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By Alanna Kennedy

Focus on Fertility

Ongoing research aims to expand options for preserving fertility before and after cancer treatment

By Alanna Kennedy

When Renee Nicholas' doctor told her she had stage II breast cancer at age 33, fertility was the last thing on her mind. "As someone who was just told 'You have cancer,' you're obviously fearing for your life and thinking the worst," says Nicholas. But her fears were eased when her doctor asked if she was interested in taking steps to preserve her fertility. "That vote of confidence from him made me feel like I was going to beat it," she says, "and I was going to live."

Like Nicholas, who is now the director of corporate relations for the LiveStrong organization, most patients are focused on survival at the time of diagnosis. But it's also important to look ahead to life after treatment—and taking action early can help preserve fertility. Even for men and women who have already completed treatment, options still exist that can increase the odds of having biological children.



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The Price of Fertility

Fertility preservation can be expensive; here are ways to help make it manageable.

Preserving Your Child's Fertility

Learn about options for protecting your child's fertility after a cancer diagnosis.

Reproductive Options

Compare options for preserving fertility.

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FERTILITY LOSS FROM CANCER

According to the National Cancer Institute, 72,000 men and women between the ages of 15 and 39 will be diagnosed with cancer in 2010. While it's nearly impossible to predict how many of these patients will become infertile, it is a problem that many survivors will face.

There are several ways cancer can lead to infertility. If a patient is diagnosed with a cancer of a reproductive organ, it may be the disease itself that leads to infertility. For other cancers, it is the treatment that can cause trouble.

Sometimes infertility is temporary, especially for men, but if a woman is infertile following therapy, it is unlikely she will regain fertility. High-dose chemotherapy regimens and radiation therapy may kill some or even all of a woman's eggs, says Jennifer Levine, a pediatric oncologist at Columbia University Medical Center in New York City. Once those eggs are gone, a woman's body cannot create more. And egg supply isn't the only problem, according to Levine: Pelvic radiation can damage the uterus, leaving it unable to sustain a pregnancy.

Although cancer treatment can also damage male fertility, the damage may be short-lived. "Men have stem cells that can mature to become sperm," says Levine. If all of the stem cells are destroyed during treatment, a man will be permanently infertile. But, Levine says, in many cases the stem cells aren't destroyed and with time, a man can become fertile again.

(Illustration: © Michael Maslan Historic Photographs / Corbis)

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OPTIONS BEFORE TREATMENT

The best time for cancer patients to preserve their fertility is before treatment starts, when there are several options for men and women who think they may want to have biological children after cancer.

For women, the most common procedure is embryo freezing, which has been available for more than 25 years. The first step in the process is a regimen of shots that stimulate the ovaries to mature multiple eggs at once. This is followed by a medication that induces ovulation, after which the eggs are removed with a needle by a physician. The doctor then uses sperm to fertilize the eggs in a lab. When the eggs develop into embryos, they're frozen.

While thousands of women have had successful pregnancies after using this method, there are drawbacks to it. Some women can't delay cancer treatment long enough to complete the process, which takes at least two weeks. And the hormones necessary to stimulate egg production and ovulation might not be safe for some women who have estrogen receptor-positive breast cancer.

Beyond these challenges, not all women who are diagnosed have a partner. Using donor sperm is one solution, but many women don't want to do that, says Melissa Sileo, a social worker who manages LiveStrong's SurvivorCare program. For these women, egg freezing is an alternative.

With egg freezing, the egg collection process is the same as the one used by women who are freezing embryos, so time constraints and hormonal injections are still an obstacle for some cancer patients. In this case, though, the eggs can be kept frozen until the woman is ready to have a child. Once thawed, the eggs are artificially fertilized with sperm from the woman's partner or a donor, and one or more of the resulting embryos are implanted in the woman's uterus. The first baby conceived from a frozen egg was born in 1986; more than 900 babies have been born this way since. Nonetheless, according to Levine, doctors still consider the technique to be experimental.

For women whose tight treatment timelines don't allow for egg harvesting, ovarian tissue cryopreservation may be an option. This method involves surgically removing part or all of an ovary and freezing it. After cancer therapy is completed, surgeons return the frozen tissue to the woman's body.

Ovarian tissue cryopreservation is a new technology, and doctors can't be entirely sure how effective it is yet. Fewer than 20 women have undergone the procedure, become pregnant and given birth—the first in 2004—and doctors don't know for certain whether these women ovulated from the replaced tissue or from an ovary that wasn't removed, says Levine.

The risks of ovarian tissue freezing are also still unknown. Researchers in Belgium recently reported that the tissue can potentially harbor malignant cells, and they suggest that its re-implantation may put survivors at risk of recurrence. In a small study published online July 1 in the journal *Blood*, the scientists reported molecular evidence of cancer in frozen ovarian tissue from seven out of 10 patients with acute lymphoblastic leukemia (ALL) and two out of six patients with chronic myelogenous leukemia (CML). Going a step further, the researchers found that four out of 12 mice implanted with the ALL patients' ovarian tissue developed tumors, although none of the six mice they implanted with CML patients' tissue developed tumors.

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For men who want to have biological children after cancer treatment, fertility preservation is a slightly different game. Unlike the procedures available to women, sperm banking requires no hormonal therapies and can be done quickly and easily. A man interested in banking his sperm can manually stimulate himself in order to expel seminal fluid for long-term storage.

Yet not all men of childbearing age are informed about the option when they are diagnosed with cancer. When Tom Whiteside learned he had lymphoma at age 26, his oncologist briefly mentioned to him that treatment could damage his fertility but didn't suggest what Whiteside could do about it.

"I was the one who first brought [sperm banking] up," says Whiteside, who lives in Austin, Texas, where he helps plan events for LiveStrong. "The doctor didn't even know where I should go in the town I was getting treatment in." Whiteside eventually found a fertility clinic near his oncologist's office and was able to bank his sperm. Cancer patients like Whiteside who need help finding a sperm bank can turn to programs like Fertile Hope (www.fertilehope.org), part of LiveStrong's SurvivorCare program, to locate a clinic in their area.

OPTIONS AFTER TREATMENT

Men and women who have already finished treatment without undergoing fertility preservation procedures aren't necessarily excluded from having biological children.

There aren't special fertility treatments specifically designed for female cancer survivors, says Clarisa Gracia, a reproductive endocrinologist at the University of Pennsylvania in Philadelphia. But there are options—essentially the same ones available to any woman struggling with her fertility, she explains.

"We'd treat them basically like other infertility patients," says Gracia, "potentially doing in vitro fertilization, insemination or egg donation, or giving fertility medications to increase the number of eggs a month, which may increase the odds of getting pregnant."

Gracia cautions that female survivors should wait a year or two before trying to conceive to lower the odds that they have a cancer recurrence while pregnant. But survivors who are at high risk of infertility shouldn't wait much longer than that because chemotherapy often drastically depletes a woman's egg supply. If these women aren't yet ready to have children but would like to do so in the future, they should consider freezing embryos or eggs soon after treatment, says Levine. The procedures are the same as those available to cancer patients who have not yet undergone treatment (see "Options Before Treatment," on the previous page).

Female survivors who have been trying unsuccessfully to get pregnant for three to six months shouldn't delay meeting with a fertility specialist. The bottom line, according to Gracia, is that women should see an obstetrician who specializes in high-risk pregnancies and a fertility endocrinologist if they are having trouble conceiving, to help maximize the likelihood of conception.

There's also hope for men who have already completed cancer treatment. According to Levine, even men who have very low sperm production may be able to father a child. One option is for the man to collect his sperm for artificial insemination of his partner. Or, if the man has an extremely low sperm count, his doctor can extract sperm using a testicular biopsy. The doctor then places a

single sperm inside an egg to create an embryo that can be implanted in the man's partner.

Ultimately, a cancer survivor's best hope to have a baby is to consult a doctor about being proactive in addressing fertility—especially before cancer treatment begins. However, Marla Clayman, a health communication researcher at the Feinberg School of Medicine in Chicago, cautions that survivors should keep in mind that fertility procedures aren't always successful. Fertility is never guaranteed, and even people who have never had cancer aren't always able to conceive a biological child. [CR](#)

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