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Topic: In Vitro fertilization

In vitro fertilization

IVF is a process of fertilization where an egg is combined with sperm outside the body, in vitro ("in glass"). The process involves monitoring and stimulating a woman's ovulatory process, removing an ovum or ova (egg or eggs) from the woman's ovaries and letting sperm fertilize them in a liquid in a laboratory. After the fertilized) egg (zygote undergoes embryo culture for 2–6 days, it is implanted in the same or another woman's uterus, with the intention of establishing a successful pregnancy

IVF is a type of assisted reproductive technology used for infertility treatment and gestational surrogacy. A fertilized egg may be implanted into a surrogate's uterus, and the resulting child is genetically unrelated to the surrogate.

In 1978, Louise Brown was the first child successfully born after her mother received IVF treatment. Brown was born as a result of natural-cycle IVF, where no stimulation was made. The procedure took place at Dr Kershaw's Cottage Hospital (now Dr Kershaw's Hospice) in Royton, Oldham, England.

Depending on your situation, IVF can use:

- your eggs and your partner's sperm
- your eggs and donor sperm
- donor eggs and your partner's sperm
- donor eggs and donor sperm
- donated embryo.

The success rate of IVF varies. According to the American Pregnancy Association, the live birth rate for women under age 35 undergoing IVF is 41 to 43 percent. This rate falls to 13 to 18 percent for women over the age of 40.

Terminology

The Latin term *in vitro*, meaning "in glass", is used because early biological experiments involving cultivation of tissues outside the living organism were carried out in glass containers, such as beakers, test tubes, or Petri dishes.

Today, the scientific term "in vitro" is used to refer to any biological procedure that is performed outside the organism in which it would normally have occurred, to distinguish it from an *in vivo* procedure (such as *in vivo*

fertilization), where the tissue remains inside the living organism in which it is normally found.

A colloquial term for babies conceived as the result of IVF, "test tube babies", refers to the tube-shaped containers of glass or plastic resin, called test tubes.

Indication:

- reduced fertility in women over the age of 40
- blocked or damaged fallopian tubes
- reduced ovarian function
- endometriosis
- uterine fibroids
- male infertility, such as low sperm count or abnormalities in sperm shape
- Unexplained infertility.

IVF may be used to overcome female infertility when it is due to problems with the fallopian tubes, making in vivo fertilisation difficult. It can assist in male infertility, in those cases where there is a defect in sperm quality, in such situations intracytoplasmic sperm injection (ICSI) may be used, where a sperm cell is injected directly into the egg cell. This is used when sperm has difficulty penetrating the egg.

Procedure: In Vitro Fertilization

There are five steps involved in IVF:

1. stimulation
2. egg retrieval
3. insemination
4. embryo culture
5. embryo transfer

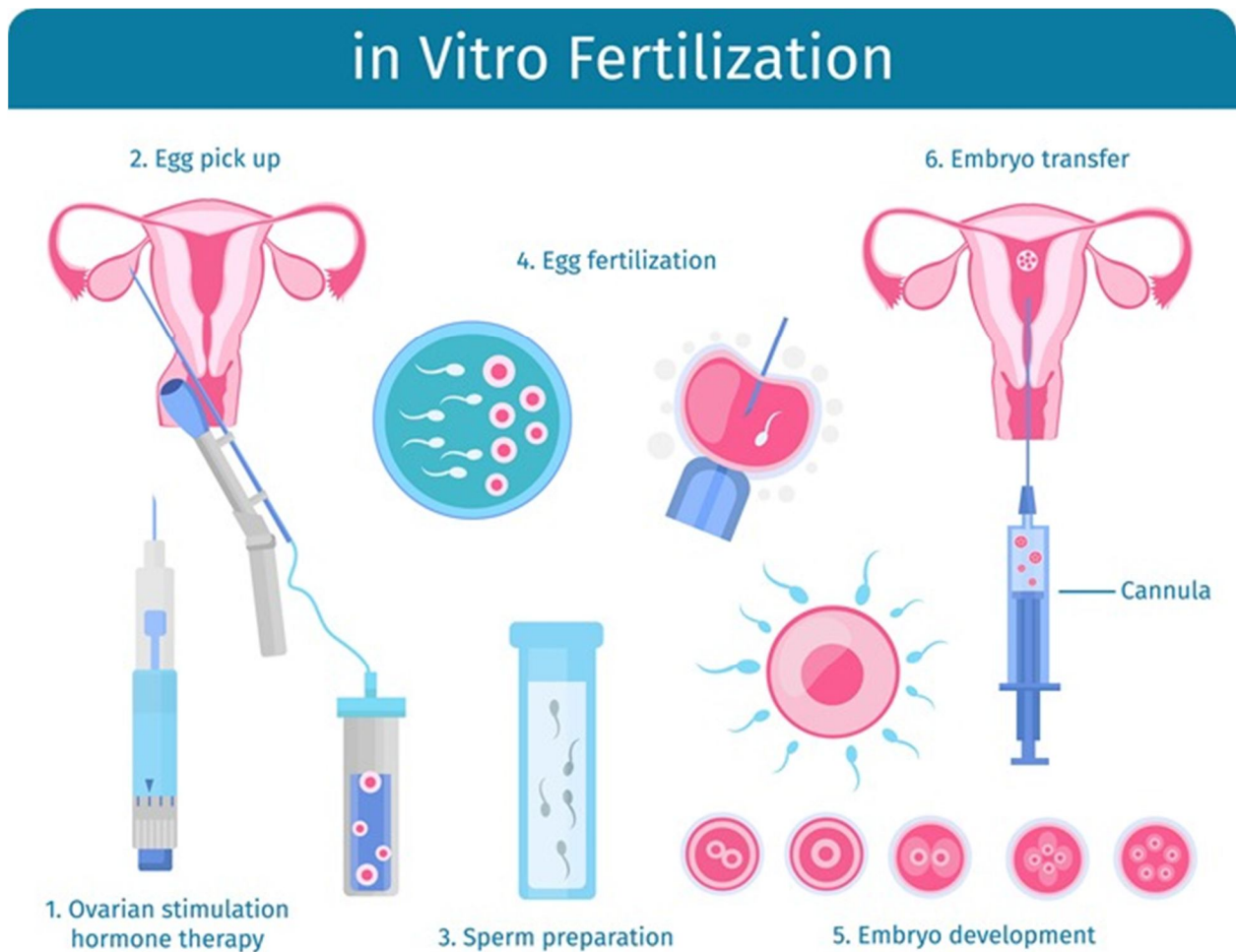


Fig. Steps of In Vitro Fertilization

Stimulation:

A woman normally produces one egg during each menstrual cycle. However, IVF requires multiple eggs. Using multiple eggs increases the chances of developing a viable embryo. A woman will receive fertility drugs to increase the number of eggs her body produces. During this time, the doctor will perform regular blood tests and ultrasounds to monitor the production of eggs and to let the doctor know when to retrieve them.

Egg Retrieval:

Egg retrieval is known as follicular aspiration. It's a surgical procedure performed with anesthesia. The doctor will use an ultrasound wand to guide a needle through the vagina, into the ovary, and into an egg-containing follicle. The needle will suction eggs and fluid out of each follicle.

Insemination:

The male partner will now need to give a semen sample. A technician will mix the sperm with the eggs in a petri dish. If that doesn't produce embryos, the doctor may decide to use ICSI.

Embryo Culture:

The doctor will monitor the fertilized eggs to ensure that they're dividing and developing. The embryos may undergo testing for genetic conditions at this time.

Embryo Transfer:

When the embryos are big enough, they can be implanted. This normally occurs three to five days after fertilization. Implantation involves inserting a thin tube called a catheter inserted into the vagina, past the cervix, and into the uterus. The doctor then releases the embryo into your uterus.

Pregnancy occurs when the embryo implants itself in the uterine wall. This can take 6 to 10 days. A blood test will determine if you're pregnant.

Luteal support:

Luteal support is the administration of medication, generally progesterone, progestins, hCG, or GnRH agonists, and often accompanied by estradiol, to increase the success rate of implantation and early embryogenesis, thereby complementing and/or supporting the function of the corpus luteum.

Complications:

- **Multiple pregnancies:**

The major complication of IVF is the risk of multiple pregnancies. This is directly related to the practice of transferring multiple embryos at embryo transfer. Multiple births are related to increased risk of pregnancy loss, obstetrical

complications, prematurity, and neonatal morbidity with the potential for long term damage.

- **Sex ratio distortions:**

Particular in ICSI (first applied in 1991) and blastocyst transfer (first applied in 1984) have been shown to lead to distortions in the sex ratio at birth. ICSI leads to slightly more female births (51.3% female) while blastocyst transfer leads to significantly more boys (56.1% male) being born. Standard IVF done at the second or third day leads to a normal sex ratio.

- **Spread of infectious disease:**

By sperm washing, the risk that a chronic disease in the male providing the sperm would infect the female or offspring can be brought to negligible levels.

- **Risks to the egg provider/retrieval:**

Ovarian hyperstimulation syndrome, particularly if hCG is used for inducing final oocyte maturation. This results in swollen, painful ovaries. It occurs in 30% of patients.

During egg retrieval, there exists a small chance of bleeding, infection, and damage to surrounding structures such as bowel and bladder (transvaginal ultrasound aspiration).

- **Ectopic pregnancy:** It may occur if a fertilized egg develops outside the uterus, usually in the fallopian tubes and requires immediate destruction of the fetus.