

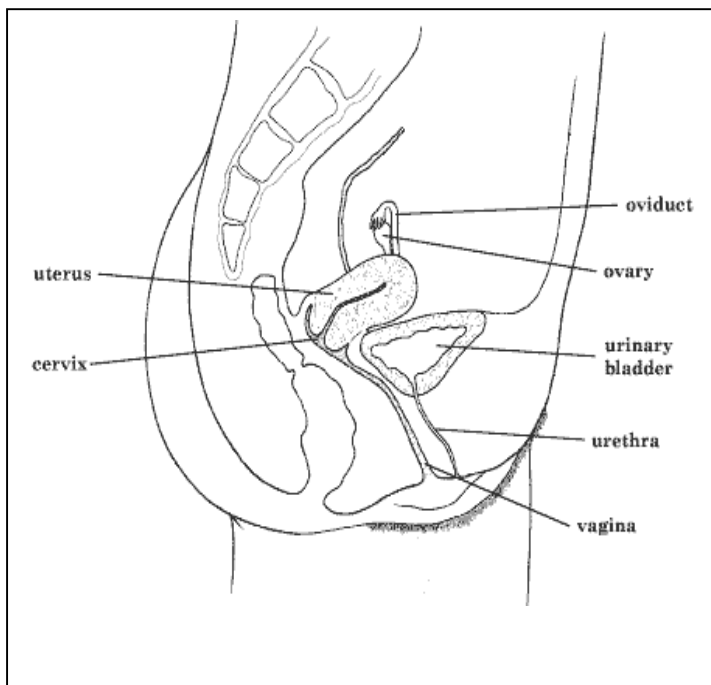
Name \_\_\_\_\_ Date \_\_\_\_\_

## The Female Reproductive System

The female reproductive system produces eggs, but usually only one at a time and only one a month. This is a very different approach to the male system. Fertilization and development of the embryo take place within the female reproductive system ending in birth of the offspring.

### Female Sex Cell Development

The diagram shown below illustrates the female reproductive system in humans. Each labeled part has an important function in the process of reproduction.



**Vagina** - The tube shaped part of the female reproductive system that receives sperm from the male and acts as the birth canal.

**Cervix** - The cervix connects the vagina to the uterus.

**Uterus** - The fertilized egg will travel to the uterus. It is in the uterus that the fertilized egg will receive nourishment and protection as it develops.

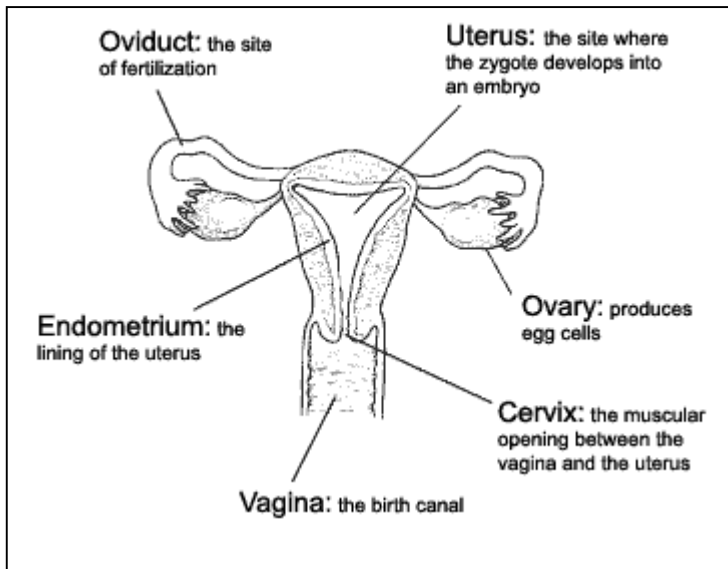
**Ovary** - The ovary is the primary female reproductive organ. The ovary is place where a follicle cell will develop into a mature egg cell that is ready to be fertilized by sperm.

This is a cross view picture of the female reproductive system.

**Oviduct (Fallopian tube)** - The oviduct is the path that starts with a primary egg cell at the ovary and ends with a mature egg ready to be fertilized near the uterus.

### Fertilization and Formation of a Zygote

Fertilization of the egg takes place in the oviduct. Once sperm have been released in the vagina, they travel by moving their tails back and forth. Sperm move through the vagina, cervix, uterus, and into the fallopian tubes (oviducts) where they can meet a single egg.



**Follicle:** Small fluid-filled sacs where the egg starts to develop

**Fallopian tube (Oviduct):** the site of fertilization

**Uterus:** the site where the zygote develops into an embryo.

**Ovary:** produces egg cells

**Cervix:** the muscular opening between the vagina and the uterus

**Vagina:** the birth canal

**Endometrium:** lining of the uterus.

There were several hundred million sperm released in the vagina but only several thousand will reach the egg. Of the several thousand sperm that reach the oviduct, only one will fertilize the egg. The egg cell is large compared to the sperm. The first sperm to penetrate the cell wall of the egg will trigger a chemical reaction that prevents any other sperm from entering the egg.

The sperm and the egg have haploid numbers of chromosomes. The two are able to join nuclei and produce a single diploid cell called a **zygote** that has **23 pairs of chromosomes**.

Remember that humans have 23 pairs of chromosomes in all cells except sex cells.

## Ovulation and Menstrual Cycle

The female reproductive system is more complicated than the male system since females must care for the embryo once the **egg** has been fertilized. The human female differs from the male in that she receives all the egg cells she will ever have during her embryonic development inside her mother's womb. A female receives around 7 million follicle cells between the 14th and 20th week of her development. **Follicle cells** surround egg cells and provide nourishment for them. The number of follicle cells from that moment decrease until her birth where she will have about 2 million and to the time of puberty when she will have about 400,000.

## A Description of the Fertilization Site

The fertilized egg is moved into the **uterus** where it is attached to the uterus wall and receives nourishment. The uterus wall contains a lining called the **endometrium** that supports the developing embryo.

The male sperm has no reproductive cycle. Large numbers of sperm are produced continuously. The female, however, has a cycle called the **menstrual cycle** in which her body prepares the endometrium four ways.

- building up the endometrium
- Ovulation
- preparing hormonally for pregnancy
- shedding the endometrium if no pregnancy occurs (menstrual phase).

The menstrual cycle lasts approximately 28 days before repeating itself.

If there is no fertilization and no pregnancy is taking place, the egg cell and the endometrium are discarded through menstruation. Menstruation is a flow of liquids that clean out the egg and endometrium which have not been used for embryo development. If a pregnancy has taken place, there is no menstrual flow as the egg is developing into an embryo and the endometrium is needed to sustain the embryo.

#### Hormones and the Female Reproduction Cycle

Once the female reaches puberty, the pituitary gland secretes two hormones. These hormones are the same as those that mark the beginning of male puberty - **FSH** and **LH**. During this time, development of the external and internal reproductive organs takes place as the body prepares for reproduction. The interaction of hormones in the reproductive cycle for females is shown below.

- The pituitary gland secretes FSH into the blood and stimulates follicles to develop in the ovary.
- Estrogen is produced, which is responsible for the thickening of the uterine lining.
- **Estrogen** travels to the pituitary and causes it to release LH. LH triggers ovulation.
- Following ovulation, follicle cells produce a corpus luteum that secretes increasing amounts of estrogen and **progesterone**.

As the level of progesterone increases, it travels to the pituitary and signals the pituitary to decrease the production of LH and FSH. The decreasing levels of LH and FSH prevent the production of egg cells until the next cycle when levels of LH and FSH increase again.

## Summary

The reproductive cycle in females consists of two basic stages:

- Ovulation where the ovary prepares the egg for fertilization
- Menstruation where the uterus is prepared to nurture the fertilized egg as it develops into a mature embryo ready for birth

The hormones LH and FSH are the same as those in males but they have a different effect. FSH triggers the development of follicle cells and the production of estrogen. Estrogen stimulates the uterus to thicken the endometrium in preparation for the zygote. Progesterone is produced in the corpus luteum. It also helps produce a thick endometrium and prepares the uterus for an embryo.