

In Vitro Fertilization

In vitro fertilization (IVF) may be used to overcome infertility which may result from a disturbance of any of the factors involved in fertilization or embryonic development. Female infertility may be due to a failure to ovulate, requiring stimulation of the ovary, with or without hormone therapy. For couples with one or both partners incapable of providing suitable gametes, it may be possible for them to receive eggs and/or sperm from

Causes of infertility

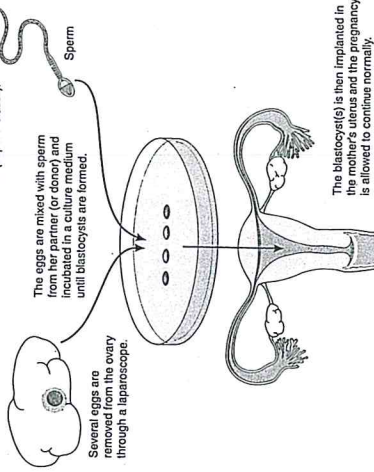
Infertility is a common problem. (as many as one in six couples require help from a specialist). The cause of the infertility may be inherited, the result of damage caused by disease, or psychological.

- Causes of male infertility**
- ▶ Penis: Fails to achieve or maintain erection; abnormal ejaculation.
 - ▶ Testes: Too few sperm produced or sperm are not fully shaped, have impaired motility, or too short-lived.
 - ▶ Vas deferens: A blockage or a structural abnormality may impede the passage of sperm.

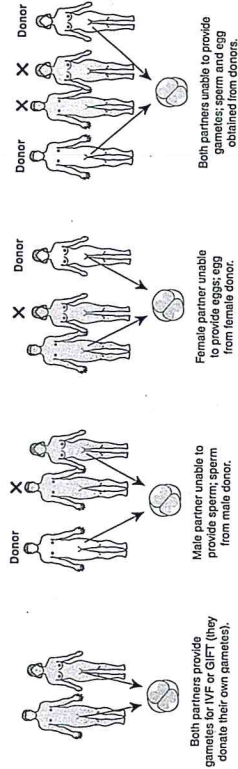
- Causes of female infertility**
- ▶ Fallopian tubes: Blockage may prevent sperm from reaching egg; one or both tubes may be damaged (disease) or absent (congenital).
 - ▶ Ovaries: Eggs may fail to mature or may not be released.
 - ▶ Uterus: Abnormality or disorder may prevent implantation of the egg.
 - ▶ Cervix: Antibodies in cervical mucus may damage or destroy the sperm.

In Vitro Fertilization

The woman is given hormone therapy (fertility drugs) causing a number of eggs to mature at the same time (superovulation).



Biological Origins of Gamete Donations



1. Describe three causes of female infertility: _____

2. Describe three causes of male infertility: _____

3. Describe the key stages of IVF: _____

IVF raises a number of ethical issues including the concept of personhood, religious beliefs, and the rights and responsibilities of the individual, parents, and community as a whole. It also raises issues over the health and psychological effects of the offspring.



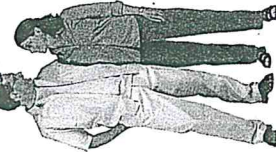
Ethical Issue 1:

The rights of the pre-embryo (blastocyst)

Multiple blastocysts are transferred to a woman's uterus to increase the chances of pregnancy. Some of these blastocysts are destroyed by selective pregnancy reduction.

When does personhood or the individual begin?

- ▶ If it begins at conception, destruction of the extra embryos technically constitutes murder.
- ▶ Many different ideas and definitions exist over the start of personhood or individuality.
- Can the pre-embryo technically be called an individual during the period of totipotency (about 3 weeks)? During this period, any one of its cells could develop into an individual.



Ethical Issue 2:

Possible wrongs to the couple by the use of IVF

- ▶ Multiple blastocysts are transferred to a woman's uterus to increase the chances of implantation.
- ▶ A multiple pregnancy can have psychological and health effects on the parents.
- ▶ A multiple pregnancy can have health effects on the embryos.
- ▶ The parents may have to bear the cost of IVF, putting financial strain on them (and possibly resentment towards others).
- Cost may be indirect, because the offspring may have health problems (either caused by IVF or naturally occurring).

Ethical Issue 3:

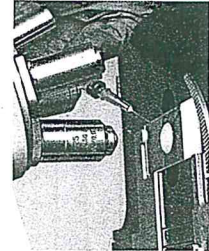
Possible wrongs to the offspring by the use of IVF



- ▶ There is some medical evidence to suggest IVF babies have a higher chance of medical problems such as pre-term birth, low birth weight, spina bifida, and heart defects.
- ▶ Parents with genetic defects preventing them from conceiving naturally could pass these defects to the offspring via IVF.

Ethical Issue 4:

Possible wrongs to the community by the use of IVF



- ▶ IVF is a costly procedure.
- ▶ Couples who can afford IVF may be putting money and effort into conception instead of the community.
- ▶ The community may have to bear the cost of IVF and welfare for financially struggling individuals.
- ▶ Offspring with health issues due to IVF may be an ongoing burden to the community.

Treating Female Infertility

Failure to ovulate is a common cause of female infertility. In most cases, the cause is hormonal, although sometimes the ovaries may be damaged or not functioning normally. Female infertility may also arise through damage to the Fallopian tubes as a result

of infection or scarring. These cases are usually treated with hormones, followed by IVF. Most treatments for female infertility involve the use of synthetic female hormones, which stimulate ovulation, boost egg production, and induce egg release.

Treating Female Infertility

Cause of the infertility
Failure to ovulate because of low levels of GnRH, FSH, LH, or ovarian hormones.



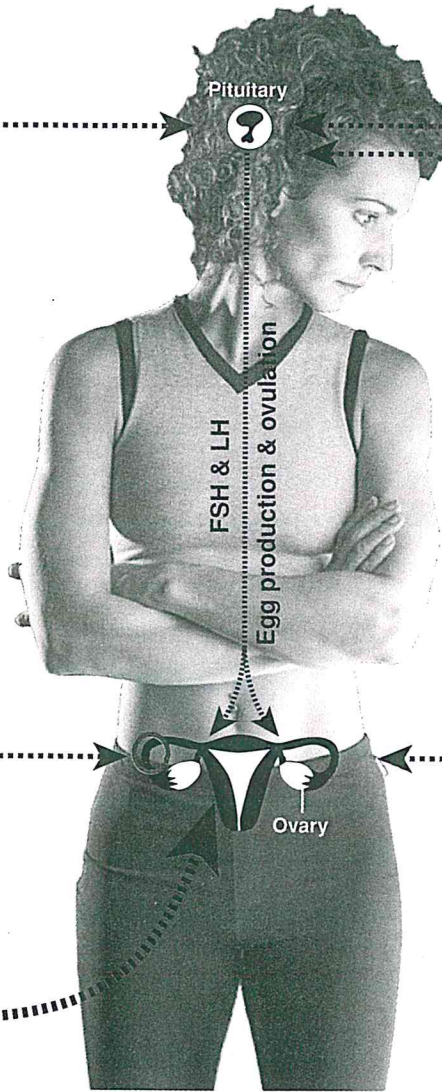
Hormonal treatment successful?
Treatment may enable conception in the usual way.



Fallopian tubes blocked?
Eggs may be collected from the follicles using laparoscopy and fertilized *ex-vivo* in a glass dish (*in-vitro* fertilization or IVF).



Successful fertilisation
At an early stage of cell division, the pre-embryo is transferred to the uterus. A pregnancy results if implantation is successful.

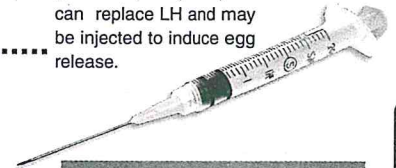


Hormone imbalance can be corrected using estrogen-like drugs, e.g. clomiphene (pictured here under a trade name) and tamoxifen, which induce release of FSH from the pituitary.



Sometimes fertility drugs containing FSH and/or LH are used. These induce the release of many ova, increasing the risk of a multiple pregnancy.

Human chorionic gonadotrophin (HCG) can replace LH and may be injected to induce egg release.



HCG is a hormone involved in the maintenance of early pregnancy.

1. Describe two ways in which the hormonal drugs used to enhance fertility operate:

(a) _____

(b) _____

2. Identify two examples of female infertility where treatment using IVF would be appropriate:

(a) _____

(b) _____

3. Identify one risk associated with the use of fertility drugs: _____