reproductive concerns and cancer treatment:

what you need to know

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ADVANCES IN DIAGNOSTIC TECHNOLOGIES and treatment strategies have improved cancer survival rates significantly since the 1970s, allowing physicians to focus not only on the ultimate goal of survival but also on the quality-of-life issues that are recognized as increasingly important. But despite the recent advances in survival rates, receiving a cancer diagnosis can be devastating. One factor that increases the anxiety of many newly diagnosed patients is the possible impact of treatment on their fertility. For women, this can mean that the treatments that could potentially save their life could also affect ovarian function and result in the loss of childbearing capacity.

Infertility is extremely difficult for many survivors to contemplate on top of an already frightening diagnosis of cancer, and survivors' self-esteem and quality of life are often adversely affected. Thus, while the emphasis on survival continues, infertility practitioners aim to improve survivors' quality of life by incorporating reproductive concerns into treatment plans. Following are some of the questions commonly asked by women who are about to undergo cancer therapy.

What type of cancer treatment can affect my fertility potential?

In particular, chemotherapy and/or radiation have become essential components of cancer treatment and are directly gonadotoxic, or injurious to ovaries. In addition, surgical removal of any of the reproductive organs may also have an impact on your fertility potential. For example, treatment for gynecological cancer may involve the removal of the uterus (hysterectomy), ovaries (bilateral oophorectomy), or some portion of the reproductive tract such as the cervix, vulva, or vagina. Some operations may involve these organs but spare reproductive function, although the scar tissue that develops after surgery can also hinder conception. The surgery that is performed will depend on the type of cancer and whether it has spread to other organs.

How might my ovaries be damaged by the surgeries or treatments described above?

The damage may be total, resulting in immediate ovarian failure; or your ovaries might be only partially damaged, resulting in early menopause and increased difficulty in achieving conception.

Why does chemotherapy affect my ovaries?

Your oocytes (eggs) are completely formed during fetal development and are stored in a "resting pool" in your ovaries. After birth these oocytes do not regenerate but rather decline with age. This depletion process actually begins before birth and proceeds throughout the reproductive years (approximately 12 to 40 years of age). Total depletion results in ovarian failure (menopause).

Your oocytes naturally decline as you age. During this maturation phase, thousands of oocytes leave the resting pool at any given time; supporting cells surround each oocyte and divide rapidly to provide nourishment. Because chemotherapy targets tissues with actively dividing cells (such as the skin, hair, and digestive tract), the ovaries are also a potential target.

What kind of symptoms or side effects can I expect if there is injury to my ovaries?

Symptoms of ovarian failure include hot flashes, vaginal dryness, and the absence of menses. Alternatively, you may not experience any symptoms until you try to conceive.

If I am having menstrual cycles after treatment, does that mean my reproductive capacity has been spared?

Not necessarily. Evidence from population studies suggests that, as the number of oocytes diminishes, reproductive capabilities decline. Furthermore, current knowledge indicates that the inability to conceive usually precedes menopause by 10 years despite continued normal menstrual cycles. Therefore the presence of menstrual cycles does not ensure the ability to reproduce.

What is my risk of infertility?

It can be assumed that most chemotherapeutic agents have an adverse impact on the ovaries and may therefore compromise your reproductive lifespan compared with your baseline genetic potential. The effect of radiation is dependent on the dose and the field of exposure. Several studies have attempted to estimate the risk of ovarian dysfunction from radiation, but most of these focus on events surrounding the treatment period and lack long-term follow-up. The best estimates are that 5 to 35 percent of individuals will be able to conceive following chemotherapy, and fewer following radiation if the field includes the pelvis.

What factors influence the risk?

The risk of infertility following treatment depends on many factors, some of which include age at diagnosis, baseline ovarian reserve, type of cancer, chemotherapeutic/radiation regimen, type of surgery, and when you are planning to conceive.

Are there options that will preserve my chances of building a family?

Your options will depend on the type of cancer and the cancer treatment protocol. These options may include ovarian suppression and assisted reproductive technology (ART).

What is ART?

Assisted reproductive technology entails the retrieval of

eggs and sperm for the purpose of reproduction. The gametes (spermatozoon and ovum) can be used for the creation of embryos that can then be transferred back into the uterus or cryopreserved (frozen) for later use. The procedures necessary to retrieve eggs include established methods such as ovarian stimulation, followed by an egg harvest, or experimental methods such as an ovarian tissue biopsy.

What is ovarian stimulation?

Ovarian stimulation is a process whereby we synchronize your cycle with a drug regimen to increase the number of viable mature eggs. Briefly, this entails subcutaneous hormone injections for approximately two weeks, followed by several ultrasounds to evaluate follicle (egg) development.

When is the best time to do ovarian stimulation?

The best time frame for the utilization of ART is before any chemotherapy or radiation has been administered. Following chemotherapy or radiation, the potential to retrieve eggs diminishes. In addition, there is animal evidence to suggest that if conception occurs within six months to one year of exposure to chemotherapy or radiation, there is a potential increase in fetal abnormalities.

How much time is needed to perform the procedures?

Two to six weeks are required.

How many eggs can you get?

It depends on your ovarian reserve and where you are in your menstrual cycle as well as on how much time you have available prior to your cancer treatment.

Should I stop my birth control pills prior to seeing an infertility specialist?

You should stop taking birth control pills only if you have a hormone receptor–positive cancer. Otherwise you should not stop taking them. The birth control pills will enable better coordination of your treatment.

When is the best time to see an infertility specialist?

You should see an infertility specialist as soon as your cancer has been diagnosed. The specialist will want to have a working relationship with your oncologist(s) to coordinate your treatment and minimize any delays in beginning your cancer therapy.

What if I don't have a partner? Can I freeze my eggs?

Yes, you can have your eggs frozen, but the procedure is experimental. The reported success rate for a live birth after freezing eggs is 2 to 6 percent per oocyte retrieved. This is a viable option for young women with ample ovarian reserve. The average number of eggs retrieved for a 25-year-old is 20. This area is of great research interest, and advancements are continually being made, with corresponding improvements in pregnancy rates.

If I have already had treatment or I am unable to delay my treatment, what are my options?

If you cannot delay treatment, you might consider ovarian tissue freezing. During this procedure ovarian tissue is surgically removed and stored for later use. When ready, the tissue can either be transplanted back into the ovary or into another location in the body (such as the forearm). This procedure is experimental, and to date two patients have achieved pregnancy following transplantation.

Other options depend on your type of cancer, treatment status, and ovarian reserve. If you are in remission and have an adequate ovarian reserve, you might attempt natural conception. In any event it is recommended that you see an infertility specialist early in the process if you have

undergone cancer treatment and you want to conceive. If your ovarian reserve has been compromised but not eliminated, fertility treatments can be provided. If you no longer have an ovarian reserve, egg donation and adoption are options.

Alternatively, if you are not ready to achieve pregnancy but desire to preserve your fertility, ovarian stimulation and egg harvest may still be possible at least six months to one year following cancer treatment. Success will depend on your ovarian reserve and the effects of your treatment.

Will ART procedures compromise my cure?

The answer to this question is not completely known, although current data suggest that ART procedures do not compromise cure rates or recurrence rates, even with hormone-responsive tumors.

Is my children's cancer risk decreased if I utilize ART?

If you carry genes for hereditary cancers such as the breast cancer gene (BRCA), the utilization of ART with pre-implantation genetic diagnosis (PGD) may decrease the risk of transmission to your children. PGD involves the ovarian stimulation and in vitro fertilization process, followed by an embryo biopsy to identify and choose for transfer those embryos without the mutation.

If I have had chemotherapy and I am able to conceive naturally, is there an increased risk of fetal abnormalities?

The answer to this question is not completely known. The best available data suggest that if you wait at least six months to one year prior to conception, the incidence of fetal abnormalities will be no different than those in the general population.

Are there medical concerns if I get pregnant following cancer treatment?

This depends on the type of treatment. If abdominal or pelvic radiation has been administered, it could—depending on the dose—compromise your uterus and lead to miscarriage, low birth weight, or premature birth. If chemotherapy has been administered—again, depending on the regimen—it could compromise your heart and lung function. If there is no target organ damage, there is no additional risk.

Does my recurrence risk increase if I get pregnant?

The answer is not completely known. Current data suggest that if sufficient time has passed and you are in remission, there is no increased risk of recurrence regardless of your hormone receptor status.

If I am in menopause, can I still carry the pregnancy?

Yes. Hormone supplementation will be administered until the placenta has developed (at approximately eight weeks' gestation). Once developed, the placenta will produce all the hormones necessary to maintain the pregnancy. ✿