Frozen futures: The art and science of oocyte cryopreservation

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A woman's chance of having a baby decreases with age – accelerating after 35. Oocyte cryopreservation (egg freezing) has established itself as a viable option for women wanting to preserve their fertility for medical reasons (e.g. prior to cancer treatment) or for personal considerations.

Modern reproductive technology utilises a rapid method for efficiently freezing eggs using a process called 'vitrification'. This has challenges, risks and costs. These need to be discussed so women can make an informed choice.

Key messages

- Fertility preservation is a viable option, with a 70-80% chance of having a baby from frozen eggs for a woman freezing eggs before age 35
- The optimal number of eggs to be collected for freezing increases with age, needing multiple stimulation cycles, with implications on overall costs
- Return of user to use the eggs is low, opening important ethical and legal considerations including ownership, discarding, or donating the oocytes if unused.

The freezing process

The woman is screened for infectious diseases including HIV, hepatitis B and C. She is then given a course of fertility drugs to stimulate her ovaries and the size and development of follicles is tracked with serial ultrasound examinations and hormone levels.

When mature, the eggs within the follicles are retrieved using an ultrasound-guided procedure under sedation. The number of eggs retrieved per stimulation cycle can vary (depending on ovarian reserve, technique of operator etc) and this determines how many cycles is deemed necessary to retrieve the optimal number of eggs. The eggs are then frozen and stored at the fertility clinic.

Biologically, eggs can be stored indefinitely, and when the woman is ready to become pregnant, the eggs can be thawed and fertilised with her partner's or donor's sperm. If healthy embryos develop, one will be transferred to her uterus and any remaining embryos can be frozen for later use.

What are the success rates of egg freezing?

In IVF treatment, the chance of a live birth is similar for frozen and 'fresh' eggs. The two most important factors determining the chance of having a baby from frozen eggs are age when the eggs are frozen and the number of stored eggs.

The number and quality of the eggs that develop when the ovaries are stimulated decline with age while chromosomal abnormalities increase. At every step of the process there is a risk that some will be lost. Of the transferred embryos, only some will result in a pregnancy, and some pregnancies miscarry.

Currently there is a 70-80% chance of having a baby from frozen eggs in a woman who froze her eggs below age 35, with success declining with increasing age.

Current data indicates that a woman under 35 years when freezing eggs needs to store 10 eggs for a successful pregnancy. This increases to 20 at age 38 and as many as 35 at age 40. Although there is no current evidence to support exact number of eggs required to be frozen at any particular age, in practice, the aim is to freeze at least 15-20 eggs for optimal chance of success. The number of cycles needed to get to this number will depend on age and ovarian reserve.

Risks and cost

A small proportion of women can have an excessive response to the fertility drugs that are used to stimulate the ovaries. In rare cases, this causes ovarian hyperstimulation syndrome (OHSS), a potentially serious condition. Bleeding and infection are very rare surgical complications of the egg retrieval procedure.

Egg freezing technology is still at a nascent stage and the long-term health of babies born from a frozen egg is unknown. However, although safety data remains preliminary, the fact that the babies are born healthy with no apparent health issues is reassuring.

In general, a Medicare rebate is only available for egg freezing for medical, not personal reasons. Costs may be considerable and provided up front. More than one stimulation cycle is usually required with final costs depending on the number of cycles needed.

Frozen eggs are stored in liquid nitrogen tanks at minus 196 degrees Celsius incurring an ongoing storage cost This can be substantial if stored for several years, especially given the fact that return of user is low (10-12% in Australia). There will also be costs involved eventually when using the eggs to conceive.

Important considerations

Women need to know the chances of successfully having a baby from frozen eggs, considering age and other factors and how many eggs will need to be stored as this impacts cost. Women should be counselled that they may not need to use the frozen eggs, and that pregnancy is not guaranteed. Ethical and legal considerations, including issues surrounding delayed parenthood, ownership, and status of stored oocytes; and eventual discarding or donating the oocyte if not used should be discussed.

Robust education and counselling about the procedure's efficacy, risks, limitations and potential outcome and thorough informed consent are imperative before making this important choice. MF

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