# TECHNOLOGICAL MARVELS ADVANCING FERTILITY OUTCOME



On 25th July 1978, Louise Joy Brown was created in a test tube, outside the womb and the world of reproductive medicine was never the same again. In-vitro Fertilization (IVF) is a ray of hope for infertile couples and nothing short of a miracle. It earned Robert Edwards the Nobel Prize in Medicine in 2010. He along with Dr. Partick Steptoe developed the technique of IVF.

From offering just 5% chances of success in the 1980s, to 50% scientific chances of a successful pregnancy today, IVF has advanced tremendously, owing to the progress made in the field of reproductive medicine, in general, and the embryology lab in particular. The embryology lab has seen newer procedures, equipment, and techniques used, and safety parameters employed.

## AN ADVANCED EMBRYOLOGY LAB: THE CORE OF IVF SUCCESS

The embryology lab is the place where the oocyte (eggs) from the female and the sperm from the male are processed and cultured together in specialised machines called incubators, to result in an embryo. The embryo is later transferred into the woman's uterus, where it attaches to the lining and develops into a foetus and a baby later.

The embryology lab maintains the ideal conditions for the gametes (the sperm and the oocyte) and developing embryos. These conditions which mimic the environment inside the uterus are a crucial part of an embryology lab. It enables the embryos to develop at their fullest potential thereby maximising success.

Highly specialised advanced equipment called incubators help maintain strict developmental conditions required by the developing embryo. Incubator technology has progressed leaps and bounds in the last four decades —from culturing embryos in modest bell jars to the latest incubators which take care of the minutest needs of the developing embryo.

The embryology lab needs a controlled environment, wherein the harmful substances and particles are removed from the air - providing a safe background for these incubators to function. A strict monitoring system with a fully functional and robust backup system overlooks their correct functioning 24X7. Quality Control (QC) and Quality Assurance (QA) is an integral part of safety and involves quintessential embryology lab monitoring.

The identity of the gametes and embryos is maintained by trained professionals with the help of an electronic double witnessing system based on RFID technology.

## ADVANCED SPERM SELECTION TECHNIQUES

Advanced sperm selection techniques that focus on parameters like sperm concentration, motility and morphology amongst others, help select better sperms to inject into the oocyte.

### INTRA-CYTOPLASMIC SPERM INJECTION (ICSI)

The machines used for ICSI have advanced with better visualisation and better control, thereby revolutionising the world of infertility.

### INTRACYTOPLASMIC MORPHOLOGICALLY SELECTED SPERM INJECTION (IMSI)

While ICSI works at 200x - 400x magnification, IMSI, the advanced version of ICSI magnifies sperm to 5000x. IMSI is helpful in certain categories of patients.

### MICROFLUIDICS

This upcoming technology uses specific chips (devices) to mimic the natural sperm movement and selection.

### TESA and TESE

For patients with azoospermia (no sperm in the semen), surgical sperm retrieval using advanced techniques of TESA and TESE, combined with ICSI has been a boon. Micro-TESE is a further advancement of this already advanced technique.

## CRYOPRESERVATION

Technology has advanced to a stage where gametes and embryos can be frozen and recovered effectively and successfully. The efficient vitrification (freezing) program, brings life to a standstill in these gametes and embryos, so they can be brought back to their original state at a later date. Cryopreservation also helps couples who are not infertile per-se and want to plan their pregnancy at a later stage.

## EGG FREEZING: A PATHBREAKING TECHNIQUE TO PRESERVE FERTILITY

Egg freezing or oocyte cryopreservation is a process in which a woman's eggs (oocytes) are extracted, frozen and stored as a method to preserve reproductive potential in women of reproductive age.

Before 2013, egg freezing was considered an experimental procedure. However, in 2018, it was made "ethically permissible" for women to preserve their fertility from aging. Since then, there has been approximately 25% rise in women undergoing egg freezing worldwide.

## WHO NEEDS TO THINK ABOUT FREEZING THEIR EGGS?

- Women with cancer before they undergo chemotherapy or radiotherapy
- Women undergoing surgery that can damage the ovaries
- Women with ovarian diseases like endometriosis that can damage the eggs in the long term
- Women with a family history of early menopause
- Women with social and personal reasons to delay pregnancy
- Those who seek to circumvent age related infertility

## WHAT DOES THE PROCESS INVOLVE?

The egg freezing process is similar to IVF. The woman is first evaluated with respect to her ovarian reserve through blood tests and scans. Stimulation injections are then started from day 2 of her cycle and the dosing is adjusted according to her requirements. Monitoring is done with ultrasound and usually within 8-12 days the egg pick up is done. The egg pickup is a simple procedure done under ultrasound guidance, by needle aspiration from transvaginal route under short anaesthesia. It is a scarless minimally invasive day care procedure. The embryologist will assess the egg quality under a microscope, following which the mature eggs are frozen in liquid nitrogen by ultra rapid cooling known as vitrification. Women planning to start oncology treatment can start egg freezing treatment irrespective of the day of the cycle.

## WHEN CAN I FREEZE MY EGGS?

Women younger than age 35, have higher chances of successful live birth with egg freezing when compared to older women. So, women in their late 20s and early 30s are good candidates for egg freezing.

## WHAT ARE THE COMPLICATIONS ASSOCIATED WITH THE EGG FREEZING PROCESS?

The complications of egg freezing can be very few, if done with expertise. Short term side effects like pain in the injection site and redness is observed. Since the procedure is done under anaesthesia, related complications can be expected. Post procedure, mild symptoms of superovulation like bloating, pain, nausea and abdominal tightness can happen which will resolve within 3-5 days. The first period after the procedure is expected to come early. OHSS is rare.

## HOW CAN I USE MY EGGS IN FUTURE?

Whenever you want to plan pregnancy, the frozen eggs are thawed and fertilized with the desired sperm and will be allowed to grow for 3-6 days to form an embryo. Simultaneously your uterus will be prepared and the embryo will be transferred.

## HOW MANY EGGS SHOULD BE FROZEN?

Ovarian reserve testing can help predict the number of eggs which can be obtained from a woman in one cycle. Women under 35 years should freeze around 15-20 mature (M2) oocytes to anticipate around 80% chance of successful live birth. In older women, more eggs are frozen, through multiple cycles if necessary.

## IS THERE ANY EFFECT ON THE BABIES BORN OUT OF FROZEN EGGS?

As it is a new concept, long term data is not available. However, as of now, births from using frozen eggs do not lead to increased abnormalities in babies as compared to babies born out of fresh oocytes.

## WILL MY EGGS FINISH AFTER I FREEZE THEM?

Every month a cohort of eggs are recruited into the cycle and seen on the scan. So, eggs seen in that particular cycle are frozen. As a fresh cohort of eggs come every month, it is a misconception that eggs will finish and your ovaries will become empty. The woman will continue to ovulate and produce eggs in the future also. Egg freezing is a benign procedure and does not affect your menstrual cycle.

## CAN I CONCEIVE NATURALLY IF I FREEZE MY EGGS?

Egg freezing is an insurance for your future and can help to circumvent age related fertility decline. You can plan pregnancy naturally and if unsuccessful can resort to frozen eggs. If your family is completed and do not desire to use your eggs you can ask the IVF centre to discard those eggs.

## DOES THE PROCEDURE LEAVE A SCAR ON MY BODY?

As eggs are commonly aspirated through the vaginal route and sometimes abdominal route with the help of a needle creating a suction, no cut is made and the body is completely scar free.

## IS EGG FREEZING A CELEBRITY THING?

No. It is just that celebrities have easy and better access to advanced scientific procedures and opt for them owing to the demands of their career.

Oocyte freezing is a relatively simple procedure with no long-term complications or risk associated. However, the thought and decision to freeze your eggs is complicated as very few people may give you correct advice. You should meet a fertility specialist who offers the facility to freeze eggs and discuss the pros and cons of the procedure. Social egg freezing is as affordable as any other medical treatment. You can also freeze your future by making a sensible and intelligent decision at the right time to have the best outcome.

An IVF centre with all these modernizations incorporated into their protocols, managed by a team of well-trained professionals for decision taking and headed by highly skilled and experienced clinical and scientific directors will be able to deliver better and safer outcomes to infertile couples.