However, some cancers are hereditary (passed down in the genes). Ask your doctor or nurse if you have a hereditary cancer. If so, a genetics counselor can tell you more about the risks of passing on the cancer to a child.

***What should I do with my frozen embryos or eggs if I decide not to use them?***

If you decide you will not be using your embryos or eggs you can stop storing them. Contact your reproductive endocrinologist. You will sign papers so the embryos or eggs can be discarded.

**Additional Resources on Fertility Preservation**

There are a number of internet sites with helpful information:

- FertileHope: [www.fertilehope.org](http://www.fertilehope.org)
- MyOncofertility: [www.myoncofertility.org](http://www.myoncofertility.org)
- Lance Armstrong Foundation: [www.livestrong.org](http://www.livestrong.org)

You can also call the Fertility Hotline at 1-866-708-FERT sponsored by the Oncofertility Consortium at Northwestern University.

