

**FS23** in a series providing the latest information for patients, caregivers and healthcare professionals.

## Highlights

- Fertility describes the ability to conceive a biological child. Some cancers and some cancer treatments affect fertility in males and females.
- The risk of infertility caused by cancer and its treatment is based on several factors, including the type of cancer; the type, duration, and doses of treatment; and the patient's age at the start of treatment.
- Addressing fertility and sexual health is an essential part of cancer treatment and follow-up care. It is important to talk with members of your oncology team before treatment begins about the potential effects of your treatment.
- There are many options available to help you preserve the ability to have biological children in the future. Some of these choices require that action be taken before treatment begins. Not all patients starting cancer treatment will need or want to consider this subject, but it is important to discuss fertility concerns with your treatment team.
- Sperm cryopreservation (sperm banking) is the fertility preservation method with the highest likelihood of success for male cancer survivors. Embryo/egg freezing is the method with the highest likelihood of success for female cancer survivors.
- Most cancer survivors who can conceive after treatment have normal pregnancies and healthy babies. However, patients should talk with their oncologists about any potential risks they face regarding conception or pregnancy.
- There are many ways to build a family, whether through natural conception, using assisted reproductive technology, or adoption. Patients who want children should consider and discuss all options.

## Introduction

Chemotherapy and radiation can cause “late” side effects that may appear months or years after treatment has ended. One possible late effect is infertility, the inability to conceive a child without medical intervention. When first diagnosed with a blood cancer, your primary concern may be your upcoming treatment and long-term survival. You may not be thinking about whether you can or want to have children in the future. However, information about the potential effects of your treatment can help you take steps to leave your options open, which includes conceiving a child after cancer treatment.

This publication provides only general information about this topic. Speak with members of your healthcare team about the specific effects of your treatment and the fertility preservation options that are available to you.

Visit [www.LLS.org/booklets](http://www.LLS.org/booklets) to read more about other late effects in the free LLS publications, *Long-Term and Late Effects of Treatment for Childhood Leukemia or Lymphoma Facts* and *Long-Term and Late Effects of Treatment in Adults Facts*.

## Cancer and Fertility

Not all cancer treatments affect fertility. The risk to your fertility depends on several factors, including

- Your age at the time of diagnosis
- The type and dosage of chemotherapy drug(s) you receive
  - Alkylating agents—for example, cyclophosphamide, ifosfamide and procarbazine, along with the drug cisplatin—have the most significant effect on fertility. Other drugs are generally less toxic to sperm-forming cells and eggs, but can also cause infertility, especially when used as part of a combination of therapies.

- The location and dosage of radiation
  - Exposure to the testes may destroy cells that form sperm.
  - Exposure to the ovaries may destroy eggs.
  - Exposure to the pituitary gland in the brain may cause changes in secretion of hormones that regulate puberty and fertility.
- The duration of treatment
- Whether you received a blood or marrow stem cell transplantation, which is associated with a high risk of infertility
- The type of cancer. Certain cancers cause decreased sperm counts. For example, patients with leukemia, Hodgkin lymphoma and testicular cancer may have a low sperm count at the time of diagnosis.

Other medical issues unrelated to cancer can also impact fertility.

### Possible effects on males

- Sexual dysfunction, that is, the inability to achieve or maintain an erection
- Lower-than-normal testosterone production
- Loss of sperm production, which may be temporary or permanent
  - If sperm production recovers, it can take 1 to 3 years, and sometimes longer

Analysis of a semen sample can indicate whether you are making sperm. This can be done after treatment is completed. Talk with your doctor about when to be evaluated.

### Possible effects on females

- The ovaries (organ where eggs are produced) are especially susceptible to damage during cancer treatment because they contain germ cells that cannot be regenerated after birth. When female babies are born, nearly one million follicles that contain eggs are present in their ovaries; but females cannot produce new eggs. Therefore, the total effect of cancer treatment on fertility will depend on how many eggs remain after treatment has ended.

Chemotherapy protocols containing alkylating agents can be especially damaging to ovarian tissue, causing:

- Disruption of the menstrual cycle (periods), which may be temporary or permanent
- Premature ovarian failure (POF), also called premature menopause. This is a loss of ovarian function in a female younger than 40. When POF is caused by cancer treatment, it is unlikely that a female will have subsequent menstrual periods or be able to become pregnant without medical intervention. Generally, POF is managed with hormone (estrogen and progesterone) replacement therapy.
  - Females with POF are encouraged to eat a healthy diet and exercise regularly (aerobics and weight training) to decrease the health risks of osteoporosis and heart disease. Calcium and vitamin D supplements for bone health may also be prescribed.
  - Females who retain a degree of ovarian function after treatment or those who restart menstruation may still develop POF and have trouble conceiving later in life. If you are at risk for POF, you may want to start a family early. If you are fertile after treatment but not ready to start a family, you may want to consider egg or embryo freezing (see page 3).
- Radiation to the pelvic area can cause damage to the uterus (womb) and increase the risk for infertility, miscarriage, or premature birth
- Chemotherapy and/or radiation may cause sexual dysfunction, including loss of desire, pain during intercourse and inability to achieve an orgasm.
- Females who undergo cancer treatment as children tend to have fewer fertility problems than females treated during the teen or adult years, but they can still be at risk for infertility.
- Changes in your body or difficulty conceiving may or may not be related to the effects of your cancer treatment. Talk with your doctor if you have:
  - Irregular menstrual cycles
  - Hot flashes
  - Breast tenderness
  - Painful intercourse
  - Trouble getting pregnant
  - A history of miscarriages
  - Early or delayed onset of puberty (in children)
  - Any other questions or concerns

### Options to Preserve Fertility Before Treatment

You may be able to take steps before treatment begins to preserve your fertility. The options available to you depend on

- Your age, sex and current fertility status
- Your overall health at the time of diagnosis
- How quickly you need to begin cancer treatment

Some of the options to preserve fertility on the following pages are available for children, even those who have not gone through puberty. See *Fertility Issues in Children and Adolescents With Cancer* on page 5 to learn more about how to address fertility issues with your minor child and the healthcare team.

#### Options for Males

- **Sperm banking (cryopreservation).** This is a common, noninvasive option. It involves the collection of semen by masturbation. If there are sperm in the semen, they can be frozen and stored at a special facility (some hospitals have sperm bank programs) for possible future use. Sperm banking is a reliable and effective fertility preservation option with the highest likelihood of success for males. However, the success of sperm banking may be limited in some patients, such as those with Hodgkin lymphoma and testicular cancer, who may already have low sperm counts caused by the cancer.

The American Society of Clinical Oncology guidelines recommend that sperm banking be offered to all males who have gone through puberty and who have a recent diagnosis of cancer. Most male children have some sperm in their semen by about age 13. The optimal timing for sperm banking is prior to the start of therapy because the quality of the semen and the DNA integrity of the sperm can be affected even after a single course of chemotherapy.

- **Electroejaculation.** For males who cannot perform masturbation for physical or emotional reasons or because of cultural prohibitions, this procedure can be performed. It involves an electrical current to stimulate ejaculation while a patient is under anesthesia. Another option is penile vibratory stimulation, which employs a special device that attaches to the penis.

- **Testicular sperm extraction (TESE).** For males who have no sperm in the semen specimen, this surgical procedure, performed under anesthesia, can be considered. The doctor removes pieces of tissue from the testes, which are then examined for mature sperm. These can be removed from the tissue and frozen for possible future use.
- **Testicular shielding.** A shield can be used to protect the testicles during radiation therapy. This must be planned before treatment begins, and the shields must be used every day of treatment. Not all patients will be able to use shields, because sometimes there is a need to treat the testes with radiation.
- **Testicular tissue cryopreservation (TTC).** Males who have not yet gone through puberty do not produce mature sperm, so they cannot preserve their sperm in a sperm bank. Testicular tissue cryopreservation (TTC) is considered an experimental approach. This method involves collecting and freezing a small amount of testicular tissue with the hope that the tissue will contain stem cells that would later produce mature sperm. The healthcare team can later thaw and place the tissue back into the testicle, or inject stem cells taken from the frozen tissue. For some types of cancer, the doctor may advise against tissue freezing because of a concern that transplanted tissue could carry cancer cells back into the body. Researchers are still learning about these methods and further study is needed.

#### Options for Females

- **Egg or embryo cryopreservation (freezing).** These are procedures in which mature eggs are removed from the ovary to be frozen and stored for possible use in the future. They can be frozen as unfertilized eggs or as eggs fertilized with sperm and then frozen as embryos. These procedures are performed by trained specialists called reproductive endocrinologists.
  - **Egg freezing.** A female who has gone or is going through puberty can freeze her eggs. Puberty usually occurs between the ages of 9 and 15. This method of freezing eggs begins with hormone fertility treatment. The patient receives daily hormone injections for about 10 days to stimulate the ovaries. The patient is given an anesthetic, and the eggs are then removed from the ovaries and frozen for future use without being fertilized. The entire process generally takes two to four weeks; however, it can possibly be done in less time.

Sometimes it is necessary to begin cancer treatment right away, which does not allow time for hormone fertility treatment. Instead, egg collection may occur after only brief fertility treatment or without fertility treatment. However, these eggs will not have fully matured in the ovaries. The eggs must then undergo in vitro maturation, which means that the eggs will mature in a laboratory. Researchers are still learning about in vitro maturation and success rates are lower than when freezing mature eggs.

Since egg freezing does not require sperm at the time of collection, it is a good option for females who may be undecided about family plans and do not want to use donor sperm to fertilize their eggs. It is also a choice for those who have religious or ethical objections to embryo freezing.

- **Embryo freezing.** After a 10-day period of hormonal stimulation of the ovaries, egg retrieval is performed under anesthesia. Then the eggs are fertilized in the laboratory with sperm from a partner or donor to create embryos (this is called IVF, in vitro fertilization). The embryos are then frozen and stored for possible future use. Embryo freezing is the option with the highest likelihood of success for females. The process can typically take about two weeks, but it may be done faster if necessary.

These fertility preservation techniques are not indicated for females with aggressive cancers that require immediate treatment or for females with hormone-sensitive cancers. These techniques cannot be done for females who have not reached puberty.

- **Ovarian tissue freezing.** Freezing ovarian tissue for later transplantation may be an option. This procedure is for females who have not yet gone through puberty and have no mature eggs, and also for females who need to start treatment quickly. These patients may be able to undergo a procedure in which part of the ovary (or the entire ovary) is removed and frozen for possible future use. At the time of removal, the tissue is evaluated for evidence of cancer. The outer layer of the ovary that holds the eggs is removed, cut into small pieces, and frozen. The tissue is stored for the patient's use. The ovarian tissue is retrieved through surgery and the tissue can later be transplanted to the pelvis. This method has been considered experimental but is becoming a more standard option.

The ovarian frozen tissue containing eggs is used in two main ways:

- 1) Transplantation of the tissue back into the patient with the hope that the eggs will mature and be released through ovulation
- 2) Isolation of eggs from the tissue for in vitro growth, maturation and future fertilization

As of 2018, approximately 130 babies have been born after re-implantation of ovarian tissue, mostly from patients who were adults at the time of tissue freezing. For some types of cancer, the doctor may advise against tissue freezing because of a concern that the transplanted tissue could carry cancer cells back into the body.

- **Ovarian transposition (oophoropexy).** If the ovaries will be in the radiation treatment field, patients may undergo this minor surgical procedure in which a doctor moves the ovaries outside of the radiation field to minimize exposure and radiation damage. Even when the ovaries are moved, they may still be exposed to some radiation.
- **Ovarian suppression with gonadotropin-releasing hormone (GnRH) agonists**—GnRH agonists are drugs that are modified versions of a naturally occurring hormone known as gonadotropin-releasing hormone, which helps control the menstrual cycle. Leuprolide is a type of GnRH agonist. This drug, when administered during cancer therapy, may protect the ovaries from damage by preventing ovulation (when the ovary releases a mature egg) and reduce the number of eggs that are affected during cancer treatment. The drug is usually given one to two weeks before the beginning of the first chemotherapy cycle and continues until the treatment is completed. Side effects may include symptoms similar to those of menopause, such as hot flashes and mood swings. Ovarian suppression has been studied mainly in females with breast cancer and lymphoma. Based on data from those studies, it is unclear if this technique can preserve fertility, and further research is needed.

### Emerging Techniques Under Study

- **Artificial ovary.** Researchers have been working to develop a process to create an “artificial ovary” constructed from the patient’s own frozen ovarian tissue for transplantation. Once transplanted into the patient, this ovary will potentially restore both hormonal function and fertility.
- **Nanoparticles.** Some studies are focusing on finding better ways to protect eggs from the toxic effects of cancer therapy. One approach is to encapsulate chemotherapy agents inside tiny (nano) particles that specifically target cancer cells where they are, decreasing the toxicity of these drugs into non-target tissues like the ovaries.
- **Fertoprotective agents.** Fertoprotective means protecting fertility. Fertoprotective agents may protect against the damaging effects of radiation and chemotherapy. Several agents are showing promising results in clinical trials; however, further research is needed to determine the effectiveness and safety of these agents in cancer patients.

### Fertility Issues in Children and Adolescents With Cancer

Pediatric cancer has seen a significant rise in survival rates in the last decades. Overall survival rates of about 80 percent can be expected for many newly diagnosed young patients. But success in using therapies such as radiation, chemotherapy and surgical procedures has translated into patients requiring medical attention for late and long-term effects. The potential negative impact of cancer treatment on the future reproductive health of childhood cancer survivors has placed fertility preservation at the forefront of survivorship care.

**Discussing Fertility Issues With Your Child.** Fertility is a complex concept, which may be hard to understand, especially for young children and adolescents. Parents may also find it difficult to discuss issues regarding sexuality and fertility with their children. Still, pediatric patients should be involved, as much as possible, in the discussion about how their cancer treatment can affect their future ability to have children. Parents can ask the pediatric oncology team to help them find age-appropriate ways to explain and talk about these issues with their children. Many pediatric oncology centers have multidisciplinary teams that include oncologists,

reproductive endocrinologists, nurses, psychotherapists, child-life specialists and social workers, who work together to help children and their families cope with disease, treatment and survivorship issues.

**Fertility Preservation for Children.** The American Society of Clinical Oncology (ASCO) recently updated guidelines on fertility preservation, acknowledging that adult, adolescent and pediatric patients and their families should be informed of fertility options. The guidelines state that discussion about infertility risks and options for preservation should occur as early as possible, and preferably before the start of treatment. The American Academy of Pediatrics supports these guidelines.

Some cancer treatments—like chemotherapy with alkylating agents and radiation—can have long-term effects on a child’s future fertility. In addition, some therapies can affect the endocrine system, the glands and cells that control growth and development. Talk with your child’s doctor if your child seems to be going through puberty early (before age 9) or has not entered puberty by age 15. The doctor will want to evaluate the child and may prescribe medicine to alleviate symptoms caused by hormone imbalance.

Parents may consider discussing these questions with the pediatric oncology team:

- Could the treatment plan affect my child’s ability to have children?
- Will this treatment affect my child’s ability to go through puberty?
- For female children: What are the chances this treatment will lead to early menopause? Can treatment affect some organs (like the lungs or heart) in a way that will increase the risk of problems during pregnancy or labor?
- Are there any cancer treatment options that may not affect my child’s fertility?
- What options are available to preserve fertility before treatment begins? Will any of these options affect how well the cancer treatment works?
- Would it be helpful to see a fertility specialist before treatment begins? Can you make a recommendation?
- Who can help me with financial concerns about the cost of fertility preservation?
- After treatment, how will my child know if his or her fertility has been affected?

Talk with your child's healthcare team about the risk of infertility based on your child's treatment plan. You may decide against fertility-preserving techniques and opt for cancer treatments that have a lower risk of affecting fertility. Many childhood cancer survivors go through puberty after cancer treatment and have children without medical intervention.

There are many online resources that parents and children can refer to for information and support. See the *Resources* section on page 10.

### Options for Having a Family After Treatment

Many patients will be able to conceive naturally after cancer treatment. Patients are generally counseled to wait at least two years after treatment is completed before attempting conception. Check with your doctor to find out how long after treatment you should wait. If you are not able to conceive naturally, there are a number of other ways to build a family.

#### Options for Males

- **Use of your frozen sperm.** Depending on the number of vials stored and the number and quality of the sperm specimens, there are two options for use of frozen sperm—artificial insemination and in vitro fertilization (IVF). Artificial insemination involves the injection of semen into part of the reproductive tract of a female partner (or surrogate) by a method other than sexual intercourse. Or, the female can undergo an in vitro fertilization (IVF) cycle to remove her mature eggs so they can be fertilized in the laboratory with the sperm. The embryos created are transferred to the female's uterus so pregnancy can occur.
- **Testicular sperm extraction (TESE).** If no sperm are present in the semen, this surgical procedure, performed under anesthesia, can be considered. The doctor removes pieces of tissue from the testes, which are then examined for mature sperm. If sperm are found, the male's female partner (or surrogate) can undergo an IVF cycle to remove mature eggs so they can be fertilized in the laboratory with the sperm. Embryos are created and then transferred into the female's uterus.
- **Donor sperm.** Sperm donated by another male is used to produce a pregnancy through artificial insemination.

#### Options for Females

- **Use of frozen eggs or embryos.** If eggs were frozen, they will first be fertilized in the laboratory with a male partner or donor's sperm to create embryos. The embryos are then transferred to the uterus so pregnancy can occur.
- **In vitro fertilization (IVF).** If a female has a low egg count (called a low ovarian reserve), she may want to consider undergoing an IVF cycle to remove mature eggs so they can be fertilized in the laboratory with a partner or donor's sperm. The embryos created are transferred to the uterus.
- **Donor eggs.** Eggs donated by another female who undergoes an IVF cycle can be fertilized in the laboratory with the partner's sperm. The embryos created are transferred to the female patient's uterus so pregnancy can occur.
- **Donor embryos.** Embryos are generally donated by couples who have undergone IVF for infertility. If these couples now have families, they may choose to donate their remaining embryos rather than discard them.
- **Surrogacy.** If you are unable to carry a child through pregnancy, you can arrange for another female (a gestational carrier) to carry the fetus for you. Embryos created with your eggs or donor eggs and your partner's sperm or donor sperm are transferred to her uterus.

#### Adoption

Adoption is also a choice for building a family after cancer treatment. In general, people who have been treated for cancer but are free of disease are eligible to adopt infants or older children. It is helpful to ask any agency you plan to use if they have worked with other cancer survivors, and if not, ask if they are open to working with you. You may need to talk to multiple agencies to find the best fit for you.

At this time, adopting from within the United States is generally easier than adopting internationally. However, agencies and attorneys can provide guidance on which countries may be willing to work with you because policies vary from state to state and from country to country.

As you discuss and think about adoption, you will need to consider the cost. The adoption process can total in the thousands of dollars. There are organizations that provide some financial assistance for this, and some tax benefits can help with qualified adoption expenses. Another option is to adopt a child after fostering one. This process is often funded by the state and has few fees. Ask about all options if you are interested in adopting.

### Other Reproductive Health Issues

**Ethical and Religious Concerns.** Fertility and reproduction in the context of a cancer diagnosis and treatment can raise a number of ethical, moral and religious issues related to the welfare of both patients and their future children. The decision-making process associated with these concerns may be accelerated by the need to start therapy. This can cause a great deal of anxiety for both patients and their families.

Some of the ethical issues related to fertility preservation that patients and their caregivers may have to consider include:

- Religious and cultural beliefs associated with fertility preservation
- The use of experimental versus established fertility preservation therapies
- The ability of minors to understand fertility issues and give consent to certain procedures
- The future welfare of children created by assistive reproductive technologies
- Decisions regarding posthumous reproduction (eg, what to do with stored eggs, sperm or embryos, in case the patient does not survive)

These are all sensitive and complex subjects that will require the patient (and/or parent) to consult with not only the medical treatment team but with their family members and possibly with legal and spiritual counselors who can guide them, help them make decisions and plan accordingly. It may also be helpful to connect with others who are going through similar experiences through support groups and online forums.

**Pregnancy After Cancer Treatment.** Most females of childbearing age who have been treated for cancer and are able to conceive can go on to have low-risk pregnancies and healthy babies. Females should be able to become pregnant if treatment did not affect their ovaries or uterus, and there are no other medical issues that may impact fertility. Before you try to become pregnant, talk with your treatment team about your medical readiness for pregnancy. You may also want to have a fertility assessment by consulting with a doctor called a reproductive endocrinologist.

Generally, females are advised to wait for at least two years after the end of treatment to try to conceive. This allows enough time for the patient to surpass the period

of an early cancer recurrence and allows the body to recover from the effects of treatment. If the treatment has caused late effects that might make pregnancy more difficult, it is recommended to consult a maternal-fetal medicine specialist prior to trying to conceive.

Even though some drugs used to treat cancer, such as imatinib (Gleevec®) or other, newer targeted therapies are not usually associated with infertility, they are not recommended to be taken by females who are pregnant. Patients, however, should not stop medication without medical advice. A female who is taking any cancer drug should consult her oncologist before trying to conceive, or if she is on cancer medication and thinks she is pregnant.

**Health of Children of Cancer Survivors.** Most children born to cancer survivors are healthy. The percentage of babies with birth defects born to cancer survivors is similar to that of babies born to parents without a cancer history.

When a parent is diagnosed with cancer, it does not mean that his or her child is at a greater risk for cancer. Very few cases of cancer are inherited (passed on from a parent to a child). You may want to ask members of your healthcare team if your cancer is a type that can be passed on to your children. If it is, you may want to ask for a referral to a genetic counselor.

**Breastfeeding.** Talk with the doctor about whether you will be able to breastfeed after treatment. If you have had radiation to the breast area, your ability to produce milk may be affected.

Some medicines should not be used while you are breastfeeding. Tell your healthcare team if you are starting or re-starting treatment and you are breastfeeding.

**Birth Control and Sexually Transmitted Diseases.** If you are sexually active, it is important to use birth control throughout your treatment and for a period of time after treatment ends. Some drugs can be very harmful to an unborn child and may cause birth defects. Pregnancy during cancer treatment or immediately after treatment ends may also not be safe for the mother.

Males who are receiving cancer treatment and whose partners are pregnant should wear condoms during sex. Chemotherapy can be excreted in semen and it is possible that exposure could cause fetal abnormalities.

Even if you believe you cannot become pregnant or father a child, you are still at risk for sexually transmitted diseases (STDs). It is important to protect yourself from STDs. A barrier method of contraception is recommended. Condoms, female condoms, film and dental dams help protect against STDs. Oral contraception (birth control pills) do not protect against STDs.

If, during cancer treatment, your white blood cell or platelet counts become too low, your doctor may advise you to abstain from sex until the blood cell counts return to normal levels because of an increased risk for infection or bleeding. Ask your healthcare team for more information.

### Talking With Members of Your Healthcare Team

Ask your oncology team about the fertility effects of your treatment. By having this information before treatment begins, you can consider the options most likely to preserve your fertility. You can also ask for a referral to a fertility specialist to help you understand and explore your options. Some questions you may want to ask are:

- What are the chances the treatment will affect my fertility?
- Have other females been able to get pregnant, or have males been able to father a child, without medical intervention after receiving this treatment?
- Are there alternative treatments that will not compromise my fertility?
- What can I do to protect fertility before treatment begins, during treatment and/or after treatment ends?
- How much time do I have to preserve my fertility before I need to start treatment?
- Can you recommend a fertility specialist that I can speak with?
- How will I know if treatment has affected my fertility? Are there any tests I can take?
- If I have a period of infertility after treatment, should I have my fertility status re-evaluated? If yes, how soon should I have a follow-up evaluation?
- Are premature ovarian failure or hormone deficiencies possible side effects of my treatment? If so, how could these be treated?
- If my fertility cannot be preserved, what are my options to start a family after treatment is over?

- Is pregnancy safe for me after treatment? How long should I wait after treatment ends to try to get pregnant?
- Are there any risks to my children based on the type of cancer I have and the treatment I received?

Learning that you have cancer-treatment-related infertility may bring up feelings of sadness, anger, or grief. Some people find it helpful to talk about this. Consider asking your healthcare team the following questions:

- Can you suggest a local support group of people who have been through the same challenges?
- Can you recommend a mental health specialist I can speak with?

### Talking With a Partner or Spouse

If you are already in an established relationship, you may want to discuss future plans of parenthood and options to preserve fertility with your partner. These conversations may also include other complex topics such as financial concerns related to fertility preservation.

In addition to affecting fertility, cancer treatment can also affect sexual function in both males and females. You both may need to prepare for changes to your intimate relationship and learn to work through them. Talk to your doctor about any changes you experience related to your sexual health. You may even wish to ask for a referral to a sex therapist.

People react to difficult situations, such as a cancer diagnosis and treatment, differently. Throughout your cancer journey, your partner may be your biggest source of practical and emotional support. Your partner may also have a difficult time coping. Either way, your relationship will probably change. If you hit a rough patch, it may be beneficial for you and your partner to do couples counseling. Ask your healthcare team for resources and recommendations.

You and your partner may find it helpful to attend a support group. There are support groups for people with cancer and their families. There are also support groups for people facing infertility. To find an infertility support group, use Resolve: The National Fertility Association's locator at <https://resolve.org/support/find-a-support-group/> to search by location. Your healthcare team and The Leukemia & Lymphoma Society can also help you access local or online support resources.

### Dating and Fertility

Dating and new relationships can be challenging no matter your situation. When and how you tell someone about your cancer diagnosis and fertility status is your choice. Some people prefer to tell a potential partner early in the relationship to clear the air. Others prefer to wait until they trust the person. The timing of when you discuss cancer and fertility with your potential partner will likely depend on a number of factors, such as the seriousness of your relationship or whether you or your potential partner already have children from prior relationships. Even for someone without a history of cancer, discussing children and the future can be intimidating. There is no right or wrong way or time to tell someone about your cancer history or fertility status.

Before talking about your diagnosis, you may want to take time to consider how much you would like to disclose about your diagnosis and impact of treatment on your sexuality and fertility. It may also be helpful to practice what you would like to say in advance. That way, you can try to anticipate questions and plan your answers.

If the person reacts negatively, that is not your fault. People have different histories and understandings of cancer. You may be able to explain what it means to have a cancer diagnosis. For example, clarifying that cancer is not contagious can help dispel a specific concern right away. People also have different desires for their future. It is good to discuss these topics so you can find a partner with similar family plans.

Visit [www.LLS.org/YoungAdults](http://www.LLS.org/YoungAdults) for more information on dating, sexuality and intimacy.

### Financial Concerns

Fertility treatments can be expensive, so it is important to find out whether your health insurance plan covers the treatment you need. The current costs of fertility treatments and egg and sperm annual storage can add up to tens of thousands of dollars and make it very challenging for patients to cover these expenses out-of-pocket. Often, cancer treatment must be started immediately after diagnosis, leaving patients very little time to appeal to insurers for coverage of fertility preservation treatments.

Unfortunately, many private insurance plans and government-funded health plans and services including Medicaid, Tricare (for active duty service members and retirees) and the Veterans Administration do not cover

fertility preservation treatment. The current laws and regulations define infertility as “an inability to conceive after one year of trying to get pregnant,” and do not include the infertility caused by cancer therapy. In addition, due to the experimental nature of certain fertility techniques, such as ovarian tissue freezing, health insurers are not required to cover these services.

Fortunately, in recent years there has been a slight increase in insurers covering fertility preservation treatments on a case-by-case basis. Furthermore, legislation in a few states has started to support the needs of cancer patients interested in fertility preservation. Some states have laws requiring insurance coverage of fertility preservation services for patients about to undergo a medical treatment (surgery, radiation or chemotherapy) that may have a negative effect on fertility. Insurance coverage of fertility preservation is slowly changing.

Contact your insurance provider to learn if your policy covers fertility preservation. If you are denied coverage, you may be able to appeal for reimbursement of your fertility preservation costs. Your treatment team can also refer you to other resources and organizations that can provide financial assistance or discounted prices for patients.

Some questions you may want to ask your health insurance carrier are:

- Does my plan pay for a consultation visit with a fertility specialist?
- Does my plan cover fertility preservation before cancer treatment?
- Does my plan cover infertility treatments? If yes, what are the conditions for coverage?
- Do I need to see a doctor from a particular list of doctors (also called “in-network”) in order to receive insurance coverage?
- Do any visits need to be pre-authorized (approved by the insurance company before the patient sees the doctor)? Do I need to complete claim forms or other paperwork?
- What is my copayment (the amount of money I pay out-of-pocket) for the services needed?

Various organizations offer programs to help patients offset the costs of fertility preservation. In addition, some fertility specialists offer their own discount programs for cancer patients. See the *Resources* section on page 10 for more information.

## Acknowledgement

The Leukemia & Lymphoma Society appreciates the review of this material by

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## Resources

### **General Information on Fertility and Family Building Options**

- **Path2Parenthood**  
[www.path2parenthood.org](http://www.path2parenthood.org)
- **American Society of Reproductive Medicine (ASRM), Reproductive Facts**  
[www.reproductivefacts.org](http://www.reproductivefacts.org)
- **Resolve: The National Infertility Association**  
(703) 556-7172  
[www.resolve.org](http://www.resolve.org)  
Provides a locator to find an infertility support group.

### **Information on Fertility and Family-Building Options for Patients with Cancer**

- **American Cancer Society**
  - Fertility and Women with Cancer  
<https://www.cancer.org/treatment/treatments-and-side-effects/physical-side-effects/fertility-and-sexual-side-effects/fertility-and-women-with-cancer.html>
  - Fertility and Men with Cancer  
<https://www.cancer.org/treatment/treatments-and-side-effects/physical-side-effects/fertility-and-sexual-side-effects/fertility-and-men-with-cancer.html>
- **Cancer.Net, American Society of Clinical Oncology (ASCO)**
  - Having a Baby After Cancer: Fertility Assistance and Other Options at <https://www.cancer.net/survivorship/life-after-cancer/having-baby-after-cancer-fertility-assistance-and-other-options>
  - Information on Dating, Sexuality and Reproduction <https://www.cancer.net/navigating-cancer-care/dating-sex-and-reproduction>
- **Hope for Two...The Pregnant with Cancer Network**  
[www.hopefortwo.org](http://www.hopefortwo.org)  
Offers free support for females diagnosed with cancer while pregnant.

- **The Oncofertility Consortium**

[www.oncofertility.northwestern.edu](http://www.oncofertility.northwestern.edu)  
SaveMyFertility at [www.savemyfertility.org](http://www.savemyfertility.org)  
Research group dedicated to exploring the relationships between health, disease, survivorship and fertility preservation in young patients with cancer. The site provides information on fertility options as well as a map of oncofertility centers in the United States.

### **For children and teens with cancer, and their families**

- **13Thirty Cancer Connect**  
[www.13thirty.org](http://www.13thirty.org)  
National organization dedicated to helping teens and young adults live with cancer. Offers teen-oriented resources to help cope with their disease and connect with other teens.
- **Cancer.Net, American Society of Clinical Oncology (ASCO)**  
[www.cancer.net](http://www.cancer.net)  
<https://www.cancer.net/navigating-cancer-care/children/preserving-fertility-children-cancer>
- **Children's Oncology Group**  
This organization is devoted to childhood and adolescent cancer research and is supported by the National Cancer Institute.
  - Fertility Information for Males
    - [www.childrensoncologygroup.org/index.php/hormonesandreproduction/malereproductivehealth](http://www.childrensoncologygroup.org/index.php/hormonesandreproduction/malereproductivehealth)
    - [www.survivorshipguidelines.org/pdf/MaleHealthIssues.pdf](http://www.survivorshipguidelines.org/pdf/MaleHealthIssues.pdf)
  - Fertility Information for Females
    - [www.childrensoncologygroup.org/index.php/hormonesandreproduction/femalereproductivehealth](http://www.childrensoncologygroup.org/index.php/hormonesandreproduction/femalereproductivehealth)
    - [www.survivorshipguidelines.org/pdf/FemaleHealthIssues.pdf](http://www.survivorshipguidelines.org/pdf/FemaleHealthIssues.pdf)
- **Pediatric Oncofertility Research Foundation**  
[www.porf.org](http://www.porf.org)  
Provides information for parents regarding fertility preservation for children undergoing cancer treatment and supports research in this field.
- **Stupid Cancer**  
[www.stupidcancer.org](http://www.stupidcancer.org)  
The nation's largest online support community for adolescent and young adult cancer survivors. Provides resources for survivors, holds conferences and podcasts, and hosts a peer-to-peer matching app.

- **Teen Cancer America**

[www.teencanceramerica.org](http://www.teencanceramerica.org)

Offers education and support to medical institutions and healthcare professionals in the development of specialized adolescent and young adult cancer care units.

### Financial Assistance

- **California Cryobank, Fertile Future Program**

[www.fertile-future.com/](http://www.fertile-future.com/)

Provides financial aid services and special rates for cancer patients.

- **Chick Mission**

[www.thechickmission.org](http://www.thechickmission.org)

Program that works directly with healthcare practices to provide need-based grants to cover the costs of fertility preservation.

- **Heart Beat**

<https://www.ferringfertility.com/paying-for-treatment/save-on-your-medication/heart-beat-program>

Program offered by Ferring Pharmaceuticals and Walgreens. Provides free medications needed for egg or embryo freezing for women who are newly diagnosed with cancer.

- **LIVESTRONG Fertility**

[www.livestrong.org/what-we-do/program/fertility](http://www.livestrong.org/what-we-do/program/fertility)

Initiative dedicated to providing reproductive information, resources and financial support to cancer survivors whose medical treatments present the risk of infertility.

- **Verna's Purse**

[www.vernaspurse.org](http://www.vernaspurse.org)

Offers a financial assistance program for those in need of fertility services.

- **California Cryobank, Fertile Future Program**

[www.fertile-future.com/](http://www.fertile-future.com/)

Provides financial aid services and special rates for cancer patients.

## We're Here to Help

LLS is the world's largest voluntary health organization dedicated to funding blood cancer research, education and patient services. LLS has chapters throughout the United States and in Canada. To find the chapter nearest to you, visit our website at [www.LLS.org/chapterfind](http://www.LLS.org/chapterfind) or contact:

The Leukemia & Lymphoma Society  
3 International Drive, Suite 200  
Rye Brook, NY 10573

Contact an Information Specialist at (800) 955-4572  
Email: [infocenter@LLS.org](mailto:infocenter@LLS.org)

LLS offers free information and services for patients and families touched by blood cancers. The following entries list various resources available to you. Use this information to learn more, to ask questions, and to make the most of your healthcare team.

**Consult with an Information Specialist.** Information Specialists are master's level oncology social workers, nurses and health educators. They offer up-to-date disease, treatment and support information. Language services (interpreting and translation) are available. Please contact our Information Specialists or visit our website for more information.

- Call: (800) 955-4572 (Monday through Friday, from 9 am to 9 pm EST)
- Email: [infocenter@LLS.org](mailto:infocenter@LLS.org)
- Live chat: [www.LLS.org/InformationSpecialists](http://www.LLS.org/InformationSpecialists)
- Visit: [www.LLS.org/InformationSpecialists](http://www.LLS.org/InformationSpecialists)

**Clinical Trials (Research Studies).** Research is ongoing to develop new treatment options for patients. LLS offers help for patients and caregivers in understanding, identifying and accessing clinical trials. When appropriate, patients and caregivers can work with Clinical Trial Nurse Navigators who will help find clinical trials and personally assist them throughout the entire clinical trial process. Visit [www.LLS.org/CTSC](http://www.LLS.org/CTSC) for more information.

**Free Information Booklets.** LLS offers free education and support booklets that can either be read online or ordered. Please visit [www.LLS.org/booklets](http://www.LLS.org/booklets) for more information.

**LLS Health Manager App.** This free mobile app helps you manage your health by tracking side effects, medication, food and hydration, questions for your doctor, and more. Export the information you've tracked in a calendar format and share it with your doctor. You can also set up reminders to take medications, hydrate, and eat. Visit [www.LLS.org/HealthManager](http://www.LLS.org/HealthManager) to download for free.

**Financial Assistance.** LLS offers financial support including insurance premium and medication co-pay assistance, as well as travel and other needs, to eligible individuals with blood cancer. For more information, please

- Call: (877) 557-2672
- Visit: [www.LLS.org/finances](http://www.LLS.org/finances)

**Información en Español. (LLS information in Spanish).** Please visit [www.LLS.org/espanol](http://www.LLS.org/espanol) for more information.

**Telephone/Web Education Programs.** LLS offers free telephone/Web and video education programs for patients, caregivers and healthcare professionals. Please visit [www.LLS.org/programs](http://www.LLS.org/programs) for more information.

**LLS Community.** The one-stop virtual meeting place for talking with other patients and receiving the latest blood cancer resources and information. Share your experiences with other patients and caregivers and get personalized support from trained LLS staff. Visit [www.LLS.org/community](http://www.LLS.org/community) to join.

**Young Adult Pages.** Young adults with cancer may face challenges specific to their age group. Please visit [www.LLS.org/YoungAdults](http://www.LLS.org/YoungAdults) for more information on a variety of topics that affect this age group.

**One-on-One Nutrition Consultations.** Access free one-on-one nutrition consultations provided by a registered dietitian with experience in oncology nutrition. Dietitians assist callers with information about healthy eating strategies, side effect management and survivorship nutrition. They also provide additional nutrition resources. Please visit [www.LLS.org/nutrition](http://www.LLS.org/nutrition) to schedule a consultation or for more information.

**Weekly Online Chats.** Moderated online chats can provide support and help cancer patients to reach out and share information. Please visit [www.LLS.org/chat](http://www.LLS.org/chat) for more information.

**Podcast.** *The Bloodline with LLS* is here to remind you that after a diagnosis comes hope. Listen in as patients, caregivers, advocates, doctors and other healthcare professionals discuss diagnosis, treatment options,

quality-of-life concerns, treatment side effects, doctor-patient communication and other important survivorship topics. Visit [www.LLS.org/TheBloodline](http://www.LLS.org/TheBloodline) for more information and to subscribe.

**LLS Chapters.** LLS offers support and services in the United States and Canada including the *Patti Robinson Kaufmann First Connection Program* (a peer-to-peer support program), in-person support groups, and other great resources. For more information about these programs or to contact your chapter, please

- Call: (800) 955-4572
- Visit: [www.LLS.org/ChapterFind](http://www.LLS.org/ChapterFind)

**Other Helpful Organizations.** LLS offers an extensive list of resources for patients and families. There are resources that provide help with financial assistance, counseling, transportation, patient care and other needs. Please visit [www.LLS.org/ResourceDirectory](http://www.LLS.org/ResourceDirectory) for more information.

**Advocacy.** The LLS Office of Public Policy (OPP) engages volunteers in advocating for policies and laws that encourage the development of new treatments and improve access to quality medical care. For more information, please

- Call: (800) 955-4572
- Visit: [www.LLS.org/advocacy](http://www.LLS.org/advocacy)

**People Suffering from Depression.** Treating depression has benefits for cancer patients. Seek medical advice if your mood does not improve over time—for example, if you feel depressed every day for a 2-week period. For more information, please

- Call: The National Institute of Mental Health (NIMH) at (866) 615-6464
- Visit: NIMH at [www.nimh.nih.gov](http://www.nimh.nih.gov). Enter “depression” in the search box

## References

American Society for Reproductive Medicine, Birmingham, Alabama. Fertility preservation and reproduction in patients facing gonadotoxic therapies: a committee opinion. *Fertility and Sterility*. 2013;100(5):1224-1231.

Anazodo A, Laws P, Logan S, et al. How can we improve oncofertility care for patients? A systematic scoping review of current international practice and models of care. *Human Reproduction Update*. 2019;25(2):159-179.

Angarita AM, Johnson CA, Nickles Fader AN, Christianson MS. Fertility preservation: a key survivorship issue for young women with cancer. *Frontiers in Oncology*. 2016;6:102. doi:10.3389/fonc.2016.00102.

Bates GE, Taub RN, West H. Fertility and cancer treatment. *JAMA Oncology*. 2016;2(2):284. doi:10.1001/jamaoncol.2015.4143.

Burns KC, Hoefgen H, Strine A, et al. Fertility preservation options in pediatric and adolescent patients with cancer [review]. *Cancer*. April 2018. 124(9):1845-1852. <https://onlinelibrary.wiley.com/doi/10.1002/cncr.31255>. doi:10.1002/cncr.31255.

Cardozo ER, Huber W, Stuckey AR, Alvero RJ. Mandating coverage for fertility preservation – a step in the right direction. *New England Journal of Medicine*. 2017;377(17):1607-1609. doi:10.1056/NEJMp1709585.

Female reproductive health. Children's Oncology Group website. <https://www.childrensoncologygroup.org/index.php/hormonesandreproduction/femalereproductivehealth>. Accessed September 8, 2019.

Kimmons L. Fertility and cancer: 10 things to know. MD Anderson Cancer Center website. Last updated April 25, 2016. <https://www.mdanderson.org/publications/cancerwise/fertility-and-cancer.h00-159065556.html>. Accessed September 8, 2019.

Fertility preservation: options for women who are starting cancer treatment. Memorial Sloan Kettering Cancer Center website. <https://www.mskcc.org/cancer-care/patient-education/fertility-preservation-women-starting-treatment>. Last updated June 14, 2017. Accessed September 8, 2019.

Fertility preservation: testicular tissue extraction in pre-pubertal boys. Memorial Sloan Kettering Cancer Center website. Last updated September 18, 2017. <https://www.mskcc.org/cancer-care/patient-education/fertility-preservation-testicular-tissue-extraction>. Accessed February 20, 2019.

Green D, Appiah L. Estimating risk of cancer therapy. The Oncofertility Consortium website: Northwestern University; Chicago, IL. (2015). <https://oncofertility.northwestern.edu/resources/estimating-risk-cancer-therapy>. Accessed March 5, 2019.

Having a baby after cancer: pregnancy. Cancer.Net (ASCO website). Last updated March 2017. <https://www.cancer.net/survivorship/life-after-cancer/having-baby-after-cancer-pregnancy>. Accessed September 8, 2019.

I have cancer today. How can I build a family tomorrow? Livestrong Fertility website. 2014. Accessed February 20, 2019. Available at <https://www.livestrong.org/we-can-help/livestrong-fertility>.

Kim S-Y, Kim SK, Lee JR, Woodruff TK. Toward precision medicine for preserving fertility in cancer patients: existing and emerging fertility preservation for women. *Journal of Gynecologic Oncology*. 2016;27(2):e22. <https://ejgo.org/DOIx.php?id=10.3802/jgo.2016.27.e22>. Accessed September 8, 2019.

Kim H, Kim H, Ku SY. Fertility preservation in pediatric and young adult female cancer patients. *Annals of Pediatric Endocrinology & Metabolism*. 2018;23(2):70-74. doi:10.6065/apem.2018.23.2.70.

Mabe R. A new hope for male fertility after cancer treatment. *The Atlantic* [news magazine] website. Published October 13, 2017. <https://www.theatlantic.com/health/archive/2017/10/male-fertility-cancer/542790/>. Accessed September 8, 2019.

Mapes D. How much does chemo impact fertility? Fred Hutch [news service] website. Published March 22, 2016. <https://www.fredhutch.org/en/news/center-news/2016/03/Study-looks-at-chemos-impact-on-fertility-in-childhood-cancer-survivors.html>. Accessed September 8, 2019.

Massarotti C, Scaruffi P, Lambertini M, et al. State of the art on oocyte cryopreservation in female cancer patients: a critical review of the literature. *Cancer Treatment Reviews*. 2017;57:50-57. doi: 10.1016/j.ctrv.2017.04.009.

Male reproductive health. Children's Oncology Group website. <https://www.childrensoncologygroup.org/index.php/hormonesandreproduction/malereproductivehealth>. Accessed February 25, 2019.

McBride JA, Lipshultz LI. Male fertility preservation. *Current Urology Reports*. 2018;19(7):49. doi: 10.1007/s11934-018-0803-2.

Moss JL, Choi AW, Fitzgerald Keeter MK, Brannigan RE. Male adolescent fertility preservation. *Fertility and Sterility*. 2016;105(2):267-273.

Muñoz M, Santaballa A, Seguí MA, et al. SEOM Clinical Guideline of fertility preservation and reproduction in cancer patients (2016). *Clinical Translational Oncology*. 2016;18:1229-1236.

National Comprehensive Cancer Network: NCCN Clinical Practice Guidelines in Oncology – Adolescent and Young Adult (AYA) Oncology. 2017. [https://www.nccn.org/professionals/physician\\_gls/pdf/aya.pdf](https://www.nccn.org/professionals/physician_gls/pdf/aya.pdf) 21. Accessed February 25, 2019.

Oktay K, Harvey BE, Partridge AH, et al. Fertility preservation in patients with cancer: ASCO Clinical Practice Guideline Update. *Journal of Clinical Oncology*. 2018;36(19):1994-2001.

Pearce L. Fertility preservation. *Nursing Standard*. 2017; 31(41). 7 June 2017. Accessed February 25, 2019. doi: 10.7748/ns.31.41.15.s16.

Preserving fertility in children with cancer. Cancer.Net (ASCO) website. <https://www.cancer.net/navigating-cancer-care/children/preserving-fertility-children-cancer>. Accessed September 8, 2019.

Radon CM, Borkar AA, Homburg RR. Female fertility preservation: a fertile future? *The Obstetrician & Gynaecologist*. 2015;17(2):116-124. doi: 10.1111/tog.12191.

Romao RLP, Lorenzo AJ. Fertility preservation options for children and adolescents with cancer. *Canadian Urological Association Journal*. 2017;11(1-2suppl):S97-S102. <http://dx.doi.org/10.5489/cuaj.4410>. Accessed September 8, 2019.

Smith KL, Gracia C, Sokalska A, Moore H. Advances in fertility preservation for young women with cancer. *American Society of Clinical Oncology ASCO Educational Book*. 2018;38:27-37.

Talking with your spouse or partner about cancer. Cancer.Net (ASCO website). [www.cancer.net/coping-with-cancer/talking-with-family-and-friends/talking-about-cancer/talking-with-your-spouse-or-partner-about-cancer](http://www.cancer.net/coping-with-cancer/talking-with-family-and-friends/talking-about-cancer/talking-with-your-spouse-or-partner-about-cancer). Accessed April 10, 2019.

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