

Fertility at Risk: Navigating Oncofertility for Cancer Patient

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DESCRIPTION

Oncofertility is a multidisciplinary field at the intersection of oncology and reproductive medicine, focused on preserving the fertility potential of cancer patients who may face infertility as a result of cancer treatment. As cancer therapies like chemotherapy, radiation, and surgery can significantly impact reproductive health, oncofertility seeks to offer options for fertility preservation while patients are undergoing life-saving cancer treatments. Advances in reproductive technologies and the increasing survival rates for cancer patients have led to the growth of oncofertility as an essential component of comprehensive cancer care.

For many individuals, having children is an important part of their life plans, and a cancer diagnosis can pose significant emotional and psychological stress, particularly if fertility is threatened. Oncofertility provides hope and support for cancer patients and survivors, helping them retain the possibility of having biological children post-treatment. This article examines the importance of oncofertility, the methods of fertility preservation, ethical considerations, and the future direction of this evolving field.

Impact of cancer treatment on fertility

Chemotherapy, a standard treatment for many cancers, can have deleterious effects on fertility due to its cytotoxic nature. Chemotherapy drugs, especially alkylating agents like cyclophosphamide, are known to damage the reproductive organs by targeting rapidly dividing cells, including ovarian follicles in females and spermatogonial stem cells in males. The result can be temporary or permanent infertility, depending on factors such as the type of chemotherapy, dosage, patient's age, and pre-existing fertility status.

In women, chemotherapy can accelerate ovarian aging, leading to diminished ovarian reserve or Premature Ovarian Insufficiency (POI). Younger women may have a better chance of retaining ovarian function post-treatment, but the risk of infertility remains high. In men, chemotherapy can lead to azoospermia (absence of sperm in ejaculate) or oligospermia

(reduced sperm count), which may be temporary or permanent based on the severity of damage to the testes.

Radiation therapy

Radiation therapy, particularly when directed at the pelvic region, can also significantly impair fertility. In women, radiation can damage the ovaries, leading to loss of oocytes and early menopause. The uterine lining may also be affected, reducing the ability to carry a pregnancy to term. Radiation to the brain can disrupt the hypothalamic-pituitary-gonadal axis, impairing hormonal control of reproduction. In men, radiation to the testes can reduce sperm production, and exposure to the pelvic region can damage the tissues necessary for ejaculation and erection, further affecting fertility.

Surgery

Surgical treatments for cancer may involve the removal of reproductive organs or other structures critical for fertility. In women, surgeries for ovarian, uterine, or cervical cancer can result in the removal of the ovaries, uterus, or fallopian tubes, rendering natural conception impossible. In men, surgeries for testicular cancer or prostate cancer can lead to the removal of the testes (orchiectomy) or damage to nerves and tissues involved in ejaculation, affecting sperm delivery. Given the significant risks posed by cancer treatment to reproductive health, oncofertility is focused on providing patients with options to preserve their fertility before, during, or after treatment.

Fertility preservation options

Fertility preservation methods in oncofertility can be broadly categorized into techniques for males and females. The choice of method depends on factors such as the patient's age, type of cancer, treatment plan, and time available before cancer therapy begins.

Egg (oocyte) cryopreservation

Egg freezing is one of the most common fertility preservation methods for women. It involves stimulating the ovaries with hormones to produce multiple mature eggs, which are then

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retrieved through a minor surgical procedure and frozen for future use. The eggs can later be thawed, fertilized through *In Vitro* Fertilization (IVF), and implanted into the uterus.

Egg cryopreservation is particularly beneficial for young women who have not yet had children. The success of future pregnancies depends on the number and quality of eggs retrieved and the woman's age at the time of freezing.

Embryo cryopreservation

In cases where a patient has a partner or wishes to use donor sperm, embryo cryopreservation can be considered. This process involves fertilizing retrieved eggs with sperm in the lab and freezing the resulting embryos. Embryos tend to survive the freezing and thawing process better than eggs, and the overall success rates for pregnancy using frozen embryos are higher.

This option requires a more definitive family-building decision upfront, as the embryos are created with a specific partner or donor.

Ovarian tissue cryopreservation

Ovarian tissue cryopreservation involves the surgical removal of a portion or all of an ovary, which is then frozen for future transplantation. This method is especially useful for prepubescent girls who cannot undergo ovarian stimulation for egg retrieval. In the future, the frozen ovarian tissue can be re-implanted, potentially restoring fertility and hormonal function.

While still considered experimental, ovarian tissue cryopreservation has resulted in live births and is increasingly being offered as a viable option for fertility preservation.