The Menstrual Cycle Notes

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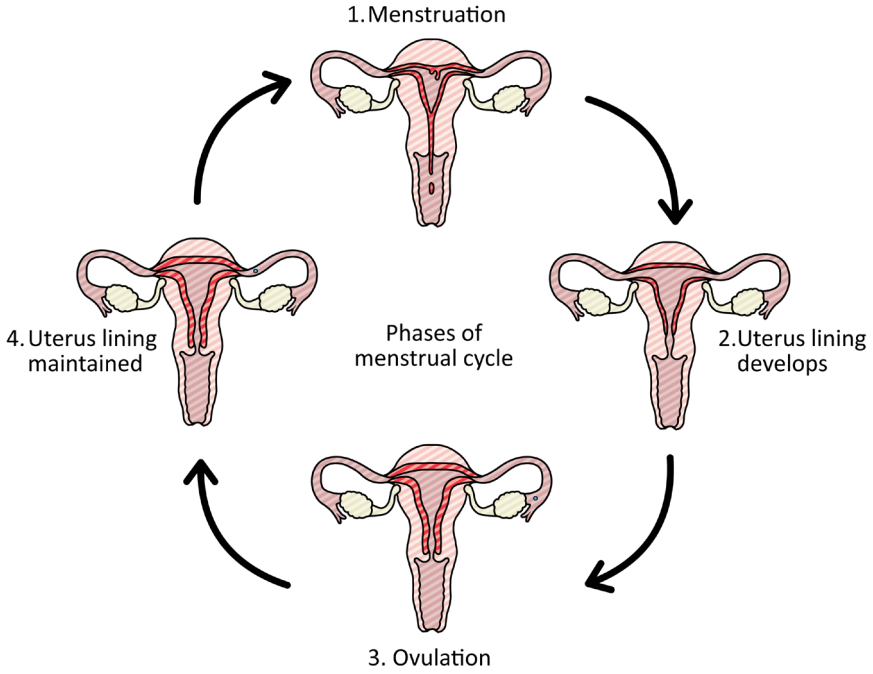
The menstrual cycle: the natural regular change that occurs in the reproductive system of a female that allows the uterus to support a pregnancy. The menstrual cycle typically takes about 28 days but cycles can vary in length.

If fertilisation does not occur the lining of the uterus is shed, this is called **menstruation**

The Stages of the Menstrual Cycle

The day count for menstrual cycle begins on the first day of menstruation when blood starts to come out of the vagina. The length of menstrual cycle for exams is assumed to be 28 days in length as, this is the average among women. The entire duration of a Menstrual cycle can be divided into **four main stages**:

1. **Menstruation** (From day 1 to 5).
2. **Uterus lining thickens and grows.** (From day 6 to 13).
3. **Ovulation** (Day 14).
4. **Progesterone maintains the uterus lining.** (From day 15 to 28).



The Hormones of the Menstrual Cycle

The menstrual cycle is controlled by negative and positive feedback mechanisms involving ovarian and pituitary hormones. But, before we look at that let's look at the hormones involved 😊

1. **Hormone**: FSH – follicle stimulating hormone.
   Produced by: the pituitary gland in the brain.
   Effect: causes the development of a follicle in one of the ovaries. The follicle is a small, fluid filled sac in the ovary that contains the immature ovum (egg).

2. **Hormone**: Oestrogen.
   Produced by: the ovaries.
   Effect: causes an increase in the thickness of the uterus lining (endometrium).

3. **Hormone**: LH – luteinising hormone.
   Produced by: the pituitary gland in the brain.
   Effect: causes ovulation, this is the release of an ovum from an ovary at day 14.

4. **Hormone**: Progesterone.
   Produced by: the ovaries. Some is produced by the corpus luteum as the ovum moves down the fallopian tube.
   Effect: maintains the lining of the uterus. When the level of progesterone falls, the uterus lining breaks down and is passed out of the body through the vagina and the cycle begins again.

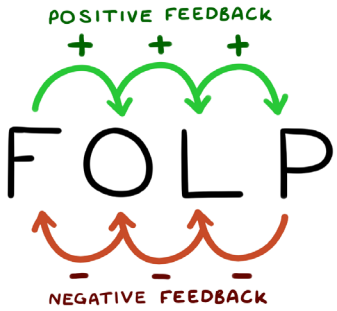
Positive and Negative Feedback

There is positive and negative feedback between the hormones of the menstrual cycle. But what does positive and negative feedback mean?

Positive feedback: is a process in which the products of one action cause more of that action to occur.
In terms of hormones, this means that the production of one hormone can **increase** the production of another.

Negative feedback: is a process in which the products of one action cause less of that action to occur.
In terms of hormones, this means that the production of one hormone can **reduce** the production of another.

When teaching this myself I use the **FOLP diagram** below. It shows the order of hormone production as well as the positive and negative feedback. It's a really useful diagram 😊 I hope it helps.



When can fertilisation occur?

Fertilisation can only occur if an ovum is available.

Fertilisation can occur after ovulation (day 14).
The ovum can survive for about 24 hours. But, normally will die after three days if it hasn't been fertilised. Sperm can live for up to 5 days.

Barrier and Hormonal Contraceptives

Barrier contraceptives: are physical barriers that prevent sperm from entering the female reproductive system. If sperm cannot reach the egg then no fertilisation can take place.
Examples are the male and female condoms. These also prevent the spread of STIs.

Hormonal contraceptives: work by preventing the development or release of an egg. If there is no egg present to fertilise then fertilisation cannot take place.
Examples are the oral contraceptive pills, which can contain progesterone or indeed a combination of oestrogen and progesterone. These both have negative feedback on FSH. Others are the injection, implant and patch.

Barrier contraceptives versus Hormonal contraceptives

Barrier contraceptives	Hormonal contraceptives
Advantages: 1. Easy to use. 2. Can be used at short notice. 3. Help prevent the spread of STIs.	**Advantages**: 1. 99% effective when used correctly. 2. Do not require barriers to work. 3. Can be used to reduce periods.
Disadvantages: 1. Can break or tear. 2. User error.	**Disadvantages**: 1. Must be taken correctly to be effective. 2. Do not protect against STIs. 3. Can cause side effects – e.g. headaches & acne.

Other Methods of Contraception

Intrauterine devices (IUDs): A small, T-shaped device inserted into the uterus. They work by preventing the implantation of an embryo. Advantage: lasts for 3–5 years. Disadvantage: must be fitted by a medical professional.

Diaphragms: A shallow plastic cup that fits over the cervix (entrance to the uterus) to form a physical barrier. It must be used alongside a spermicide (a chemical foam or jelly that kills or disables sperm).

Surgical methods (sterilisation): a permanent surgical procedure. In women, the fallopian tubes are cut or tied to prevent the egg from reaching the uterus. In men (a vasectomy), the sperm ducts are cut or tied so no sperm is released. Advantage: nearly 100% effective. Disadvantage: difficult or impossible to reverse.

Abstinence (the rhythm method): abstaining from not having sexual intercourse during the days of the menstrual cycle when a woman is most fertile (around ovulation). Disadvantage: highly unreliable.

In vitro fertilisation (IVF) treatment

IVF is probably the best known method to treat infertility. The stages of IVF are as follows:

1. The IVF process involves giving a woman the hormones FSH and LH, these stimulate the maturation of several ova or eggs in the ovary.
2. The ova/ eggs are collected from the woman and fertilised by sperm from the father in a glass dish in the laboratory. This is why it is called in vitro, as it means "in glass".
3. The fertilised eggs develop into embryos in the dish.
4. When the embryos are large enough, one or two of them are inserted into the woman's uterus.

Disadvantages of IVF Treatment

While IVF is a fantastic technology that helps people have children, exams often ask us to evaluate it. We must know the following disadvantages:

- **Low success rates**: The success rate of IVF is relatively low (especially for older women). This means patients often have to go through several expensive cycles before a successful pregnancy occurs.

- **Physical and emotional stress**: The process is can be stressful. The fertility drugs require daily injections and can cause physical side effects (like abdominal pain or vomiting), and the low success rate causes emotional stress for the parents.

- **Risk of multiple births**: To increase the chance of success, multiple embryos are often transferred into the uterus. This can lead to multiple births (twins, triplets), which significantly increases the risk of complications, premature birth, and danger to both the babies and the mother.

- It is also quite an expensive procedure.