Doctors can now harvest eggs from frozen ovarian tissue implanted in a woman’s forearm or abdomen. The technique is just one of several new treatment options that may soon be available for women who face both cancer and possible treatment-related infertility.

The American Society for Clinical Oncology released guidelines on fertility options for cancer patients earlier this year, which has shown a spotlight on the problem often faced by premenopausal women. New options include procedures that preserve the ovaries before treatment and changes in vaginal surgery techniques that could alter the outcome for premenopausal women.

Although the number of women who become infertile after cancer treatment is unknown, 113 women per 100,000 under age 50 are expected to get cancer each year in the United States. Infertility can affect patients with any cancer treated with radiation therapy or chemotherapy, but the greatest risks are from chemotherapy involving alkylating agents or whole-body radiation. Surgeries that are common for ovarian and cervical cancers can also compromise fertility.

When weighing their options, patients also must take into account the high cost of fertility treatments that are uncertain to yield a child in the future. And many researchers worry that such uncertainties won’t improve in a field that lacks a consistent avenue for funding.

“None of the fertility preservation methods is clearly effective. All of them tend to be expensive, unless there’s a research protocol that pays for medications or procedures,” said Leslie Schover, Ph.D., a behavioral scientist at the University of Texas M. D. Anderson Cancer Center in Houston, who studies parenthood after cancer. “Some women will choose not to spend large amounts of money if they can’t be sure a procedure will do them any good.”

New Fertility Options

Currently, women can take measures to preserve their ability to have children after a cancer diagnosis, but the available options are limited, particularly for patients who need immediate cancer treatment. Fertility preservation is limited mostly to egg and embryo cryopreservation; women take fertility drugs and hormones to produce large numbers of eggs, which are frozen alone or fertilized and frozen as embryos. Embryo cryopreservation is generally recommended over egg cryopreservation because the eggs are more fragile and the egg freezing process is not as well developed. The entire process can take 6 weeks—a long delay for patients with high-risk cancers. Fertility drugs may also be dangerous for women with hormone-sensitive cancers.

For patients who can’t wait 6 weeks for treatment or are in danger from hormone-loaded fertility drugs, a newer procedure involves cryopreservation of one or both ovaries. The procedure, now 10 years old, is used only in patients whose cancer does not involve the ovaries.

Once the ovaries have been frozen, women have several options. One, pioneered in 1999, involves transplanting strips of the egg-producing ovarian tissue into the patient’s forearm or abdomen after cancer treatment. A paper published in The Lancet in 2004 by Kutluk Oktay, M.D., of Cornell University in Ithaca, N.Y., and colleagues described one successful transplant where researchers retrieved an egg produced by the implanted tissue and fertilized it using traditional in vitro fertilization (IVF).

“It’s a very new procedure. It’s promising and may be the only option available for many women with cancer,” Oktay says.
So far the method has resulted in three successful pregnancies from 12 patients; traditional IVF success rates are around 50%. Oktay says more testing needs to be done before any conclusions can be drawn about how successful this new method is.

Another technique developed by Theresa Woodruff, Ph.D., of Northwestern University in Evanston, Ill., and colleagues uses ovarian follicles, the part of the ovary that develops into an egg, to produce eggs in a tissue culture. These follicles can be extracted from cryopreserved ovaries.

Woodruff used the follicles to harvest eggs in a medium called alginate, the thickening substance in ice cream. In a paper published in *Tissue Engineering* this June, Woodruff reported that mouse eggs produced using this method had been fertilized and implanted into mice using IVF. The technique resulted in the birth of several live mice.

“I hope women will be able to access this treatment in the next year or two,” she said.

If successful, this technique would have several advantages over Oktay’s method. Women wouldn’t have to worry about possible cancerous tissue from an ovary being reimplanted in the body because the egg production takes place in a dish. The technique might also work for childhood cancer survivors, who couldn’t produce eggs using fertility treatment.
Options To Prevent Miscarriage

Where work with frozen ovaries may be accessible to patients with many types of cancer, several new techniques target women who face infertility after their cancers are removed through surgery. Specifically, many women with cervical cancer become infertile because doctors remove the cervix and surrounding tissue that keep a fetus or embryo safely inside a mother and prevent miscarriage.

Recent research by several groups of scientists, including a group led by Marie Plante, M.D., of Laval University in Quebec, and another led by Thomas Ind, M.D., of Royal Marsden Hospital in London, indicates that a procedure called radical vaginal trachelectomy may help women with cervical cancer remain fertile in the future. The procedure removes the cervix itself but maintains the structure where a fetus grows, called the uterine fundus. Women who undergo the procedure have a nylon band inserted around the junction of their uterus and cervix, which allows doctors to cinch the cervix closed when a woman becomes pregnant. These women then deliver children via C-section.

A paper published by Ind and colleagues in June in the International Journal of Obstetrics and Gynecology showed 5-year pregnancy rates of around 50% in women who underwent the procedure. A similar project by Plante and colleagues produced 59 pregnancies in 36 women who underwent the procedure. Researchers say the procedure can spare fertility in several women with early-stage cervical cancer.

A Crisis of Funds

Both the surgical and ovary preservation methods may mean new hope for female cancer patients who face infertility. But researchers worry that if the government doesn’t put more money into the field, such expensive research may come to a halt.

ASCO’s guidelines, which were written by a committee including Oktay, have generated enthusiasm from several advocacy groups.

“We’re thrilled that ASCO has taken this on head-on,” says Joyce Reinecke, program director of Fertile Hope in New York.

Oktay says he’d like to see the paper increase awareness about the importance of researching fertility options for cancer patients and generate more funding for research in fertility and oncology.

“It’s no-man’s-land with funding. We have NCI, which funds cancer studies, and others fund fertility studies. But it seems there’s no good place to fund research for cancer and fertility,” Oktay says. “Research on fertility is going at the speed of light. More than technology, funding is a limiting factor.”

ASCO’s guidelines, new research, and the push for more funding are part of an effort to better women’s quality of life and give cancer survivors better childbearing options. As research continues, ASCO and organizations like Fertile Hope want to educate potential donors about the need for new techniques and funding for research. Reinecke hopes obtaining more funding is only a matter of time.

“As techniques become more standardized and widespread, I hope this kind of technology will become more accepted as a standard of care. … I’d like to have this be a part and parcel of cancer care.”

— Ariel Whitworth

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