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In vitro fertilization (IVF)

In vitro fertilization (IVF) is the joining of a woman's egg and a man's sperm in a laboratory dish. In vitro means outside the body. Fertilization means the sperm has attached to and entered the egg.

Description

Normally, an egg and sperm are fertilized inside a woman's body. If the fertilized egg attaches to the lining of the womb and continues to grow, a baby is born about 9 months later. This process is called natural or unassisted conception.

IVF is a form of assisted reproductive technology (ART). This means special medical techniques are used to help a woman become pregnant. It is most often tried when other, less expensive fertility techniques have failed.

There are five basic steps to IVF:

Step 1: Stimulation, also called super ovulation

- Medicines, called fertility drugs, are given to the woman to boost egg production.
- Normally, a woman produces one egg per month. Fertility drugs tell the ovaries to produce several eggs.
- During this step, the woman will have regular transvaginal ultrasounds to examine the ovaries and blood tests to check hormone levels.

Step 2: Egg retrieval

- A minor surgery, called follicular aspiration, is done to remove the eggs from the woman's body.
- The surgery is done in the doctor's office most of the time. The woman will be given medicines so she does not feel pain during the procedure. Using ultrasound images as a guide, the health care provider inserts a thin needle through the vagina into the ovary and sacs (follicles) containing the

eggs. The needle is connected to a suction device, which pulls the eggs and fluid out of each follicle, one at a time.

- The procedure is repeated for the other ovary. There may be some cramping after the procedure, but it will go away within a day.
- In rare cases, a pelvic laparoscopy may be needed to remove the eggs. If a woman does not or cannot produce any eggs, donated eggs may be used.

Step 3: Insemination and fertilization

- The man's sperm is placed together with the best quality eggs. The mixing of the sperm and egg is called insemination.
- Eggs and sperm are then stored in an environmentally controlled chamber. The sperm most often enters (fertilizes) an egg a few hours after insemination.
- If the doctor thinks the chance of fertilization is low, the sperm may be directly injected into the egg. This is called intracytoplasmic sperm injection (ICSI).
- Many fertility programs routinely do ICSI on some of the eggs, even if things appear normal.

Watch this video about: Intracytoplasmic sperm injection

Step 4: Embryo culture

- When the fertilized egg divides, it becomes an embryo. Laboratory staff will regularly check the embryo to make sure it is growing properly. Within about 5 days, a normal embryo has several cells that are actively dividing.
- Couples who have a high risk of passing a genetic (hereditary) disorder to a child may consider pre-implantation genetic diagnosis (PGD). The procedure is most often done 3 to 5 days after fertilization. Laboratory scientists remove a single cell or cells from each embryo and screen the material for specific genetic disorders.
- According to the American Society for Reproductive Medicine, PGD can help parents decide which embryos to implant. This decreases the chance of passing a disorder onto a child. The technique is controversial and not offered at all centers.

Step 5: Embryo transfer

- Embryos are placed into the woman's womb 3 to 5 days after egg retrieval and fertilization.
- The procedure is done in the doctor's office while the woman is awake. The doctor inserts a thin tube (catheter) containing the embryos into the woman's vagina, through the cervix, and up into the womb. If an embryo sticks to (implants) in the lining of the womb and grows, pregnancy results.

- More than one embryo may be placed into the womb at the same time, which can lead to twins, triplets, or more. The exact number of embryos transferred is a complex issue that depends on many factors, especially the woman's age.
- Unused embryos may be frozen and implanted or donated at a later date.

Why the Procedure is Performed

IVF is done to help a woman become pregnant. It is used to treat many causes of infertility, including:

- Advanced age of the woman (advanced maternal age)
- Damaged or blocked fallopian tubes (can be caused by pelvic inflammatory disease or prior reproductive surgery)
- Endometriosis
- Male factor infertility, including decreased sperm count and blockage
- Unexplained infertility

Risks

IVF involves large amounts of physical and emotional energy, time, and money. Many couples dealing with infertility suffer stress and depression.

A woman taking fertility medicines may have bloating, abdominal pain, mood swings, headaches, and other side effects. Repeated IVF injections can cause bruising.

In rare cases, fertility drugs may cause ovarian hyperstimulation syndrome (OHSS). This condition causes a buildup of fluid in the abdomen and chest. Symptoms include abdominal pain, bloating, rapid weight gain (10 pounds or 4.5 kilograms within 3 to 5 days), decreased urination despite drinking plenty of fluids, nausea, vomiting, and shortness of breath. Mild cases can be treated with bed rest. More severe cases require draining of the fluid with a needle and possibly hospitalization.

Medical studies have shown so far that fertility drugs are not linked to ovarian cancer.

Risks of egg retrieval include reactions to anesthesia, bleeding, infection, and damage to structures surrounding the ovaries, such as bowel and bladder.

There is a risk for multiple pregnancies when more than one embryo is placed into the womb. Carrying more than one baby at a time increases the risk for premature birth and low birth weight. (However, even a single baby born after IVF is at higher risk for prematurity and low birth weight.)

It is unclear whether IVF increases the risk for birth defects.

IVF is very costly. Some, but not all, states have laws that say health insurance companies must offer some type of coverage. But, many insurance plans do not cover infertility treatment. Fees for a single IVF cycle include costs for medicines, surgery, anesthesia, ultrasounds, blood tests, processing the eggs and sperm, embryo storage, and embryo transfer. The exact total of a single IVF cycle varies, but may cost from approximately $12,000 to $17,000.

After the Procedure

After embryo transfer, the woman may be told to rest for the remainder of the day. Complete bed rest is not necessary, unless there is an increased risk for OHSS. Most women return to normal activities the next day.

Women who undergo IVF must take daily shots or pills of the hormone progesterone for 8 to 10 weeks after the embryo transfer. Progesterone is a hormone produced naturally by the ovaries that prepares the lining of the uterus (womb) so that an embryo can attach. Progesterone also helps an implanted embryo grow and become established in the uterus. A woman may continue to take progesterone for 8 to 12 weeks after becoming pregnant. Too little progesterone during the early weeks of pregnancy may lead to miscarriage.

About 12 to 14 days after the embryo transfer, the woman will return to the clinic so that a pregnancy test can be done.

Contact your provider right away if you had IVF and have:

- A fever over 100.5°F (38°C)
- Pelvic pain
- Heavy bleeding from the vagina
- Blood in the urine

Outlook (Prognosis)

Statistics vary from one clinic to another and must be looked at carefully. However, patient populations are different in each clinic, so reported pregnancy rates cannot be used as an accurate indication of one clinic being preferable to another.

- Pregnancy rates reflect the number of women who became pregnant after IVF. But not all pregnancies result in a live birth.
- Live birth rates reflect the number of women who give birth to a living child.

Outlook of live birth rates depend on certain factors such as mother age, prior live birth, and single embryo transfer during IVF. Success rates have changed over the years in part due to the increasing

use of single embryo transfers. IVF clinics have encouraged single embryo transfers to reduce the risk of twin pregnancies, which have higher risk for complications than singleton pregnancies. Embryos not transferred may be frozen and saved. The cycles in which those frozen embryos are thawed and transferred are called frozen embryo transfer cycles (FET).

Alternative Names

IVF; Assisted reproductive technology; ART; Test-tube baby procedure; Infertility - in vitro

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