

## **In vitro fertilisation (IVF)**

In vitro fertilisation (IVF) is a process by which egg cells are fertilised by sperm outside the womb, in vitro. IVF is a major treatment in infertility when other methods of assisted reproductive technology have failed. The process involves hormonally controlling the ovulatory process, removing ova (eggs) from the woman's ovaries and letting sperm fertilise them in a fluid medium. The fertilised egg (zygote) is then transferred to the patient's uterus with the intent to establish a successful pregnancy.

### **Method**

#### Ovarian stimulation

Treatment cycles are typically started on the third day of menstruation and consist of a regimen of fertility medications to stimulate the development of multiple follicles of the ovaries. In most patients injectable gonadotropins (usually FSH analogues) are used under close monitoring. Such monitoring frequently checks the estradiol level and, by means of gynecologic ultrasonography, follicular growth. Typically approximately 10 days of injections will be necessary. Spontaneous ovulation during the cycle is typically prevented by the use of GnRH antagonists, which block the natural surge of luteinising hormone (LH).

#### Egg retrieval

When follicular maturation is judged to be adequate, human chorionic gonadotropin (hCG) is given. This agent, which acts as an analogue of luteinising hormone, would cause ovulation about 42 hours after injection, but a retrieval procedure takes place just prior to that, in order to recover the egg cells from the ovary. The eggs are retrieved from the patient using a transvaginal technique involving an ultrasound-guided needle piercing the vaginal wall to reach the ovaries. Through this needle follicles can be aspirated, and the follicular fluid is handed to the IVF laboratory to identify ova. It is common to remove between ten and thirty eggs. The retrieval procedure takes about 20 minutes and is usually done under conscious sedation or general anesthesia.

#### Fertilisation

In the laboratory, the identified eggs are stripped of surrounding cells and prepared for fertilisation. In the meantime, semen is prepared for fertilisation by removing inactive cells and seminal fluid. If semen is being provided by a sperm donor, it will usually have been prepared for treatment before being frozen and quarantined, and it will be thawed ready for use. The sperm and the egg are incubated together at a ratio of about 75,000:1 in the culture media for about 18 hours. In most cases, the egg will be fertilised by that time and the fertilised egg will show two pronuclei. In certain situations, such as low sperm count or motility, a single sperm may be injected directly into the egg using intracytoplasmic sperm injection (ICSI). The fertilised egg is passed to a special growth medium and left for about 48 hours until the egg consists of six to eight cells.

In gamete intrafallopian transfer, eggs are removed from the woman and placed in one of the fallopian tubes, along with the man's sperm. This allows fertilisation to take place inside the woman's body. Therefore, this variation is actually an in vivo fertilisation, not an in vitro fertilisation.

### **Risk**

The major complication of IVF is the risk of multiple births. 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.

Another risk of ovarian stimulation is the development of ovarian hyperstimulation syndrome.

If the underlying infertility is related to abnormalities in spermatogenesis, it is plausible, but too early to examine that male offspring is at higher risk for sperm abnormalities.