Fertility and Cancer: What Are My Options?

Although not everyone ends up having children, most people want at least to have the option. Cancer – and treatment for cancer – can sometimes take that option away, or can raise doubts about whether having children is even the right thing to do.

The effect of treatment on fertility depends on the type of cancer treatment you get. Effects also depend on many other physical factors, like your type of cancer, where it is, your age, gender, and your response to treatment.

If you can, talk with your doctor, nurse, or another member of your health care team **before treatment** to learn about all of your choices. There might be ways to save or protect your fertility before and maybe even during treatment. But after treatment, your options are often more limited.

If you are facing cancer, the good news is that in most cases you can become a parent if you wish. It might not happen the way you had expected before you had cancer, but if you can be flexible, you will find there are options to help.

What is infertility?

Fertility is a person's ability to start or maintain a pregnancy. Infertility is not being able to start or maintain a pregnancy. For a woman, it means that she either can't become pregnant or that she can't carry a baby full-term. For a man, it means that he cannot father a child. In medicine, infertility is defined for couples as being unable to conceive a child after one year of trying to get pregnant.

Men are infertile if:

- Their testicles don't make sperm.
- The pathways that carry sperm are blocked or cut off.

Women are infertile if:

- Their ovaries don't make mature eggs.
- Damage to the reproductive system keeps eggs from being fertilized.
- A fertilized egg cannot implant and grow inside the uterus.

Talking to your cancer care team about fertility before your treatment

Before you start cancer treatment, talk to your doctor or nurse about any concerns you have about your fertility. An open discussion with him or her will help you plan your cancer treatment and know what to expect. Sometimes your oncologist may not be well-informed about fertility problems, or may look at this issue as less important compared to saving your life with cancer treatment. But you have a right to get your questions answered, even if it means getting a second opinion or seeing a specialist. You can talk to an oncologist, surgeon, gynecologist (OB/GYN), nurse, reproductive endocrinologist, or fertility specialist.

This is not a complete list of questions, but it should give you a good starting point as you begin talking with your doctor or nurse about having children. These questions are for both men and women to ask:

- Will this treatment have any short- or long-term effect on my reproductive system? If so, what kind of effect and how long will it last?
- Can anything be done to prevent infertility before I start cancer treatment?
- Will any of the options to preserve my fertility interfere with my cancer treatment?
- If I become infertile, what are my options for having a family, such as adoption, using a donor egg or sperm, or having a woman carry a pregnancy for me?
- Can you refer me to a fertility specialist before treatment?
- Once I finish treatment, how will I know if I am fertile or infertile?
- How long should I wait to try to start a pregnancy after cancer treatment?
- Is my infertility likely to be short-term or permanent?

Women might also want to ask:

- Can cancer treatment damage my ovaries so that I lose some or all of my eggs, or go into early menopause?
- Is my cancer treatment likely to damage my uterus, heart, or lungs in such a way that I could have trouble with a full-term pregnancy?

How does cancer treatment affect fertility in women?

A lot of things must take place for a couple to make a baby, and a “system malfunction” at any point can lead to infertility. Cancer, or more often some cancer treatments, can interfere with some part of the process at almost any stage and affect your ability to have children.

Studies have suggested that women with cancer are less likely to be given information about preserving their fertility than men. If you are interested in having children in the future, you might need to be the one to start this conversation with your cancer team or your doctor.

Chemotherapy

Many chemotherapy (or chemo) drugs will damage some of the eggs stored in the ovaries. The effect will depend on the type and dose of chemo. It's hard to predict how many women will be fertile after chemo since the woman's age, the types of drugs she gets, and her drug dose all make a big difference. The drugs *most likely* to cause infertility are the alkylating drugs and nitrosoureas such as:

- Cyclophosphamide (Cytoxan®)
- Ifosfamide (Ifex®)
- Melphalan (Alkeran®)
- Busulfan
- Procarbazine
- Chlorambucil (Leukeran®)
- Carmustine (BCNU)
- Lomustine (CCNU)
- Mechlorethamine (Mustargen)

On the other hand, chemo drugs that have a *low* risk of causing infertility include:

- Methotrexate
- 5-fluorouracil (5-FU)
- Vincristine (Oncovin®)
- Bleomycin
- Dactinomycin

Chemo and pregnancy

Age makes a difference: Women who are treated for cancer before they are 30 have the best chance of becoming pregnant after treatment. The good news is that young women who stop having menstrual periods during treatment often start having periods again after they are off chemo for a while.

After chemo, fertility may not last long: This means that even girls who had chemo before puberty (the time when periods begin and other body changes happen like growth of breasts and body hair) or young women whose menstrual periods start back after chemo are at some risk for early (premature) menopause. When a woman stops having periods long before the average age of 51, it's considered *premature menopause*. She becomes infertile because her ovaries stop releasing eggs. Early menopause also means that the ovaries stop making the female hormones estrogen and progesterone.

Periods don't always mean fertility: Even if a woman's periods start back after cancer treatment has stopped, her fertility is still uncertain. Usually some eggs are destroyed by cancer treatment. You may need a fertility expert to help you find out if you are actually fertile.

Avoid getting pregnant during chemo: Many chemo drugs can hurt a developing fetus, causing birth defects or other harm. You might be fertile during some types of chemo, so you will need to use very effective birth control. Talk with your doctor about this.

It can harm the baby if you get pregnant too soon after chemo: Women are often advised not to get pregnant within the first 6 months after chemo because the medicine may have damaged the eggs that were maturing during treatment. If a damaged egg is fertilized, the embryo could miscarry or develop into a baby with a genetic problem. Studies about this are hard to find.

Bone marrow or stem cell transplant

Bone marrow or stem cell transplant usually involves high doses of chemo and sometimes radiation before the transplant. This often permanently stops a woman from releasing eggs. Talk with your doctor or nurse about this risk before starting treatment. (See the sections called "Chemotherapy" and "Radiation treatments" for more on these parts of the transplant.)

Radiation treatments

Radiation therapy uses high-energy rays to kill cancer cells. These rays can also damage a woman's ovaries. For a woman having radiation therapy to the abdomen (belly) or pelvis, the amount of radiation absorbed by the ovaries will determine if she will become infertile. High doses can destroy all the eggs in the ovaries and cause early menopause. Even if the radiation is not aimed right at the ovaries, the rays bounce around inside the body and can still damage the ovaries. When radiation is directed inside the vagina, the ovaries absorb a high dose of radiation. Radiation to the uterus can increase the risk of miscarriage, low-birth weight infants, and premature births. This happens because the treatment can cause scarring which restricts flexibility and blood flow to the uterus. These problems also can interfere with the growth and expansion of the uterus during pregnancy.

Sometimes radiation to the brain may affect the pituitary gland. The pituitary gland signals the ovaries to make hormones. Interference with these signals can affect egg production. This may or may not affect fertility depending on the focus and dose of the radiation.

You may be fertile when you start getting radiation treatments, but it's important to avoid pregnancy until after treatment is completed. Talk with your doctor about this.

Surgery

Surgery on certain parts of the reproductive system can cause infertility. For some cancers in women, a hysterectomy is part of the treatment. A hysterectomy is surgery to remove the uterus either through the vagina or through a cut made in the abdomen (belly). Once the uterus is removed, a woman cannot carry a child. The ovaries might be removed (called an *oophorectomy*) at the same time the uterus is taken out. Without ovaries, a woman can't get pregnant because she no longer has any eggs. In some women with early stage ovarian or cervical cancer, the surgeon will try to save one ovary, if possible, to preserve eggs. Keeping at least one ovary also preserves the hormones that prevent menopause symptoms like hot flashes and vaginal dryness. Some

women with small cervical cancers can have a surgery called a *trachelectomy*, which removes the cervix but leaves the uterus behind so a woman can carry a pregnancy. (See “Radical trachelectomy” under the section called “Preserving fertility in women before cancer treatment.”)

Sometimes surgery can cause scarring in the fallopian tubes. These scars may block the tubes and prevent eggs from traveling to meet the sperm. This means they can’t become fertilized and move on to the uterus to implant in the lining.

Other treatments

Hormone therapies used to treat breast cancer or other cancers can affect your ability to have a child. The effect of some of the newer treatments on fertility and pregnancy, like vaccines, immune therapies, or biological response modifiers, is not yet known. It’s always best to talk to your doctor, nurse, or other member of your health care team about your treatment and any possible effects on your sexual function and fertility.

Preserving fertility in women before cancer treatment

Discuss your fertility options carefully with your doctor before treatment. In some cases, you and your doctor might decide to try more than one option to preserve your fertility, especially if one of them has a low or unknown success rate. Be sure that you understand the risks and chances of success of any fertility option you are interested in, and keep in mind that no method works 100% of the time. Married women and others with long-term partners might want to include them in these discussions and decisions.

Embryo freezing

Embryo freezing, or *embryo cryopreservation*, is the most common and successful method of preserving a woman’s fertility today. Mature eggs are removed from the woman’s ovaries and fertilized in the lab. This is called *in vitro fertilization* (IVF). The embryos are then frozen to be used after cancer treatment. This option works well for women who already have a partner, though single women can still have in vitro fertilization using donor sperm.

Eggs are collected during outpatient surgery, usually with a light anesthetic (drugs are given to make you sleepy while it’s done). An ultrasound machine shows the ovaries and the fluid sacs (follicles) that contain ripe eggs. A needle is guided through the upper vagina, then into each follicle to collect the eggs. The eggs are fertilized, then frozen and stored.

Since each egg can most likely produce a single embryo at best, a woman will have a better chance of a successful pregnancy if several embryos are stored. Hormones can be used to ripen several eggs at once. In most women, this means starting a cycle of hormone shots on day 3 of her menstrual cycle and continuing them for 2 to 3 weeks until many eggs are mature (often around 12 in a woman under age 35).

But some women who have fast-growing cancers cannot wait 2 to 3 weeks to begin treatment. And women with breast cancer may risk some growth of their tumors during IVF cycles because of the high levels of estrogen caused by the hormone shots. In cases like this, one option is “natural cycle IVF” in which ultrasounds are used to follow the progress of normal ovulation, and 1 or sometimes

2 eggs can be collected. Another option uses letrozole or tamoxifen during the hormone stimulation to keep the estrogen from encouraging cancer cells to grow. More studies are needed, but results so far do not show that this has any harmful effects on women's breast cancer treatment or survival.

Successful pregnancy rates vary from center to center. Centers with the most experience usually have better success rates. Most states don't make insurers cover IVF treatment, but a letter from your oncologist to your insurance company explaining why fertility preservation is needed can sometimes make a difference.

An important note about freezing

If you have frozen embryos, eggs, or ovarian tissue, it's important to stay in contact with the cryopreservation facility to be sure that any yearly storage fees are paid and your address is updated. Once a couple is ready to have a child, the frozen items are sent to their infertility doctor.

Ovarian transposition

Ovarian transposition means moving the ovaries away from the target zone of radiation treatment, usually during laparoscopy. Surgeons will usually move the ovaries above and to the side of the central pelvic area. This procedure typically does not require being in the hospital. It can be used either before or after puberty. The success rates have usually been measured by the percentage of women who regain their menstrual periods, not by being able to have a live birth. Typically, about half the women start menstruating again.

It's hard to estimate the costs of ovarian transposition, since this procedure may sometimes be done during another surgery that is covered by insurance. It's usually best to move the ovaries just before starting radiation therapy, since they tend to fall back into their old places over time.

Do not try to become pregnant during radiation therapy because radiation can harm the fetus.

Radical trachelectomy

Radical trachelectomy is an option for cervical cancer patients who have very small, localized tumors. The cervix is removed but the uterus and the ovaries are left. A special band or stitch is wrapped around the bottom of the uterus to act as the cervix. A small opening allows your period flow to come out. Trachelectomy appears to be just as successful as radical hysterectomy in removing cervical cancer in certain women. Women can become pregnant after the surgery, but are at risk for miscarriage and premature birth because the opening to the uterus may not close as strongly or tightly as before. These women will need specialized obstetrical care while pregnant.

Fertility-sparing surgical procedure

This surgical treatment can be used in some women with ovarian cancer in only one ovary. The cancer must be one of the less aggressive types, like borderline, low malignant potential, germ cell tumors, or stromal cell tumors. A surgeon will remove just the ovary with cancer, leaving the healthy ovary and uterus in place. If there's a risk of the cancer coming back, the unaffected ovary may be removed later, after the woman has finished having children.

Experimental options

Egg freezing

For egg freezing (*oocyte cryopreservation*), mature eggs are removed using the same procedure described for embryo freezing, but the eggs are frozen before being fertilized with sperm. This process may also be called *egg banking*. The eggs are fertilized after thawing.

Egg freezing is experimental, although its use is growing. Less is known about it than IVF, but the methods are improving quickly. Doctors have learned how to freeze the eggs with little damage, and now are using a fast-freezing process called *vitrification*. Two European studies published in 2010 (one with 600 women) found that frozen eggs worked about as well as fresh ones when they were fertilized. Smaller studies in the United States have found similar success rates.

Egg freezing usually costs less than embryo freezing. It can be an option for women who have no partner when they are diagnosed with cancer. Some doctors freeze eggs at the same time they freeze embryos. Because younger women have more eggs, and the eggs are likely to be healthier, some facilities cut off the age for egg freezing at the mid-thirties. This varies by facility.

If you are looking at egg freezing, ask how many live births the facility has had using frozen eggs. You might also want to ask how many eggs it takes, on average, to produce a single live birth. You will want to know the cost of the procedure (including all the medicines), annual storage costs of the frozen eggs, and the estimated costs of fertilizing and implanting later. And, of course, how much, if any, of these expenses might be covered by your insurance.

Ovarian tissue freezing

In ovarian tissue freezing, all or part of one ovary is removed by laparoscopy (a minor surgery where a thin, flexible tube is passed through a small cut near the navel to reach and look into the pelvis). The ovarian tissue is usually cut into small strips, frozen, and stored to be transplanted back into the body after treatment. The ovarian tissue can be placed close to the fallopian tubes or in another part of the body, like the abdomen (belly) or forearm. Usually the eggs produced by the tissue are collected and fertilized in the lab. In a few cases, the whole ovary has been frozen with the idea of putting it back in the woman’s body after treatment.

Ovarian tissue removal does not usually require a hospital stay. It can be done either before or after puberty. Still, it is experimental and has produced very few live births so far. Doctors are studying it now to learn the best methods for success. Faster freezing (*vitrification)* of the tissue has greatly improved outcomes over the older slow freezing methods.

The ovarian tissue does grow a new blood supply and produces hormones after it’s transplanted, but some of the tissue usually dies and the grafts may only last for a few months to several years. Because they last such a short time, they are usually only transplanted when the woman is ready to try for a pregnancy.

Ovarian tissue freezing costs vary a lot, so you will want to ask about the freezing and annual storage costs as well as removal and transplant expenses. In some patients, removal of the ovarian tissue can be done as part of another necessary surgery so that some of the cost is covered by insurance.

GnRH analog treatment

Gonadotropin-releasing hormones (GnRH) are long-acting hormones that can be used to make a woman go into menopause for a short time. These hormones are usually given as a monthly shot starting a couple of weeks before chemo or pelvic radiation therapy begins. GnRH treatment is given each month the whole time a woman is getting the cancer treatment. The hope is that reducing activity in the ovaries will reduce the number of eggs that are damaged. Studies suggest that it might help prolong fertility in some women, especially those ages 35 and younger, but more research is still needed to prove it works. Women who want to try this treatment may want to look into a clinical trial for their type of cancer. If this treatment is used, it's best done with a back-up method of preserving fertility like embryo freezing.

This treatment costs a lot and can weaken a woman's bones if used for more than 6 months.

Oral contraceptive treatment

Some oncologists use birth control pills (oral contraceptives) during cancer treatment on the same basis as GnRH, hoping they will reduce activity in the ovary and save eggs. There's little scientific evidence for this, and some published studies suggest that it does not reduce infertility.

Still, oral contraceptives can be useful during chemo, in that they may help control menstrual bleeding when a woman's blood counts are low. They also help reduce the risk of accidental pregnancy during treatment.

Note that the hormones in birth control pills are not recommended for women with cancers that could be fueled by hormones, such as breast cancer. Oral contraceptives can also increase the risk of blood clots, which may already be high because of the cancer and its treatment effects.

Fertility options for women after treatment

Natural pregnancy

If you're a woman who has completed cancer treatment, your body may recover naturally and produce mature eggs that can be fertilized. The medical team may recommend waiting anywhere from 6 months to 5 years before trying to get pregnant. This is often based on the fact that many cancers tend to have the highest rates of recurrence (the cancer coming back) in the first 2 to 5 years after treatment. The length of time may depend on the type of cancer and the treatment you had.

But women who have had chemo or radiation to the pelvis are also at risk for sudden, early menopause even after they start having menstrual cycles again. Menopause may start 5 to 20 years earlier than expected. Women older than 35 might need a clear reason for how long they should wait to try to conceive. It's best for them to talk to their doctors about this before going on with a pregnancy plan.

Donor eggs

Donated eggs come from women who have volunteered to go through a cycle of hormone stimulation and have their eggs collected. In the United States, donors can be known or

anonymous. Some couples find their own donors on the Internet or through specialized programs at infertility clinics. Some women have a sister, cousin, or close friend who is willing to donate her eggs without payment.

Egg donors need to be screened carefully for sexually transmitted diseases and genetic illnesses. Every egg donor should also be screened by a mental health professional familiar with the egg donation process. These screenings are just as important for donors who are friends or family members. You want to be sure that everyone agrees about what the child will or will not be told in the future. Everyone also will need to understand what the donor's relationship with the child will be, and that the donor was not pressured emotionally or financially to donate her eggs.

Any woman who has a healthy uterus and can maintain a pregnancy can have IVF with donor eggs and a partner's (or donor's) sperm. The success of the egg donation depends on carefully timing preparation of the lining of the uterus (using hormone stimulation) to coordinate with the growth of the donor's eggs. If the woman preparing to receive donor eggs has ovarian failure (she's in permanent menopause), she must take estrogen and progesterone to prepare her uterus for the donor egg. The eggs are taken from the donor and fertilized with the sperm. Embryos are then transferred to the recipient to produce pregnancy. After the transfer, the woman will continue to have hormone support until the placenta develops and can produce its own hormones.

Egg donation is the most successful treatment for infertility in women who can no longer produce healthy eggs. The entire process of donating eggs, implanting them and fertilizing them with sperm usually takes 6 to 8 weeks per cycle. The major health risk for cancer survivors and babies is the risk of having twins or triplets. Responsible programs may transfer only 1 or 2 embryos to reduce this risk, freezing extras for a future cycle. The price of a donor egg cycle should include the price of IVF plus any payment to the egg donor, but it's good to find out all the costs beforehand.

Embryo donation

This approach allows a couple to experience pregnancy and birth together, but neither parent will have a genetic relationship to the child. Embryo donations usually come from a couple who have used assisted reproductive technology and have extra frozen embryos. When that couple has conceived or for some other reason chooses not to use those frozen embryos, they may decide to donate them. One problem is that the couple may not agree to have the same types of genetic testing as is usually done for egg or sperm donors, and they may not want to supply a detailed health history. On the other hand, the embryos are free, so the cancer survivor only needs to pay the cost of getting her uterus ready and having the embryo placed.

Any woman who has a healthy uterus and can maintain a pregnancy can have IVF with donor embryos. Most women who try the donor embryo procedure must get hormone treatments to prepare the lining of her uterus and ensure the best timing of the embryo transfer. The embryo is thawed and transferred to the woman to achieve pregnancy. After the embryo is transferred, the woman continues hormone support until blood work shows that the placenta is working on its own, usually around 8 to 10 weeks.

There's no published research on the success rates of embryo donation, so it's important that you research the IVF success rates of the centers where you live. Frozen embryo transfers average about a 19% live birth rate, compared with about a 30% live birth rate with fresh embryos. Some centers have higher live birth rates, like 34% with frozen and 51% with fresh embryos, but that's when the embryo is transplanted into surrogate carriers—who may be healthier and younger than many cancer survivors.

Surrogacy

Surrogacy is an option for women who cannot carry a pregnancy, either because they no longer have a working uterus, or would be at high risk for a health problem if they got pregnant. There are 2 types of surrogate mothers.

A *gestational carrier* is a healthy female who receives the embryos created from the egg and sperm of the intended parents. The gestational carrier does not contribute her own egg to the embryo and has no genetic relationship to the baby.

A traditional *surrogate* is usually a woman who becomes pregnant through artificial insemination with the sperm of the man in the couple who will raise the child. She gives her egg, carries the pregnancy and is the genetic mother of the baby.

The success rates for surrogacy are about the same as standard artificial insemination. Surrogacy can be a legally complicated and expensive process. Surrogacy laws vary, so it's important to have an attorney help you make the legal arrangements with your surrogate. You should consider the laws of the state where the surrogate lives, the state where the child will be born, and the state where you will live. It's also very important that the surrogate mother be evaluated and supported by an expert mental health professional as part of the process. Very few surrogacy agreements go sour, but when they do, typically this step was left out.

Adoption

For anyone who wants to become a parent, adoption is usually a feasible option. Adoption can take place within your own country by a public agency or by a private arrangement, or internationally through private agencies. Most adoption agencies state that they do not rule out cancer survivors as potential parents. But agencies often require a letter from your doctor stating that you are cancer-free and can expect a healthy lifespan and a good quality of life. Some agencies or countries require a period of being off treatment and cancer-free before a cancer survivor can apply for adoption. Five years seems to be an average length of time.

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. Most adoptions can be completed in 1 to 2 years. There are many agencies (local, national, and international) that can help you adopt a child. Some agencies specialize in placing children with special needs, older children, or siblings.

Costs of adopting a newborn vary greatly, from less than $5,000 (for a public agency, foster care, or special needs adoption) up to $50,000 (for some international adoptions, including travel costs).

You may be able to find an agency that has experience working with cancer survivors. Some discrimination clearly does occur both in domestic and international adoption. Yet, most cancer survivors who want to adopt a baby can do so.

How does cancer treatment affect fertility in men

A lot of things must take place for a couple to make a baby, and a “system malfunction” at any point can lead to infertility. Cancer, or more often some cancer treatments, can interfere with some part of the process at almost any stage and affect your ability to have children.

Chemotherapy

During puberty (usually around age 13 to 14), a boy’s testicles start making sperm, and they normally will keep doing so for the rest of his life. Since sperm cells divide quickly, they are an easy target for damage by chemotherapy (chemo). The higher the dose of chemo, the longer it takes for sperm production to get back to normal, and the more likely it is to stop. Permanent infertility results if all the stem cells in the testicles are damaged to the point that they can no longer produce maturing sperm cells. The most damage is done when men are treated with both chemo and radiation therapy to the abdomen (belly) or pelvis.

The risk of the chemo causing infertility varies depending on the type of drug and the doses used. After chemo treatment, sperm production slows down or may stop altogether. Some sperm production usually returns in 1 to 4 years, but can take up to 10 years. If sperm production has not recovered within 4 years, it’s less likely to ever recover. Men older than 40 may also be less likely to recover their fertility, but age seems to be a less important factor for men than for women.

Chemotherapy drugs that are linked to the highest risk of infertility in men include:

- Chlorambucil (Leukeran®)
- Cyclophosphamide (Cytoxan®)
- Procarbazine
- Melphalan (Alkeran®)
- Cisplatin
- Nitrogen mustard
- Actinomycin D

Higher doses of these drugs are more likely to cause permanent infertility, and sometimes other drugs that are given along with these can increase their effect. For example:

- **Busulfan** given with cyclophosphamide increases the chance of lifelong infertility more than cyclophosphamide alone.
- **Ifosfamide** given along with cisplatin can raise the infertility risk higher than cisplatin alone.

Other chemo drugs can also cause lifelong or short-term infertility. For instance, **carmustine** (BCNU) and **lomustine** (CCNU) can cause prolonged infertility when given to boys before puberty, and it’s thought they can do the same in men.

Some of the drug combinations used to treat lymphoma, osteosarcoma, and leukemia can cause prolonged infertility in up to half of the men who are treated. For some of these illnesses, there are

drug combinations that are less likely to harm fertility, so be sure to talk with your doctor about the treatment recommended for you.

Some drugs such as those listed here have a *low* risk of causing infertility in men, as long as they are given in low to moderate doses:

- Doxorubicin (Adriamycin®)
- Carboplatin
- Thiotepa
- Cytosine arabinoside (Cytosar®)
- Vincristine (Oncovin®)
- Vinblastine (Velban®)
- Bleomycin
- Dacarbazine
- Daunorubicin (Daunomycin®)
- Epirubicin
- Etoposide (VP-16)
- Fludarabine
- 5-fluorouracil (5-FU)
- 6-Mercaptopurine (6-MP)
- Methotrexate
- Mitoxantrone
- Thioguanine (6-TG)

Still, many of these drugs can cause problems for some men, especially if given in high doses or with other drugs that pose some threat to sperm.

Bone marrow or stem cell transplant

Bone marrow or stem cell transplant usually involves high doses of chemo and sometimes radiation before the transplant. This often permanently prevents a man from making sperm. Talk with your doctor or nurse about this risk before starting treatment.

Radiation therapy

Radiation to a man’s testicles can affect his fertility. Radiation at high doses kills the stem cells that produce sperm. Radiation is aimed directly at the testicles to treat some types of childhood leukemia. Young men with *seminoma*, a type of cancer of the testicle, may have radiation to the

groin area, very close to their remaining testicle. Even when a man has another type of cancer in the abdomen (belly) or pelvis, his testicles may still end up getting enough radiation to harm his sperm production.

Sometimes radiation to the brain may affect the pituitary gland. The pituitary gland signals the testicles to make hormones. Interfering with these signals can affect sperm production and cause problems with fertility.

Surgery

Surgery offers the greatest chance for cure of many types of cancer, especially those that have not spread to other parts of the body. The following types of surgery may affect a man's fertility.

Testicular surgery

The surgical removal of a testicle is called an *orchiectomy*. This is a common treatment for testicular cancer. As long as a man has one healthy testicle, he may continue to make sperm after surgery. (Less than 5% of men develop cancer in both testicles.) But some men with testicular cancer have poor fertility because the remaining testicle is not truly normal.

Testicle removal (both testicles)

Some men with prostate cancer that has spread beyond the nearby area may have both testicles removed as a way to stop testosterone production and slow the growth of prostate cancer cells. This is called a *bilateral orchiectomy*. These men can no longer father children unless they've banked sperm before surgery.

Prostate or bladder surgery

For men who have prostate cancer that has not spread beyond the gland, one of the treatments is surgery that removes the prostate gland and seminal vesicles (called *radical prostatectomy*). The prostate and seminal vesicles are the parts of a man's body that produce semen. Whether the prostate is removed through a cut in the abdomen (belly) or in the perineum (area behind the testicles and in front of the anus), this surgery leaves men with no semen.

The surgery done to treat bladder cancer is much like a radical prostatectomy, except that the bladder is also removed along with the prostate and seminal vesicles. The testicles still make sperm, but the *vas deferens* (path to the upper urinary tube) is cut. With sexual stimulation, men can still have the feeling of orgasm, but no fluid comes out of the penis and the sperm cannot get out.

Recently, a few men who had radical prostatectomy have had sperm cells taken directly from their testicles (a minor surgery). The sperm can be used by a fertility specialist to fertilize the partner's egg in the lab. The fertilized embryo is then placed into the woman's uterus.

Surgery that interferes with ejaculation

A few types of cancer surgery can damage nerves that are needed to ejaculate semen. They include removing lymph nodes in the pelvis, which may be part of the surgery for testicular cancer and some colon cancers. Nerves are often damaged when removing lymph nodes, and this can cause

problems with ejaculation. After these operations, a man still makes semen, but it doesn't come out of the penis at orgasm (climax). Instead it either shoots backward into his bladder (called *retrograde ejaculation*) or does not go anywhere. Fertility specialists can gather sperm from these men using several types of treatments including certain drugs, electrical stimulation of ejaculation, or sperm aspiration surgery (sperm cells are taken directly from the testicles).

Other treatments

Hormone therapies used to treat prostate or other cancers can affect your ability to have a child. The effect of some of the newer treatments on fertility, like vaccines, immune therapies, or biological response modifiers, is not yet known. Before you start treatment, it's best to talk to your doctor, nurse, or other health care professional about its possible effect on your sexual function and fertility.

Preserving fertility in men before cancer treatment

Discuss your fertility options carefully with your doctor before treatment. In some cases, you and your doctor may decide to try more than one method to preserve your fertility — keeping in mind that no method is perfect. Be sure that you understand the risks and chances of success of any fertility option you try. Married men and others with long-term partners may want to include them in these discussions and the decision-making.

Radiation shielding

Fertility may sometimes be saved in men who are getting radiation treatments that use modern techniques to focus the rays on a very small area. For some getting radiation to the pelvis, the testicles can be protected with a lead shield.

Seed implants for prostate cancer do not give a large dose of radiation to the testicles, and most men will remain fertile or recover sperm production. These men should use birth control after treatment if they do not want to father a child.

Radiation for prostate cancer from a machine outside the body (external radiation) is more likely to cause permanent infertility, even if the testicles are shielded. Whole body radiation used before bone marrow transplant also usually causes life-long infertility.

If you are getting radiation near your testicles, the risk of harming the sperm is uncertain. Doctors often advise men to avoid getting a woman pregnant during and for some weeks after treatment.

Talk with your cancer team about any plans for radiation treatments and the risk of infertility with the treatment you will get. Depending on your future plans, you may wish to bank sperm to raise the odds of a successful conception later on.

Sperm banking

Sperm banking is a fairly easy and successful way for men who have gone through puberty to store sperm for future use. It's usually offered routinely for younger men before cancer treatment, but if

you know you might want to father a baby later, don't wait to ask about it. Many men can store sperm even if they have reduced sperm quality or quantity. This option can also work for boys as young as 12 or 13, as long as they have gone through puberty.

In sperm banking, a man provides one or more samples of his semen. This is usually done in a private collection room at a sperm bank facility or hospital. The man ejaculates (has a climax) through masturbation or with the help of a partner. The semen is collected in a sterile cup. If a man is staying close to a sperm bank or lab, he can collect a sample and bring it in quickly, usually within an hour, keeping it at room temperature during that time.

If a man lives far from any lab or sperm bank, he might be able to use a mail-in kit. Some banks provide these kits. The man collects his sample at home, mixes it with a special protecting chemical, and express mails it to the sperm bank right away. You can find sperm banks online (see the "To learn more" section at the end of this document).

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 them are able to swim (which is called *motility*), and how many have a normal shape (called *morphology*). The sperm cells are then frozen and stored.

Sperm banking is an option for men who want to have children after completing cancer treatment. It's also a good option for a man who thinks he might want children in the future, but isn't sure. By storing his sperm, he can decide later. If the sample is not used, it can be discarded or donated for research.

Sperm donation problems

Some men have trouble when they try to donate sperm. Doctors are sometimes able to help men who have trouble with self-stimulation in a pressured situation, or who do not ejaculate normally. For those men, the doctor may be able to collect semen using electrical stimulation or microscopic surgery while the man is under anesthesia (given drugs to make him sleep during the surgery).

Collecting sperm during sex can be a problem because bacteria may mix in with the sample. But if a man cannot collect any other way, some labs will accept a sample gathered in a special silicone collection condom that is worn during sex.

Young teens often feel very nervous going to the sperm bank to give a semen sample. Having a parent in the waiting room, even a supportive mom or dad, seems to make it even more difficult. It's often better to have an older brother or adult friend to go with the teen instead.

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. In general, sperm collected before men's cancer treatment is just as likely to start a pregnancy as sperm from men without cancer. Sperm banking has resulted in thousands of pregnancies, without unusual rates of birth defects or health problems in the children. Once sperm is stored, it's good for many years. In one case, a man treated for cancer fathered a healthy baby with sperm that had been frozen for 28 years.

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. Once a couple is ready to have a child, the frozen sperm is sent to their infertility doctor.

Intrauterine insemination

If the thawed sample contains at least 2 million motile (actively swimming) sperm, it can be used for *intrauterine insemination*. The thawed sperm are washed and concentrated, and put in a sterile solution. When the woman is at her most fertile time of the month, this fluid is placed in her uterus by a doctor or nurse who threads a tiny tube (called a *catheter*) through the small opening in her cervix. This usually just takes a few minutes in a doctor's office. Sometimes the woman takes hormones to ripen more than 1 egg before the sperm is put in her uterus. This is called *super-ovulation*.

Sperm injection

Even a few sperm cells that survive freezing and thawing may be enough to conceive if the sperm is actually injected into the egg. This injection technique is called *IVF-ICSI*, which stands for *in vitro fertilization with intracytoplasmic sperm injection*. Sometimes it's just called ICSI for short.

The woman takes hormone shots for about 3 weeks to ripen multiple eggs. These eggs are then taken out in a minor surgery. In the lab, one healthy-looking sperm is injected into each egg. About 3 in 5 of the fertilized eggs will develop into embryos. These embryos can either be put back into the woman's uterus during that cycle or frozen for future use. Good infertility treatment programs get about 1 live birth out of out of 3 cycles of IVF-ICSI.

Most cancer survivors have low sperm counts and decreased sperm motility after treatment. If there are no banked sperm samples, IVF-ICSI can be a good way to deal with these sperm changes.

Limitations of sperm banking

Fast growing cancers: If you have a fast-growing cancer like acute leukemia (AML or ALL), you may be too ill to take time to store a semen sample before starting cancer treatment.

Infectious diseases: Many sperm banks do not accept samples from men who have HIV or hepatitis B, but some do have special storage areas for a slightly higher fee. A woman who tries to get pregnant with sperm from a man who has HIV or hepatitis B must be told about the risks. The infection risk to the woman can be greatly lowered by using advanced infertility treatments, as long as there are expert doctors using careful risk reduction methods. But if the woman becomes infected, there's some risk that the baby can become infected, too.

Costs: The average cost of sperm banking is often more than $1,500, which includes 3 sperm donations and a few years of storage. Costs vary from center to center, so it's important to compare costs at different centers. Many sperm banks offer financing and payment plans for cancer patients.

Experimental options

Sperm extraction

Epididymal sperm aspiration and *testicular sperm extraction* (TESE) are investigational options for men who do not have mature sperm cells in their semen, either before or after cancer treatments. Both require minor surgery done by a specialist. In micro-epididymal sperm aspiration, a tiny opening is made in the epididymis (the coiled tubes that sit on top of the testicle), and sperm are taken out with a needle. In TESE, tiny pieces of tissue are removed from the testicles and checked for sperm cells. If mature sperm are found, they can be used immediately for IVF-ICSI or frozen for future use. Insurance rarely covers the cost of this treatment. Since these sperm must be used with IVF-ICSI, the cost of that treatment must be added.

Fertility options for men after cancer treatment

After treatment, most men recover some ability to produce sperm cells. If the sperm counts and movement (motility) are close to normal, men may be able to father a child through sex (natural conception). Doctors may recommend waiting anywhere from 6 months to 2 years after chemo or radiation to try and conceive. If only a few sperm are present in the semen, men may need to use infertility treatment methods, such as intrauterine insemination or *in vitro fertilization with intracytoplasmic sperm injection* (IVF-ICSI).

Even when men have no sperm in samples of their semen, small areas of the testicle may still make sperm. In this case, a surgeon using a microscope can take several samples of tissue to look for sperm to use in IVF-ICSI. This is called *testicular sperm extraction*, or TESE for short (see “Sperm extraction” under “Experimental options” in the previous section, “Preserving fertility in men before cancer treatment”).

Other fertility options for men after cancer treatment are listed here.

For men with loss of the prostate and seminal vesicles

If you have had prostate or bladder cancer, surgery was probably done to remove your prostate gland and the seminal vesicles (these organs produce most of the fluid for semen). This means that your body no longer makes semen. Also, the ends of the vas deferens (small tubes running from each testicle to the prostate) are generally cut during this type of cancer surgery. This cut is very much like that done for a vasectomy, so there’s no way for the sperm to get outside your body. With enough mental or physical sexual excitement, you should still be able to have the pleasurable feeling of orgasm (climax), but it will be a “dry” orgasm.

If there’s no semen coming from the penis during orgasm, conceiving a child during sex is not an option. But there are ways that sperm can be taken out and used to fertilize an egg. A fertility specialist can take sperm from the epididymis (the tiny coiled tubes at the top of the testicles where sperm cells ripen) or use TESE, as described before.

For men who have dry orgasm because of damage to nerves during cancer treatment

Some men have dry orgasm after removal of lymph nodes as part of treatment for colon cancer or testicular cancer. This is because the surgery to take out the lymph nodes damages the nerves that control ejaculation. Sometimes surgery can completely paralyze the prostate and seminal vesicles, which normally squeeze and relax as a man's climax begins. But if you still have your prostate and seminal vesicles, several treatments may work.

If nerve damage is mild, the prostate and seminal vesicles may still work normally. Often, though, the valve that is supposed to block semen from getting into the bladder doesn't close the way it should. If this valve stays open, semen shoots backward into the bladder instead of out through the penis during a man's climax. This is called *retrograde ejaculation*. When this is the only problem, medicines can be taken for it. If the medicine works, normal ejaculation of semen is restored. The seminal vesicles contract, the internal valve at the bladder entrance closes, and semen is ejaculated from the penis at orgasm. In the United States, the most common medicine used to restore emission is ephedrine sulfate. Because it does not help everyone and may only work for a few doses, ephedrine sulfate is usually prescribed only for the fertile week of the woman's cycle.

Another option for retrograde ejaculation is taking live sperm cells from urine a man produces just after a climax. The man is given medicine to make his urine less acidic, which causes less damage to his sperm. Usually the man is asked to use self-stimulation to reach orgasm at the urology clinic. His urine is collected just after orgasm, either through urination or catheterization. The sperm cells are separated and put in a sterile solution to use in infertility treatment.

If none of these options work, another choice is to put a man under anesthesia (drugs are used to put him into a deep sleep) and a special electrical probe is used in the anal canal to trigger an ejaculation of semen through the penis. Since this procedure, called *electro-ejaculation*, can cause scar tissue to form, it's not used often. It must be done with a special machine that's only available in some infertility clinics.

For men who don't produce sperm

Donor sperm

Using donor sperm (donor insemination) is the simplest and least expensive way for men who are infertile after cancer treatment to become a parent. Major sperm banks in the United States collect sperm from young men who go through a detailed screening of their physical health, family health history, educational and emotional history, and even some genetic testing. Sperm donors are chosen for their high sperm counts and motility. They are also tested for sexually transmitted diseases, including the human immunodeficiency virus (HIV) that causes AIDS and the hepatitis viruses B and C. Couples may be able to choose a donor who will remain anonymous or one who will be willing to have contact with the child later in life. Anonymous donor sperm usually costs less.

Insemination usually is done in the doctor's office. The purified sperm sample is placed directly into the woman's uterus through a tiny, flexible tube. If needed, the woman's doctor might prescribe hormones to ripen more than one egg, which will increase the chance of a pregnancy. Success rates are good, and most women under age 35 without fertility problems get pregnant in an

average of 3 to 6 cycles. The cost of donor sperm varies, but averages about $500 to $600 a cycle, which includes the cost of the insemination. This does not include the cost of hormones for the woman. Be sure to ask for a list of all fees and charges before insemination, since these differ from one sperm bank to another.

Adoption

Issues for cancer survivors interested in becoming parents by adoption were discussed previously. See the section called “Adoption” under “Fertility options for women after treatment.”

Preserving fertility in children with cancer

Parents of children diagnosed with cancer face many difficult issues in a time of severe emotional distress. They are often so focused on their child’s treatment and survival that it’s hard to think beyond the present. But about 3 out of 4 children treated for cancer live a long time, and infertility can become an issue for survivors when they reach young adulthood. Not only should the oncology team discuss fertility with the parents, but it should also be mentioned to children as soon as they are old enough to understand. If children are not old enough to discuss fertility while they are being treated for cancer, parents may need to tell them about it around the time that puberty begins. A follow-up visit at the oncology clinic is often a good time to bring up the topic.

Given the chance, many parents will want to save their child’s fertility. If children are old enough to understand fertility when they are being treated, they should be asked if they will agree to the treatment. Even though they are not able to give full legal consent because of their age, a child who can understand must generally agree (this is called *assent*) before these procedures can be done. The parents also must give consent before the procedure, after being told the risks, complications, and success and failure rates. Although it’s being studied, at this time there are no options that are proven to preserve fertility in children who haven’t gone through puberty.

You might want to check into experimental options to find out more. When you see a fertility doctor, ask about any clinical trials that are going on. Depending on where you are, you may have to travel to a larger city or a research center if you’d like to have the option of a research facility.

Girls

After puberty, a girl can have eggs or embryos frozen, but girls do not produce mature eggs until they go through puberty. Most girls begin puberty between ages 9 and 15. Before puberty, ovarian tissue can be removed in an outpatient surgical procedure and frozen for the future. But even in adult women, ovarian tissue grafted back into the woman’s body after treatment has led to very few successful pregnancies. See “Ovarian tissue freezing” in the section called “Preserving fertility in women.”

If your daughter is getting radiation to her pelvic area, it may damage her uterus. This could make it hard for her to maintain a pregnancy later in life. Scarring from radiation can hinder blood flow and keep the uterus from stretching and expanding fully. If radiation is to be aimed at the abdomen (belly), sometimes the ovaries can be shielded. In some cases, the ovaries may be surgically moved aside, out of the radiation area. They can be put back into the normal position after treatment. See “Ovarian transposition” in the section called “Preserving fertility in women.”

Other fertility effects

You will want to talk with your daughter's doctor about the risk of infertility linked to the specific cancer treatment she will get. Sometimes, chemo and radiation can destroy or damage eggs and cause complete infertility.

Puberty and beyond

Some girls will go through puberty and start having periods, but may still need to have hormone levels checked to find out if they are fertile. Some who are fertile in young adulthood may go through early menopause before they have time to have a family. It will be important for your daughter to know that even if she has normal periods, she could still need to see a fertility specialist. It's best to see a specialist early in your daughter's reproductive years, soon after puberty. If available, mature eggs or embryos can be frozen to preserve her fertility in case of early menopause. (See the section called "Preserving fertility in women.")

Boys

Preserving sperm

When boys go through puberty, they begin to make mature sperm. Most boys have some sperm in their semen by about age 13. If a boy has already gone through puberty, sperm banking is a good option, since the frozen samples are not damaged by long periods of storage. Young teens often feel very anxious about masturbating to produce a semen sample, especially if they must talk about it with their parents. Some teens may have an easier time if they are given a vibrator to use in the collection room. Electro-ejaculation or epididymal sperm aspiration has also been used. See the section called "Sperm banking" under "Preserving fertility in men" for more information.

Testicular tissue freezing (an experimental procedure for young boys)

At this time there are no proven fertility preserving methods for boys who have not gone through puberty. Testicular tissue freezing is the only current option, and it's completely experimental in pre-pubertal boys, with no live births reported so far. Some tissue from the testicles is collected with a biopsy needle. It's expected that the tissue will contain stem cells that will later produce mature sperm. The tissue is frozen with the hope that in the future, it can be used to treat infertility. The thawed tissue might be grafted on to the young man's testicle or stem cells might be taken out and injected into the testicle. One concern is that tissue taken from a boy or man with cancer before treatment could re-introduce cancer cells and possibly cause a return of the disease. The average cost of testicular tissue freezing varies from one center to another. A few centers may be doing research studies that pay for the costs.

Other fertility effects

You may want to talk with your doctor about the risk of infertility linked to the cancer treatment your son is going to get. If your son is getting radiation, it may be possible to shield his testicles. As with adults, chemo and bone marrow transplants can cause infertility in some children.

Puberty and beyond

Even with no special measures to preserve fertility, many boys have normal puberty after cancer treatment and are able to have children naturally. After puberty starts, a doctor can check your son's semen to see if he is making sperm. Even if he does not produce normal amounts of sperm, your son may be able to have sperm removed surgically to fertilize an egg.

Frequently asked questions

Should I have children after I've had cancer?

After a cancer diagnosis, many people wonder if they should even think about having children. They may question whether a genetic factor might have caused them to get cancer and if they might pass this cancer gene to their children. But only about 5% to 10% of cancers have a strong link to a gene that is passed on from parent to child. (See "Do children of cancer survivors have higher risks of getting cancer?" below.)

Survivors also may worry that treatment with chemo or radiation could cause birth defects or other health problems for future children. Studies show that babies conceived after cancer treatment don't have birth defects or health problems any more often than babies whose parent didn't have cancer. But problems are more likely if a baby is conceived during (or too soon after) cancer treatment, so it's important to know how long to wait before trying to have a baby.

People with cancer already have many worries from dealing with the disease and its treatment. Concerns about the cancer coming back, how long they can expect to live now that they've had cancer, and the costs of raising a child are other serious issues that people with cancer face when thinking about having children.

There are no simple answers to the question of whether to have children. Each person's cancer situation is unique. It helps to get as much information as you can before you make a decision that will affect the rest of your life as much as this one will. You might want to discuss these concerns with a genetic counselor, geneticist, reproductive specialist, and/or a mental health professional.

Depression, anxiety, and stress may affect your ability to think as clearly as you would like about your reproductive choices. Talk about these issues and concerns with the people whose opinions you value and trust — your spouse or partner, health care team, family, close friends, clergy, etc. There are support groups as well as health professionals who deal with fertility issues for people with cancer. Ask your doctor to refer you to one of these specialists.

Is pregnancy safe after cancer?

Despite concerns that pregnancy could cause cancer to return, studies to date have not shown this to be true for any type of cancer. Breast cancer is the type most people worry about because of the hormone changes that happen during pregnancy. So far, studies suggest that survival rates in women who become pregnant after breast cancer are as good as women who do not. But this issue is still being studied. Every cancer is different, so it's not possible to say that it's safe for all cancer survivors to become pregnant.

Many women don’t know that pregnancy can be a problem if cancer treatment has damaged their heart or lungs. When organs have been damaged, the added physical stress of a pregnancy can lead to serious health problems for the mother and the growing fetus.

Radiation aimed near the uterus, especially if the woman had it done when she was a child, can limit the ability of the uterus to stretch as the fetus grows. This creates an increased risk of having a premature or low birth-weight baby, or even having a miscarriage.

If you are thinking about getting pregnant after your cancer treatment, it’s a good idea to first see a specialist in high-risk obstetrics to find out if you have any health risks because of your cancer treatment. Your cancer doctor (oncologist) can also talk with you about how your health, your cancer and cancer treatment, and your risk of cancer coming back might affect pregnancy and parenthood.

If I didn’t take action to preserve my fertility before cancer treatment, is it too late or do I still have options?

The answer to this question depends on your type of cancer and treatment. Start by discussing this question with your oncologist. You may need to be seen by a fertility specialist.

After cancer, how will I know if I need to see a fertility specialist?

It’s best to discuss fertility with your oncologist first, because everyone’s cancer diagnosis and treatment is different. But if you have had trouble conceiving for 6 to 12 months, despite having sex at the right times of the month, you may have a fertility problem.

After cancer treatment, how long should I wait to conceive?

Since each person’s situation is different, this is something to discuss with your doctor to find out what’s best for you.

How long can sperm, embryos, eggs, and tissues be frozen?

Indefinitely. Samples have been stored for decades without damage. Most of the risk occurs in the freezing and thawing processes, so once they are frozen they can be stored for many years.

Is it safe to ripen eggs for harvest – for embryo freezing and later IVF (in vitro fertilization) – before treatment for breast cancer?

Some oncologists are concerned because hormones given to ripen multiple eggs for harvesting raise estrogen levels far above normal. As discussed in “Embryo freezing,” adding letrozole or tamoxifen to the hormones may help block estrogen from being able to nourish breast cancer cells.

So far, studies do not show that pregnancy after breast cancer causes cancer recurrence. Also, IVF does not appear to cause breast cancer.

What role does age play in fertility after cancer for women and men?

For women, getting older is a factor in fertility whether or not you have cancer. The older you are, the harder it is to get pregnant. Cancer treatments that cause premature menopause affect a woman's fertility.

Research suggests that the younger a woman is when she gets damaging cancer treatments, the less likely it is that she will become infertile. This may be because a younger woman has more eggs in reserve, so more eggs remain after treatment.

In general, a man's fertility will begin to decline between ages 40 and 50. But cancer treatment can affect fertility in men of all ages, including boys who have not yet reached puberty.

Chemo may be more damaging to sperm production in men who are over 40.

Do fertility drugs cause cancer?

A few early studies suggested a link between fertility drugs and ovarian cancer, but more recent studies suggest there's no direct link between them. If you are getting any of the drugs that stimulate eggs, talk with your doctor or nurse about their short- and long-term risks and side effects.

Are the rates of birth defects higher in children born to cancer survivors who have had treatments like chemo and/or radiation therapy than in the general public?

So far studies strongly suggest that children born to cancer survivors are no more likely than others in the general public to have birth defects.

Do children of cancer survivors have higher risks of getting cancer?

Research shows that no unusual cancer risk has been identified in the offspring of cancer survivors. The exception to this is in families who have true genetic cancer syndromes. If there's a lot of cancer in your family, you might want to check with a genetic counselor to see if any of your potential children would have a higher than usual chance of having cancer.

If it looks like I am fertile after treatment, should I use the sperm, embryos, or eggs I froze before treatment?

This decision should be made with the help of a fertility specialist or a reproductive endocrinologist. Most fertility specialists would recommend that cancer survivors who recover fertility should try to conceive naturally with the sperm or eggs they are producing. There's no proof of an increased risk of birth defects in children born after cancer treatment. Fresh is usually preferred over frozen, but there could be other factors that affect your individual situation.

Do cancer survivors have trouble adopting because of their medical history?

There's no published research on this subject. Most adoption agencies say they do not rule out cancer survivors as parents. But they often require medical exams and a letter from an oncologist saying that the cancer survivor has a good prognosis (outlook for survival).

Some agencies or countries that offer international adoption may require that a cancer survivor be cancer free for 5 years before applying for adoption.

Other issues

Insurance and financial concerns

After reviewing treatments to preserve fertility, most people will ask themselves if they can ever afford any of these options. Many of the tests that diagnose fertility are covered by insurance, but treatment costs are often not covered. Some states have laws that require varying amounts of coverage for infertility and IVF treatments. But many patients are not covered by these laws and many more live in states with no or limited coverage.

In order to get your insurance plan to pay for infertility treatments, you must first call your insurance company and ask about the steps you need to take to petition for coverage. Some patients have been able to get infertility treatment covered when they explained or had their doctor show that the infertility was a side effect of a necessary medical treatment.

The costs of infertility treatments are a major barrier for most patients. Still, there are options available for some people, even if they cannot get insurance to cover it.

The first step is to figure out which treatment might be an option for you, where you can get it, and what the costs are. It helps to speak with a financial counselor in the infertility practice and ask for details about the treatment, its costs, and even specific insurance codes for the services you might need. One tip is to ask the financial counselor to get written confirmation by letter from your insurance company about which costs are covered and which are not. At that point, you might need to sit down and review your finances. Consider what you have in your bank and retirement accounts, any credit card help, or even if you can get help from family members.

Some practices provide treatment packages at a single price and some offer financing options to make treatment more affordable by paying for it over time. Ask if these options are available. Some practices may take part in the Fertile Hope financial assistance program called "Sharing Hope," which reduces the costs of fertility preservation for qualifying patients. Information about Fertile Hope can be found in the "To learn more" section.

It's hard to think about spending money on fertility while you are dealing with other medical bills and cancer. Another barrier is that often you must act fairly quickly to preserve fertility before cancer treatment begins. Getting financial help and counseling is a start and will help you feel less alone as you try to plan for a future after cancer. Most families would say it's worth the effort even though it can be hard in the beginning.

Legal considerations

With new reproductive techniques like egg and sperm freezing, donor eggs and sperm, and surrogacy, you might want to talk to an attorney (lawyer). An attorney can help you understand legal documents and your rights. Since you could be dealing with complex medical issues, find an attorney who is familiar with reproductive technology legalities.

For example, if a spouse dies after embryos are fertilized, would he or she be willing for the surviving partner to use them anyway? If you do not use all your fertilized embryos, would you be willing to donate them to others who need them? These kinds of possibilities need to be understood and worked out in advance. An expert attorney can help you with the complicated issues of assisted reproduction, donation of sperm or eggs, and surrogacy.

There are also specialized lawyers who work with adoption services. They can help the birth parents give up (terminate) their legal rights to the child and handle the adoption process. This can ensure a smoother adoption with less fear and anxiety.

Mental health services

Dealing with your cancer treatment and fertility issues may stir up strong emotions. You might feel overwhelmed, discouraged, or depressed. Some of the drugs women take for in vitro fertilization or to preserve fertility can have emotional side effects, too. These feelings are normal. A mental health professional can help you adjust to your cancer diagnosis and help you deal with your feelings about your fertility. This expert can also help you deal with feelings of guilt, anger, loss, and disability. Your therapist should understand the impact of cancer on fertility and help you sort through decisions about your parenting options. Having a third party who’s not as emotionally involved as you and your partner are can be very helpful.

You may be able to find an infertility support group through your fertility specialist’s office. Couples who share their unique experiences often find a special bond and strength. Infertility can be a roller coaster of highs and lows. It helps to go through that with others who understand.

Child-free living

Many couples may consciously decide to not have children and focus on its advantages. 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. Reaching a decision together may become an exciting new investment in your future as partners. If you still feel unsure, talking with a mental health professional may help you both think more clearly about the issues and make the best decision.

To learn more

More information from your American Cancer Society

Here is some more information you might find helpful. You also can order free copies of our documents from our toll-free number, 1-800-227-2345, or read them on our Web site, www.cancer.org.

Coping with cancer

After Diagnosis: A Guide for Patient and Families (also in Spanish)

How to Find a Financial Professional Sensitive to Cancer Issues: Financial Guidance for Cancer Survivors and Their Families

Sexual effects of cancer and cancer treatment

Sexuality for the Man With Cancer (also in Spanish)

Sexuality for the Woman With Cancer (also in Spanish)

Cancer treatment information

Understanding Cancer Surgery: A Guide for Patients and Families (also in Spanish)

Understanding Chemotherapy: A Guide for Patients and Families (also in Spanish)

Understanding Radiation Therapy: A Guide for Patients and Families (also in Spanish)

Where to Turn: Patient and Family Support Program Overview Pamphlet (also in Spanish)

Books

Your American Cancer Society also has books that you might find helpful. Call us at 1-800-227-2345 or visit our bookstore online to find out about costs or to place an order.

National organizations and Web sites*

Along with the American Cancer Society, other sources of information and support include:

Fertile Hope
Toll-free number: 1-866-965-7205
Web site: www.fertilehope.org

> Provides a list of fertility specialists and sperm banks, and information on fertility risks, options, and research studies. Financial help is available from Sharing Hope, a program for newly diagnosed cancer patients who wish to preserve fertility by egg freezing, embryo freezing, or sperm banking (must meet eligibility requirements).
> Also has Live:On at-home sperm donation kits which can be ordered online at www.liveonkit.com/order.cfm.

Oncofertility
Web site: myoncofertility.org

> Has a timeline for patients with information about fertility at all cancer stages, from diagnosis to after treatment; also offers fertility information for parents of children with cancer.

International Council on Infertility Information Dissemination (INCIID)
Telephone: 703-379-9178
Web site: www.inciid.org

Offers information on getting early care with qualified specialists and how to find them; fertility fact sheets; online support forums and weekly chat sessions; and "From INCIID the Heart," help for in vitro fertilization for those with financial and medical need, but without health insurance to cover it (Click "Programs and Initiatives" on the INCIID home page.)

RESOLVE: The National Infertility Association
Telephone number: 703-556-7172
Web site: www.resolve.org

Provides information on the infertility journey, including treatment, coping, third party reproduction, adoption, child-free living, advocacy, and more. Also has fact sheets and personal stories. Local chapters/affiliates can be found on the Web site. Offers education and support groups; online community also available.

American Society for Reproductive Medicine (ASRM)
Telephone: 205-978-5000
Web site: www.asrm.org

Offers infertility information, fact sheets, and booklets on adoption, genetic screening for birth defects, in vitro fertilization, sexual problems, reproduction information for cancer patients, and more; choose "Resources" tab on the home page. Some info available in Spanish. Has a directory of ASRM member doctors.

American Society of Clinical Oncology (ASCO)
Toll-free number: 1-888-651-3038
Web site: www.cancer.net

A comprehensive online resource providing oncologist-approved cancer information to help patients and families make informed health care decisions. Has "ASCO's Guideline on Fertility Preservation" for patients available for free at www.cancer.net/patientguides.

American Academy of Adoption Attorneys
Telephone: 202-832-2222
Web site: www.adoptionattorneys.org

Offers list of experienced adoption attorneys.

American Association of Tissue Banking (AATB)
Telephone: 703-827-9582
Web site: www.aatb.org

Lists those sperm banks that have received accreditation by the AATB.

Directory of Sperm Banks
Web site: www.spermbankdirectory.com

Maintains basic sperm banking information along with lists of sperm banks in the United States.

**Inclusion on this list does not imply endorsement by the American Cancer Society.*

No matter who you are, we can help. Contact us anytime, day or night, for information and support. Call us at **1-800-227-2345** or visit www.cancer.org.

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