Fertility and Men With Cancer

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

How cancer treatment will affect your fertility depends on the type of treatment you get. Fertility effects also depend on other factors, such as the type of cancer, where it is, your age and overall health, and your response to treatment.

If you can, talk with your doctor, nurse, or another member of your health care team about fertility **before treatment**. There might be ways to save or protect your fertility before and maybe even during treatment. But after treatment, options are often more limited. (Parents of children with cancer should consider this, too. These special concerns are addressed in the section called "Preserving fertility in boys and teens with cancer.")

Some of the things that must be considered when trying to preserve fertility are:

- Age
- Diagnosis
- Type of cancer treatment
- Time (some fast-growing cancers need to be treated right away)
- Modesty or embarrassment
- Cost

The most common reason men do not address fertility before treatment is lack of information. Talk to your medical team if you have concerns about your ability to father a child someday.

Most cancer survivors can still choose to become a parent if they wish. It might not happen the way it was expected to before cancer, but if you can be flexible, you'll find that there are options to help.

What is infertility?

Infertility is not being able to start or maintain a pregnancy. For a man, it means that he cannot father a child.

Men are infertile if:

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

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 cancer doctor (oncologist) may not be well-informed about fertility problems, or might seem to look at this issue as less important than 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, 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.

- Will this treatment have any short- or long-term effect on my reproductive system? If so, what kind of effect and how long is it likely to 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 sperm banking, adoption, or using donor sperm?
- Should I speak with 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?

How cancer treatments can 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 cancer treatments, can interfere with some part of the process and affect your ability to have children. Different types of treatments can have different effects.

- Chemotherapy
- Targeted and biologic (immune) therapies
- Hormone therapy
- Bone marrow or stem cell transplant

- Radiation therapy
- Surgery

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.

Chemotherapy (chemo) works by killing cells in the body that are dividing quickly. Since sperm cells divide quickly, they are an easy target for damage by chemo. Permanent infertility can result if all the spermatogonial stem cells (the immature cells in the testicles that divide to make new sperm) are damaged to the point that they can no longer produce maturing sperm cells.

The risk of the chemo causing infertility varies depending on:

- **The patient's age.** For example, men older than 40 may be less likely to recover their fertility after treatment.
- **The type of drug(s) used.** Some drugs are more likely to affect fertility than others (see lists below).
- **The doses of drugs given.** The higher the doses of chemo, the longer it takes for sperm production to get back to normal after treatment, and the more likely it is to stop.

After chemo treatment, sperm production slows down or may stop altogether. Some sperm production usually returns in 1 to 4 years, but it can take up to 10 years. If sperm production has not recovered within 4 years, it's less likely to ever recover.

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

- Actinomycin D
- Busulfan
- Carboplatin
- Carmustine
- Chlorambucil
- Cisplatin
- Cyclophosphamide (Cytoxan®)
- Cytarabine
- Ifosfamide
- Lomustine
- Melphalan
- Nitrogen mustard (mechlorethamine)

- Procarbazine

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

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:

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

Talk to your doctor about the chemo drugs you will get and the fertility risks that come with them. If you'd like more information on a drug used in your treatment or a specific drug mentioned in this section, see our *Guide to Cancer Drugs* , or call us with the names of the medicines you're taking.

Targeted and biologic (immune) therapies

Targeted drugs attack cancer cells differently from standard chemo drugs. These drugs have been used a lot more in recent years, but little is known about their effects on fertility or problems during pregnancy.

The small amount of data that's available on a group of targeted drugs called tyrosine kinase inhibitors (TKIs), such as imatinib (Gleevec®), suggests that pregnancies started by young men getting TKIs are probably not at an increased risk of complications or birth defects. Still, these

men need to know that there's not enough research available to know that it's safe to start a pregnancy while on these drugs. And at this time the recommendation is that men talk to their doctor before starting a pregnancy while taking TKIs.

See *Targeted Therapy* and *Immunotherapy* to learn more about these cancer treatments.

Hormone therapy

Some hormone therapies used to treat prostate or other cancers can affect sperm production and your ability to have a child. Talk to your doctor about this risk and about whether it's safe to start a pregnancy while taking these drugs.

Bone marrow or stem cell transplant

Bone marrow or stem cell transplant usually involves high doses of chemo and sometimes radiation to the whole body before the transplant. In most cases, this causes life-long infertility – it permanently prevents a man from making sperm. (See the sections called "Chemotherapy" and "Radiation therapy" for more on these parts of the transplant.)

If you'd like to learn more about transplant, see *Stem Cell Transplant (Peripheral Blood, Bone Marrow, and Cord Blood Transplants).*

Radiation therapy

Radiation treatments use high-energy rays to kill cancer cells. 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 testicular cancer and 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 gets radiation to treat a tumor in his abdomen (belly) or pelvis, his testicles may still end up getting enough radiation to harm sperm production.

Sometimes radiation to the brain affects the pituitary gland. The pituitary gland normally signals the testicles to make hormones, so interfering with these signals can affect sperm production and cause problems with fertility.

You may be fertile when you're getting radiation treatments, but your sperm may be damaged so it's important to not start a pregnancy until treatment is completed. Talk to your doctor about how long you should wait.

You can get more details about this type of treatment in *Understanding Radiation Therapy: A Guide for Patients and Families*.

For men getting radiation for prostate cancer

Brachytherapy: 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 will need to use birth control during and after treatment if they do not want to father a child.

External radiation: Radiation for prostate cancer from a machine outside the body is more likely to cause permanent infertility, even if the testicles are shielded. (See “Radiation shielding” in the section called “How cancer treatments can affect fertility in men” for more on this.)

Surgery

Surgery offers the greatest chance of cure for many types of cancer, especially those that have not spread to other parts of the body. But surgery on certain parts of the reproductive system can cause infertility.

Our document *Understanding Cancer Surgery: A Guide for Patients and Families* gives you more information on this cancer treatment.

The following types of surgery may affect a man’s fertility:

Surgery for testicular cancer

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 can 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. See our detailed guide called *Testicular Cancer* for more on this.

Testicle removal (both testicles) for prostate cancer

Some men with prostate cancer that has spread beyond the nearby area may have both testicles removed to stop testosterone production and slow the growth of prostate cancer cells. This is called a *bilateral orchiectomy*. These men cannot father children unless they banked sperm before surgery.

Our document called *Prostate Cancer* has more information on prostate cancer and how it’s treated.

Surgery to remove the prostate (radical prostatectomy)

For men who have prostate cancer that has not spread beyond the gland, surgery to remove the prostate gland and seminal vesicles is one of the treatment options. The prostate and seminal vesicles are the parts that produce semen. Whether the prostate is removed through a cut in the abdomen (belly) or in the perineum (the area behind the testicles and in front of the anus), this surgery leaves men with no semen. Surgery to remove the prostate also can damage the nerves that allow a man to get an erection, causing erectile dysfunction (ED). This means he cannot get an erection sufficient for sexual penetration. You can get more information on these issues in our detailed guide called *Prostate Cancer*.

Even if you can get an erection, if there’s no semen coming from the penis during orgasm, you cannot conceive a child during sex. But there are ways to remove sperm and use it to fertilize an egg. See “Testicular sperm extraction and epididymal sperm aspiration” to learn more about this.

Surgery to remove the bladder (cystectomy)

Surgery to treat some bladder cancers is much like a radical prostatectomy, except the bladder is also removed along with the prostate and seminal vesicles. The testicles still make sperm, but the *vas deferens* (the paths the sperm take to the urinary tube) are 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. The *Bladder Cancer* detailed guide has more details on this surgery.

Because no semen comes out of the penis during orgasm, you cannot conceive a child during sex. But there are ways that sperm might be taken out and used to fertilize an egg. See "Testicular sperm extraction and epididymal sperm aspiration" for more information on how this might be done.

Surgery that interferes with erection and ejaculation

A few types of cancer surgery can damage nerves that are needed to get an erection and 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 erections and ejaculation. Sometimes surgery can completely paralyze the prostate and seminal vesicles, which normally squeeze and relax to move the semen as a man's climax begins.

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.

In cases of retrograde ejaculation, medicines can sometimes restore normal ejaculation of semen. 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, ephedrine sulfate is the most common medicine used to restore normal ejaculation. 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.

Fertility specialists can also gather sperm from these men using several types of treatments including, electrical stimulation of ejaculation (see "Electro-ejaculation" in the section called "How cancer treatments can affect fertility in men"), or sperm aspiration surgery (see "Testicular sperm extraction" in the section called "How cancer treatments can affect fertility in men").

Preserving fertility in men with cancer

The following chart shows current options for preserving fertility before, during, and after cancer treatment. Ideally, fertility discussions should take place before treatment, but we know this is not always the case.

You can use this information to learn more and then discuss your fertility options with your doctor. In some cases, you and your doctor might decide to use more than one option to try to preserve your fertility, especially if one option 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 men and those with long-term partners might want to include them in these discussions and decisions.

This chart can help you learn more about your current options. After the chart we discuss the details of the listed options in alphabetical order.

Fertility options for men with cancer

Before treatment	**During treatment**	**After treatment**
Sperm banking	Radiation shielding	Adoption[+]
Testicular sperm extraction (TESE) or epididymal sperm aspiration*		Collecting sperm from urine*
Testicular tissue freezing*		Donor sperm
		Natural pregnancy
		Electro-ejaculation*
		Using banked sperm – see Sperm banking
		Testicular sperm extraction (TESE) or epididymal sperm aspiration*

* Experimental

[+] May be available at any point in time

Adoption

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

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.

Costs of adopting vary greatly, from less than $4,000 (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 can do so.

Collecting sperm from urine

Sometimes the nerves that are needed to ejaculate semen or close the valve at the bottom of the bladder are damaged during cancer surgery. When this happens, the man still makes semen, but it doesn't come out of the penis at orgasm. Instead, it shoots backward into his bladder (called *retrograde ejaculation*). This is not painful or harmful, though the urine may look cloudy afterward because there's semen in it.

Fertility specialists may be able to collect sperm from the urine of these men and use them to fertilize their female partner's eggs in the lab through *in vitro fertilization* (in IVF, mature eggs are removed from a woman's ovaries, joined with sperm in the lab, and then put in a woman's uterus to develop.)

Donor sperm

Using donor sperm (also called *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. They are also tested for sexually transmitted diseases, including HIV (the virus that causes AIDS) and the hepatitis B and C viruses. Couples may be able to choose a donor who will remain anonymous or one who is willing to have contact with the child later in life. Anonymous donor sperm usually costs less.

Intrauterine insemination with donor sperm usually is done in the doctor's office. The purified sperm sample is put right 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 $200 to $700 a sample, which does not include the cost of the insemination or the cost of hormones for the woman. Be sure to ask for a list of all fees and charges, since these differ from one sperm bank to another (see "Insurance and financial concerns" in the section called "Other fertility-related issues to think about").

Electro-ejaculation

This is still an experimental procedure, and only a few successful pregnancies have been reported.

After some cancer surgeries, a man still makes semen, but it doesn't come out of the penis at orgasm (climax). In these cases, fertility specialists may be able to collect sperm using electrical stimulation of ejaculation, or electro-ejaculation.

Another possible use of this technique is in young cancer patients who cannot produce semen samples (for sperm banking) with the aid of masturbation, but at this time this is not a common practice.

Drugs are used to put you into a deep sleep for this procedure. Then a probe is put into the rectum and a low voltage electrical current is used to stimulate ejaculation. The semen collected can then be used for either intrauterine insemination (where the sperm are put into the woman's uterus to fertilize an egg naturally) or for IVF (*in vitro fertilization* – where mature eggs are removed from a woman's ovaries, joined with the sperm in the lab, and then put in a woman's uterus to develop).

Electro-ejaculation can cause scar tissue to form, so it's not used often. It must be done with a special machine that's only available in some infertility clinics.

Natural impregnation

You might be able to make a woman pregnant both during and after cancer treatment. But during and for some time after treatment, a man's sperm may have a higher risk of genetic damage.

Your medical team may recommend waiting anywhere from 1 to 5 years before trying to have a child. The exact length of time is not known and depends on the type of cancer and the treatment used. It's best to have this discussion with your medical team and your partner before going on with a pregnancy plan.

Radiation shielding

Fertility may sometimes be saved in men who are getting radiation treatments that focus the rays on a very small area. For some getting radiation to the pelvis, the testicles can be protected with a lead shield. If radiation is aimed at one testicle (as for some testicular cancers), the other testicle can be shielded.

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 type of treatment you will get. You might want to bank sperm to raise the odds of successful conception later on.

Sperm banking

Sperm banking is the only well-established method of fertility preservation for men. It's a fairly easy and successful way for men who have gone through puberty to store sperm for future use. It's usually offered to young men before cancer treatment, but if you know you might want to father a baby later, don't wait to ask about it. Your doctor can refer you to a sperm bank or you can find one online (see the "To learn more" section at the end of this document).

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. Semen can be collected every 24 to 48 hours. This is usually done in a private 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 protective chemical, and express mails it to the sperm bank right away.

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 might want to have children after completing cancer treatment, even if they aren't sure now. By storing sperm, they can decide later. If the samples are not used, they 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 (see "Electro-ejaculation" – above) or microscopic surgery (see "Testicular sperm extraction and epididymal sperm aspiration" – below).

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 condom that's 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, can 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 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 decades.

Keeping in touch with your sperm bank

It's important to stay in contact with the sperm bank so that yearly storage fees are paid and your address is updated. Once a couple is ready to have a child, the frozen sperm is sent to their fertility specialist.

Using sperm for 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 put 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 to increase the chance of pregnancy. This is called *super-ovulation*.

Using sperm for in vitro fertilization

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*.

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.

Many 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 or may not have time to store semen samples 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 about $25 to $35 a month, which covers 3 sperm donations and 5 years of storage. Insurance coverage may be available and banking costs vary greatly, so it's important to compare different centers. Many sperm banks offer financing and payment plans for people with cancer.

Testicular sperm extraction and epididymal sperm aspiration

Epididymal sperm aspiration and *testicular sperm extraction* (TESE) are experimental fertility options for collecting sperm in 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 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.

With either technique, if mature sperm are found, they can be used right away (for IVF-ICSI, described above) or frozen for future use.

Testicular tissue freezing

Testicular tissue freezing is an experimental procedure for young boys who have not reached puberty. At this time there are no proven fertility-preserving methods for these boys and this is the only option. But this is still a new approach, and there have been no reported live births resulting from this technique so far.

In this procedure, tissue from the testicles is collected with a thin needle. (This is usually done while the patient is getting anesthesia for another needed procedure, such as surgery to put in a vascular access device.) 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, which might allow him to make his own sperm.

One concern is that tissue taken from a boy 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, so you will want to ask about the freezing and annual storage costs as well as removal and transplant expenses. A few centers may be doing research studies that pay for the costs.

Preserving fertility in boys and teens 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 4 out of 5 children treated for cancer live a long time, and infertility can become an issue for survivors when they reach young adulthood.

Talk with your son's doctor about the risk of infertility with the specific cancer treatment he will get. Sometimes, cancer treatment can cause complete infertility.

Talking to a child or teen about fertility

Not only should the oncology team discuss fertility with the parents, but it should also be mentioned to the child as soon as he is old enough to understand. If he is not old enough to discuss fertility while he's being treated for cancer, parents may need to tell him 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 the child is old enough to understand fertility when he's being treated, he should be asked if he agrees to the treatment. Even though he's not able to give full legal consent because of his age, a child who can understand must generally agree (this is called *assent*) before a procedure can be done. The parents also must give consent before the procedure, after being told the risks, complications, and success and failure rates.

Options before puberty

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. Studies have found that testicular volume, not age or

reproductive hormone levels, is the best way to know if a boy is able to make sperm. It's been suggested that all boys with testicular volumes of more than 5 ml should be offered semen banking before cancer treatment – this may be something you want to talk to your son's doctor about.

Testicular tissue freezing (testicular cryopreservation) has been used in young children, but to date there are no reports of successfully putting the tissue back into the testicle after treatment or of fathering a child as a result.

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.

Options after puberty

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.

But both emotional and physical maturity must be considered. Young teens often feel very anxious about masturbating to produce a semen sample, especially if they must talk about it with their parents or have not done it before. 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 "Electro-ejaculation" and "Testicular sperm extraction and epididymal sperm aspiration" in the section called "How cancer treatments can affect fertility in men" for more information.

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. Many studies have found 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.

If I didn’t act 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. This is something you need to discuss with your oncologist. You may need to see 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’ve had trouble conceiving for 6 to 12 months, despite having sex at the right times of the month, you may have a fertility problem and may need to see a specialist.

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

There is no set time. It’s very important to discuss this with your doctor to find out what’s best for you.

How long can sperm 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.

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

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.

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 I froze before treatment?

Make this decision with the help of a fertility specialist or a reproductive endocrinologist. Most fertility specialists recommend that cancer survivors who recover fertility should try to conceive naturally with the sperm they are producing, but more research is needed in this area.

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, so be sure to discuss this with a specialist.

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 a cancer survivor be cancer-free for 5 years before applying for adoption.

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

Other fertility-related issues to think about

Insurance and financial concerns

After reviewing treatments to preserve fertility, most people wonder 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.

To get your insurance plan to help 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 cancer 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.

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 fertility 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 lines of credit you have (including credit cards), 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

You might want to talk to an attorney (lawyer) about the fertility options you are considering and possible legal issues that may arise. An attorney can help you understand legal documents and your rights. Since you could be dealing with complex medical issues, find an attorney who’s familiar with reproductive technology legalities.

For example, if a spouse or partner 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, what will you do with them? 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 help 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. 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 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 website, 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)

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)

Targeted Therapy

Immunotherapy

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 websites*

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

Fertile Hope
Toll-free number: 1-855-220-7777
Website: 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 enable sperm banking by mail. Kits can be ordered online at www.liveonkit.com.

Oncofertility Consortium
Toll-free number: 1-866-708-3378
Website: myoncofertility.org

> Has a timeline for patients with information about fertility at all cancer stages, from diagnosis to after treatment; also offers assistance in finding a local fertility preservation specialist, as well as information for patients and their parents or partners whose fertility may have or will be impaired by cancer treatment.

International Council on Infertility Information Dissemination (INCIID)
Telephone: 703-379-9178
Website: 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 “IVF Scholarships & Programs” on the left side of the INCIID home page.)

RESOLVE: The National Infertility Association
Telephone: 703-556-7172
Website: 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 website. 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. Also 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 "What to Know: 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 member adoption attorneys and affiliated agencies.

Sperm Bank Directory.com
Web site: www.spermbankdirectory.com

> Offers 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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