Educational Guide

for Fertility Preservation
and Family Planning
for Male Cancer Patients

Miami Cancer Institute

BAPTIST HEALTH SOUTH FLORIDA

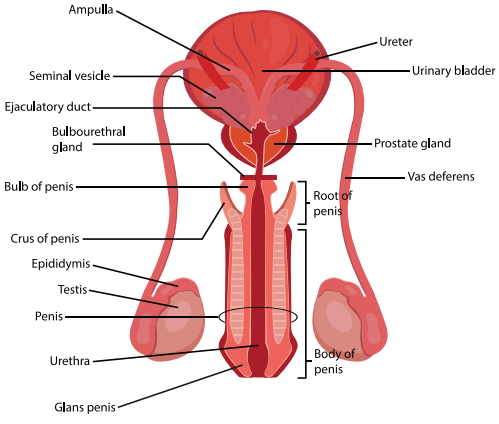
More than ever, cancer patients are surviving their disease and looking forward to a future that includes having children and raising a family. Many therapies to improve survival rates have side effects that include the loss of fertility. This brochure explains ways to preserve fertility before cancer treatments and options for having a biologic child after treatment.

Men starting cancer treatment may not need or want to consider these options. However, we want you to have all the knowledge necessary to make an informed decision.

This brochure will help you understand male reproduction, the impact and effects of cancer treatment on fertility, options to preserve your fertility before treatment and considerations after treatment, as well as answer common questions about fertility preservation.

Male Reproduction

Once puberty begins, hormones from the pituitary gland in your brain stimulate your testes (testicles) to make sperm. It takes about three months for sperm to mature, after which they are stored in the epididymis. When a male is sexually aroused, nerves stimulate muscles to push the sperm from your epididymis through your vas deferens. The sperm mixes with fluids from the seminal vesicles and prostate gland to form semen. Muscles at the opening of the bladder close, and the semen is propelled out of the penis through the urethra. This is called ejaculation.



If a man ejaculates during sex with a female partner around the time of the month when she ovulates (releases a mature egg from the ovary), a single sperm may enter and fertilize the egg. If the fertilized egg begins to divide, an embryo is formed and can implant in the woman's uterus (womb). The cells continue to divide, forming a fetus that grows and develops during the nine months of pregnancy.

Impacts on Male Fertility During Cancer Treatment

Normal male fertility is associated with the production of healthy sperm defined by:

- Sperm count (number of sperm in the semen).
- Sperm motility (how much movement and activity the sperm has).
- Morphology (shape of the sperm).

Cancer and cancer treatment can affect sperm and cause infertility in men. Though the cancer itself can contribute to infertility, cancer treatment is most commonly to blame.

Cancer treatments, including chemotherapy, radiation and surgery, may not only affect the quantity of a man's sperm, but also the quality.

Chemotherapy effects on fertility

Chemotherapy kills rapidly dividing cells like cancer cells, but also sperm and the cells that make sperm. Certain chemotherapy drugs are more damaging than others. Speak with your oncologist to understand how your prescribed chemotherapy will affect your fertility.

Radiation effects on fertility

Radiation therapy can also affect a man's fertility, depending on which part of his body is treated. Total body radiation or radiation of the abdominal or pelvic area that includes the testicles can cause infertility. Radiation to hormone-producing areas of the brain may also block normal hormone production which impedes the production of healthy sperm cells.

Surgical effects on fertility

Surgery that removes all or part of the reproductive system, such as one or both of the testicles, can lead to infertility. Certain surgeries may cause nerve damage that can affect the ability to ejaculate. The location and type of surgery will influence the risk to fertility.

Conventional Fertility Preservation in Men With Cancer

Cancer treatments vary in their impact on fertility and sometimes it is difficult for doctors to know exactly what the effect a cancer treatment will have on a person's fertility. Treatment can have a number of different effects on men, depending on the dosage of therapy, the treatment regimen and even the age of the individual.

A man's fertility can best be preserved by obtaining a semen sample prior to the start of cancer treatment for sperm freezing (cryopreservation) and sperm banking.

Sperm banking via conventional methods of collection

Freezing sperm, or sperm cryopreservation, prior to treatment provides the best chance of having children in the future if a patient's cancer treatment poses a threat to fertility. This is done by having the patient ejaculate by masturbation into a sterile specimen container and then handing the container to a laboratory technician who cryopreserves the sperm. Once the sperm sample is collected and cryopreserved, it can remain frozen until the patient is ready to build a family.

Sperm banking via alternative methods of collection

Some men have difficulty ejaculating for various reasons. Fortunately, the following options are available:

Electroejaculation is a method used to stimulate a patient to produce sperm through the use of a gentle electrical current and is typically performed under anesthesia. Once a sample is produced and collected, it is transferred to a sperm bank for cryopreservation and storage.

Additionally, there are techniques available that involve surgical extraction of sperm from the testicular tissue. This procedure is performed under sedation by a reproductive urologist where a small piece of testicular tissue is removed and examined for mature sperm. The mature sperm is extracted and then cryopreserved and transferred to a sperm bank for storage.

Measuring Male Fertility

Before assuming that you have lost fertility due to treatment or that you must now pursue alternative reproductive methods, it is important that you find out your actual fertility status.

For a man who has completed cancer treatment, there is a wide variation in the length of time it takes to return to normal levels of sperm production. For some men, it may occur within a year; for others, it may take up to 10 years or even longer. As difficult as waiting may be, it's important for you and your partner to be patient.

A fertility specialist can evaluate your fertility by collecting a semen sample and then testing your sperm levels as well as the motility, shape and appearance of your sperm. Measuring the levels of testosterone and follicle-stimulating hormone in the blood and semen also can reveal how well the testicles are functioning. The combination of this information allows a fertility specialist to measure overall fertility.

Fertility Considerations After Cancer Treatment: Impact on Reproduction in Men Previously Treated With Chemotherapy or Radiation

There are several factors that determine the impact your cancer treatment has had on your fertility. It is important to understand that there is a wide variation in the length of time it may take to return to normal levels of sperm production. Though it is possible that chemotherapy or radiation therapy may damage the sperm, the degree of damage is often difficult to measure.

It's also important to realize that the underlying cancer process can impair a man's reproductive potential. The body's response to the cancer may negatively affect his desire for sexual activity and his ability to achieve and maintain erections. While a man's fertility can be measured in a number of ways, the ultimate measure is his ability to achieve a pregnancy with his partner. If a couple is having trouble conceiving, a fertility specialist can help by testing a man's sperm levels, motility, appearance and shape, as well as measuring hormone levels (testosterone and FSH). These hormones can reveal how well the testicles are functioning to produce sperm. If a sperm's DNA is damaged, this may negatively affect ability to fertilize an egg. Subsequently, if fertilization does occur, it may affect the ability

of the subsequent embryo that's formed to undergo normal development. This will be determined by a fertility specialist.

Emotional Considerations

If you are not able to have a child naturally, the process of building your family can be complicated, time-consuming and expensive. It is common to experience feelings of anger, loss or grief. If you find that these emotions become overwhelming, last for weeks or discourage you from taking the next steps, consider talking with a counselor.

The Cancer Patient Support Center at Miami Cancer Institute offers a variety of services for cancer patients facing these difficult situations, including professional counseling services. You can also find counselors who specialize in dealing with infertility through the following organizations:

- Path2Parenthood: Visit Path2Parenthood.org. Select "Find a Professional."
- American Society of Reproductive Medicine, Reproductive Facts: Visit ReproductiveFacts.org. Search under "Resources," and select "Find a Healthcare Professional."
- RESOLVE: The National Infertility Association: Visit Resolve.org. Search under "Resources," and select "Professional Services Directory."

Common Questions About Fertility and Family Building From Male Cancer Patients

What is the cost of storage?

The cost of freezing your sperm averages $200 to $500. There is an additional annual storage fee. If you move or change your address, remember to contact the center so your specimen is appropriately handled.

Will my cancer therapy cause birth defects or other abnormalities in my future child?

Studies show that people with a history of cancer therapy have no additional risk of having offspring with congenital abnormalities or birth defects.

Will I pass this cancer on to my future offspring?

There are some cancers that run in families and can be passed on from parents to their children. Based on current research, however, most cancers seem to be spontaneous, caused by environmental and other factors. Be sure to talk to your doctor about your concerns.

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

The length of time you need to wait depends on your diagnosis and your treatment. If you have had chemotherapy or radiation, we generally suggest waiting at least one year after finishing treatment before trying to have a child. This allows time for sperm that may have been damaged to be cleared from your body. However, some people may not need to wait this long, while others may need to wait longer. Check with your oncologist to get his or her recommendations.

Will a child conceived after my cancer treatment be healthy?

There is no evidence that children conceived after cancer treatment are at an increased risk for birth defects or other health problems. However, it is important to use birth control during treatment to ensure that you do not conceive with sperm that may have been damaged from exposure to chemotherapy or radiation. This might affect the health of the child. We recommend you continue to use birth control for one year after completing chemotherapy and radiation therapy to ensure all damaged sperm have been cleared from your body.

Some cancers are hereditary, or passed down from parents to children. Ask your oncologist if you have a hereditary cancer. If you do, you can meet with a genetics counselor to learn how this may affect the health of a child.

If you have a specific genetic mutation that can be passed on to a child, you may want to consider preimplantation genetic diagnosis (PGD). PGD is a method that tests embryos that have been created by in vitro fertilization for the genetic mutation.

What if I am no longer fertile, but banked sperm before treatment?

To use the sperm you froze before treatment, you and your partner will need to work with a reproductive endocrinologist. The method used to fertilize your female partner's eggs will be

based on the quality of the specimens you were able to freeze before treatment.

Intrauterine insemination (IUI or artificial insemination): one or two vials of your sperm are thawed and drawn up into a thin, soft catheter. This is placed in your female partner's uterus and the sperm are released. This is done at the time she ovulates (releases a mature egg). It may take a woman three to six attempts at IUI before they are successful.

What if I have erectile dysfunction?

Some cancer treatments cause injury to or removal of the nerves and blood vessels that control erection. If you are still producing sperm, but your penis is not able to become firm enough to enter your female partner's vagina, the sperm cannot fertilize her eggs. Several treatments can help, including medications and injections. These option are available under the care of a reproductive urologist.

Additional Resources

A number of resources are available to help you make decisions about fertility preservation. First, speak with your oncologist to make sure it is safe for you to pursue fertility preservation. If you would like more information about the options available, or support as you consider the issues, ask your oncologist to refer you to our fertility preservation specialist at Miami Cancer Institute.

Cancer and Fertility

- Cancer.net (American Society of Clinical Oncology + Conquer Cancer Foundation)
- Cancer.org (American Cancer Society)
- Cancer.gov (National Cancer Institute)
- LIVESTRONG.com/Fertility
- MyOncofertility.org (Oncofertility Consortium of Northwestern University)
- SaveMyFertility.org

General information about fertility and fertility treatment

- ASRM.org (American Society of Reproductive Medicine)
- ReproductiveFacts.org
- INCIID.org (International Council on Infertility Information Dissemination)
- Resolve.org (National Infertility Association)

If you would like more information about the Fertility Preservation Program or want to speak to a fertility preservation Advance Practice Provider, please call 786-527-8825 or visit MiamiCancerInstitute.com.

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