

FACT SHEET

FREEZING EMBRYOS, EGGS AND SPERM (CRYOPRESERVATION)

Freezing embryos, as well as sperm and eggs, can offer many benefits. Ever since the first human pregnancy from a frozen embryo was reported in 1984, cryopreservation has spared couples from multiple IVF treatments and improved the overall success rates from a single egg recovery.

Cryopreservation is the term used for freezing tissue or cells in order to preserve them for future use. With current technology we can now freeze sperm, eggs, embryos and small tissue fragments for example ovarian tissue. All patients who have cryopreservation have to undergo screening (by having a blood test) for infections such as HIV and hepatitis B&C before the samples are frozen.

Why do we freeze embryos?

Cryopreservation is a very routine part of the IVF process and is used when stimulation of the ovaries leads to an excess number of embryos that cannot all be transferred at the same time. Transferring high numbers of embryos carries a significant risk of a multiple pregnancy. To minimise that risk, in the UK it is now standard practice in most patients to replace one embryo and freezing any remaining good quality ones for use at a future date.

There are other advantages to embryo freezing, such as delaying embryo transfer with cryopreservation in cases where there is a risk of ovarian hyperstimulation syndrome (OHSS). If pregnancy results in a patient with a risk of OHSS, this might make the condition more severe and the woman ill enough to require hospital admission.

When and how are embryos frozen?

Human embryos can be frozen at the one cell stage (pronuclear embryo) but it is more common to allow embryos to develop for a number of days before freezing them. This can be at any stage up to and including the blastocyst stage (5-6 days after fertilisation). However, not all embryos are of good enough quality to be cryopreserved and the embryologist will be able to advise you whether embryos are suitable.

There are two methods for freezing embryos; slow rate freezing and vitrification. Slow rate freezing uses a special culture media to remove water from cells, replacing with a 'cryoprotectant' to prevent damage.

Vitrification (rapid freeze) is a newer technique which uses higher levels of cryoprotectant and a higher cooling rate, preventing ice crystals from forming.

With either method the embryos are suspended in a solution to protect them from the effects of freezing and then placed in a tank of liquid nitrogen until they are needed.

Transfer of frozen thawed embryos

Frozen-thawed embryos are transferred into the uterus after the preparation of the lining of the uterus (endometrium) using either a "natural cycle" or a "hormone replacement cycle". When frozen embryos are utilised for replacement in a natural menstrual cycle, the patient will be monitored by blood tests to determine when ovulation occurs. The embryos will then be thawed and the embryo(s) transferred at the appropriate time after ovulation to ensure harmony between the development stage of the embryo and the uterine lining. During a hormone replacement cycle, appropriate development of the endometrium (lining of the uterus) is achieved with a combination of hormonal medications.

Does it work?

The primary concern with the use of freezing techniques is the possible loss of embryos due to cell damage from the freezing process. Usually around 80% of cryopreserved embryos survive the thawing process. With the recent advancements this figure is often higher.

Hundreds of thousands of babies have been born from frozen embryos and pregnancy rates with frozen/thawed embryos can be as good as for embryos transferred in a fresh cycle. However, success rates can vary so you are advised to ask your clinic for their latest results

There is no evidence to suggest that the freezing and thawing of embryos has resulted in an increased risk of miscarriage and congenital abnormality over that expected for natural pregnancies.

What about freezing eggs?

Egg freezing is a much newer technique so fewer babies have been born from frozen eggs. Success rates are lower but egg freezing is beneficial for women who may wish to preserve their fertility for the future. It offers the chance to preserve eggs for women who are diagnosed with cancer and have to go through treatment such as chemotherapy or radiation which may lead to infertility. Women also may decide to delay childbearing for personal reason. Chances of pregnancy diminishes with age so having eggs stored at a younger age will mean a better chance of successful treatment than fresh IVF at an older age. Couples may also have ethical concerns over embryo freezing due to religious or moral reasons.

Can ovaries be frozen?

For patients, such as young girls, who are not able to freeze eggs, freezing ovarian tissue may be an option. This involves either taking a whole ovary or small pieces of tissue from an ovary, containing eggs, which is then frozen and stored.

Freezing sperm

Sperm cells have been frozen and thawed successfully for many years. Not all sperm cells survive, but as most samples have millions of sperm, losing a small portion of them does not cause concern. Sperm from ejaculated samples or from surgically retrieved samples can be stored. They can then be used in the future either in artificial insemination or in in-vitro fertilisation.

There are many reasons why men freeze their sperm. Most common are; medical treatments, for example, treatments such as chemotherapy which can affect fertility and sperm quality; men who choose to freeze their sperm prior to starting treatment or prior to a vasectomy.

Cryopreservation has also been used in the process of sperm donation in order to satisfy the safety concerns and to maximise its use. Because donated sperm for treatment of male infertility is required to be screened for infection, sperm are stored whilst testing is carried out before it is released for use.

How long can sperm and embryos be stored?

Patients storing embryos or sperm should be aware that genetic material cannot be stored indefinitely. Parliament has set a limit of ten years, although these periods may be exceeded in certain circumstances. HFEA consent forms also need to be completed before any freezing can take place.

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