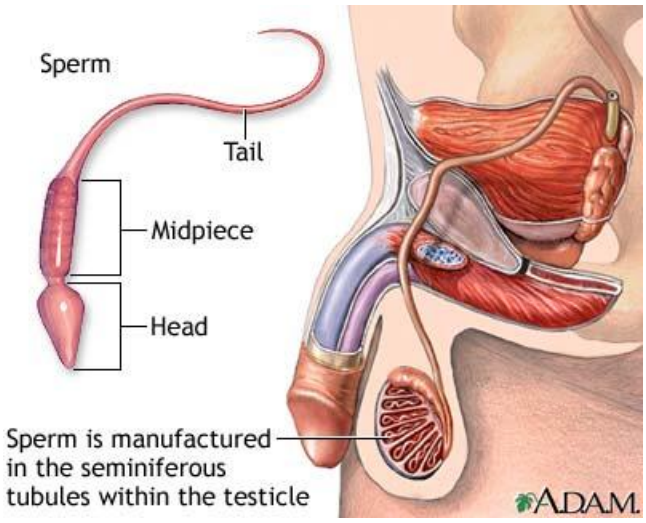
HEREDITY CHAPTER 6
HUMAN REPRODUCTION

6:1 MALE REPRODUCTIVE SYSTEM

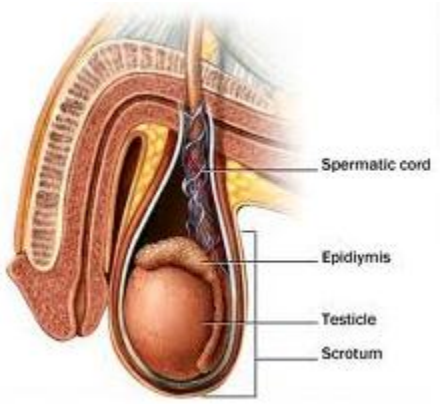
Function of the Male Reproductive System

1. Produce, store, release, and deliver SPERM: male gametes.
2. Produce TESTOSTERONE: male sex hormone responsible for secondary sex characteristics such as body hair, muscle development, and deep voice.

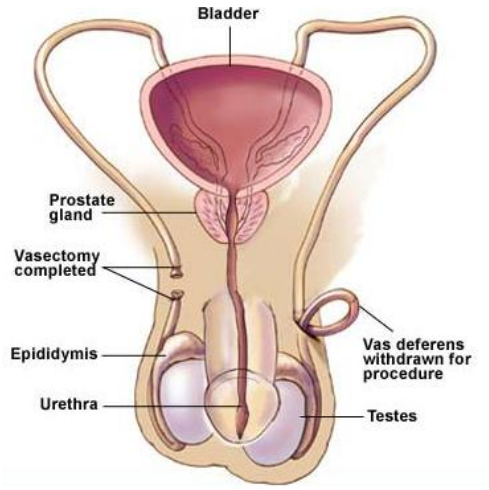


Male Reproductive Structures

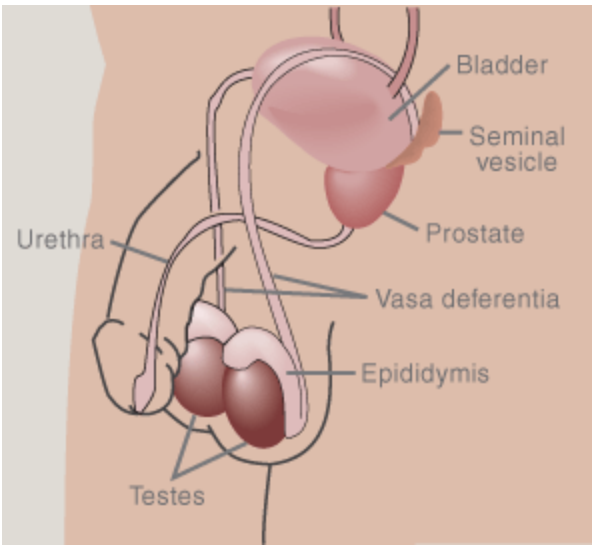
1. TESTES: male gonads, oval shaped organs that produce sperm and testosterone.
2. Each testis consists of 300-600 small, coiled tubes called SEMINIFEROUS TUBULES: tubes where special cells divides by meiosis to form sperm.



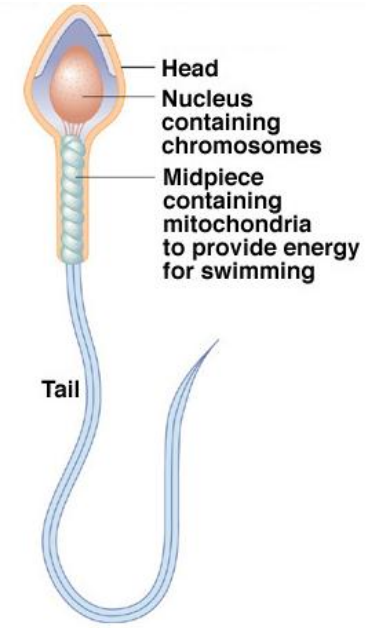
3. SCROTUM: pouch of skin that contains testes outside the body wall. The temperature in the scrotum is slightly lower than body temperature to promote production, storage and survival of sperm.
4. EPIDIDYMIS: storage area on upper, rear part of testis where sperm mature.
5. VAS DEFERENS: two tubes, one from each testis, that carry sperm upward into lower part of abdomen.



A vasectomy is the separation of the vas deferens to prevent the delivery of sperm.

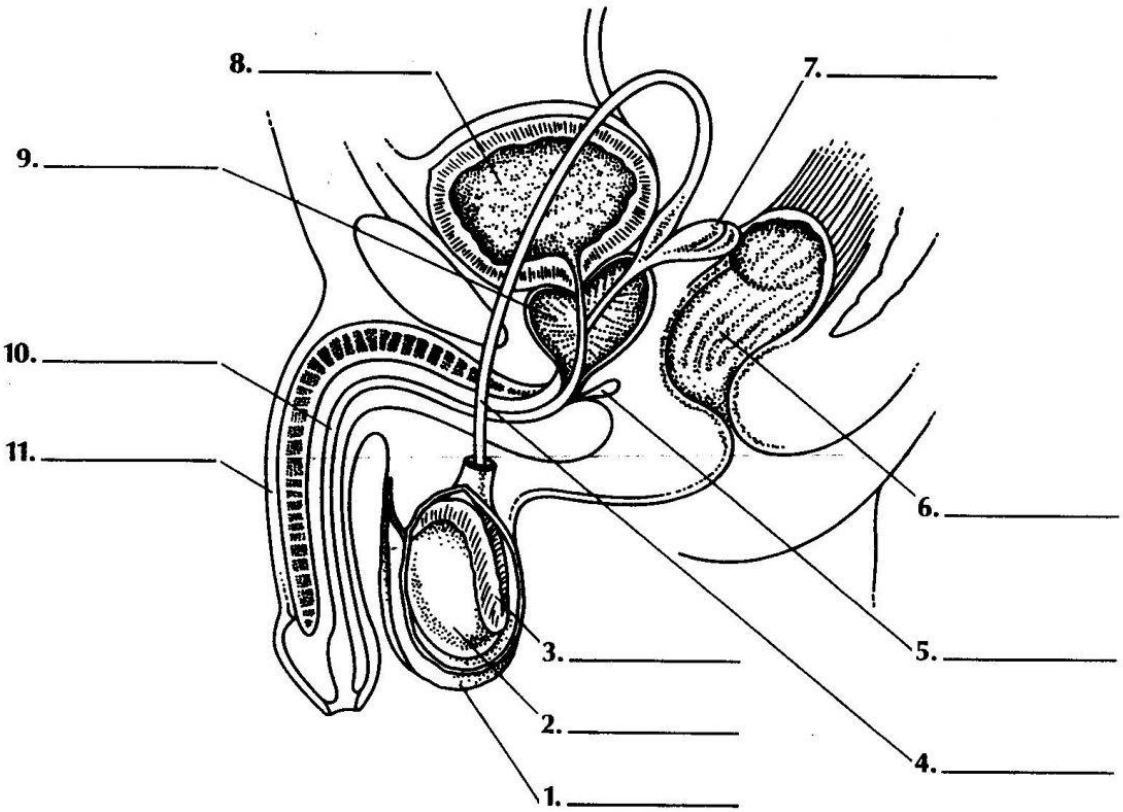


6. The two vas deferens join at the <u>URETHRA</u>: the tube within the penis through which urine and semen leave the body.
7. In the urethra, the sperm mix with secretions (fluids) from the seminal vesicles, prostate gland, and Cowper's gland to form SEMEN.
8. <u>PENIS</u>: outer male sex organ, contains urethra for eliminating urine and delivering sperm.
9. Sperm are delivered through <u>EJACULATION</u>: strong muscular contractions during orgasm that forcefully expel sperm from body.

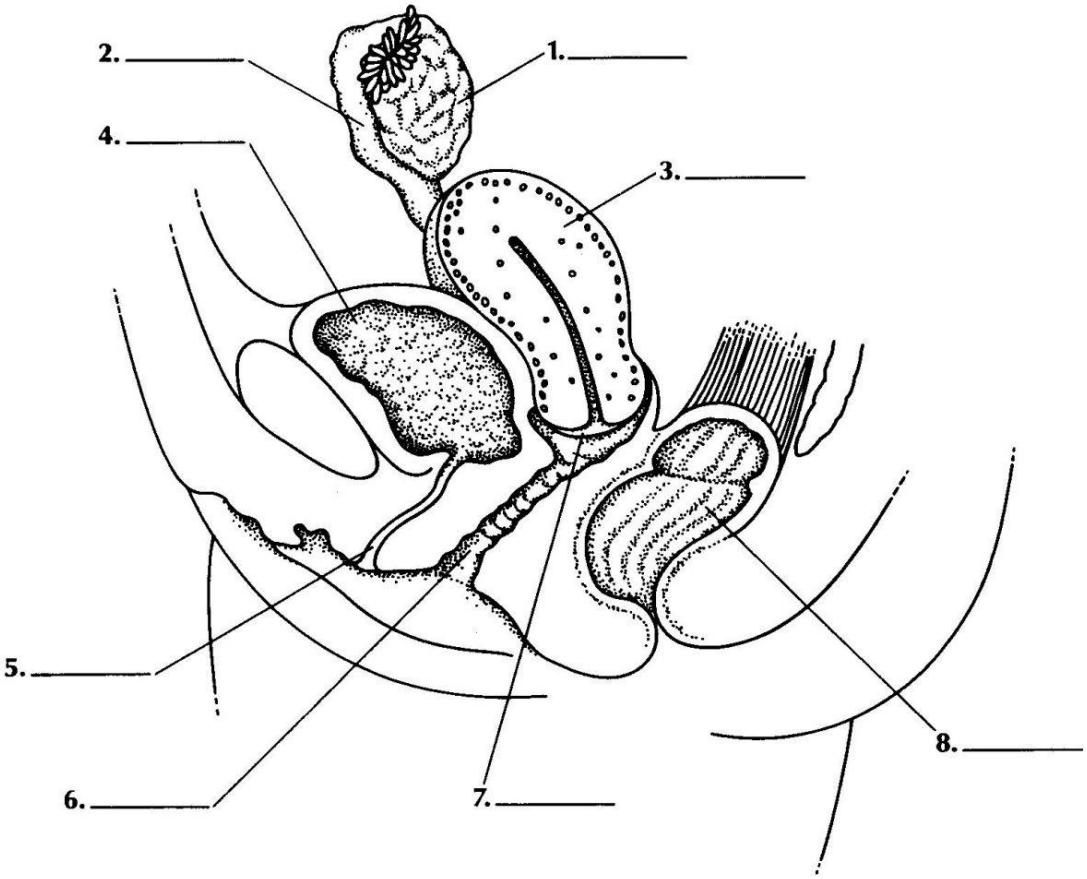


A sperm cell is a packet of DNA equipped with a flagellum that provides motility and mitochondria to provide energy.

Reproductive System of Human Male

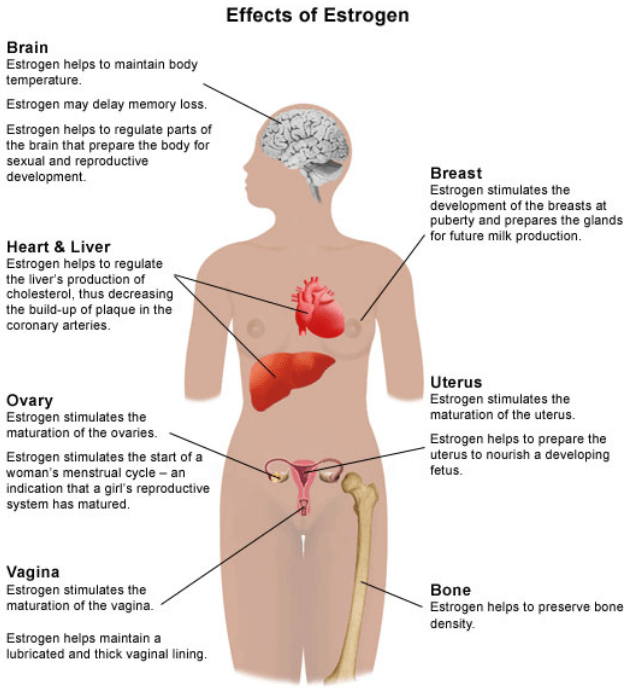


Reproductive System of Human Female



6:2 Female Reproductive System

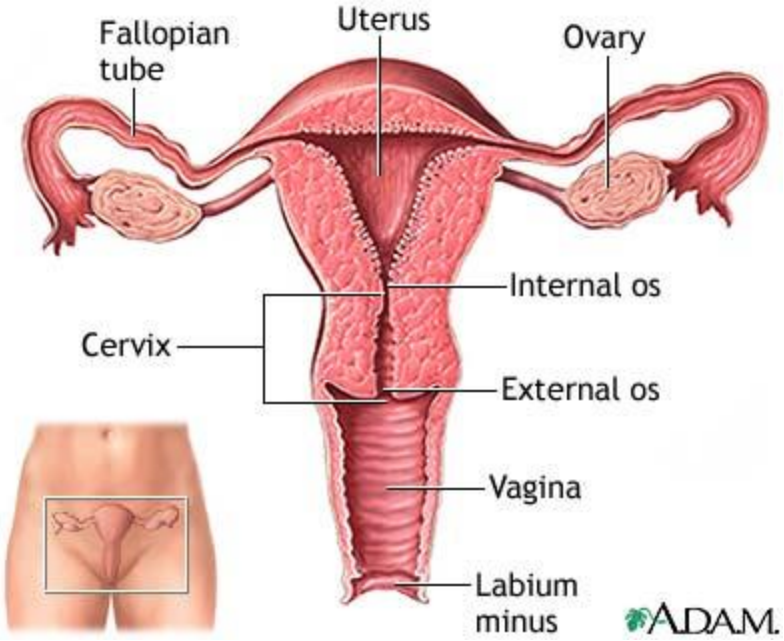
Functions of the Female Reproductive System



1. Produce EGGS: female gametes
2. Produce ESTROGEN: female sex hormone responsible for secondary sex characteristics such as development of breasts, broadened pelvis, and pattern of fat distribution

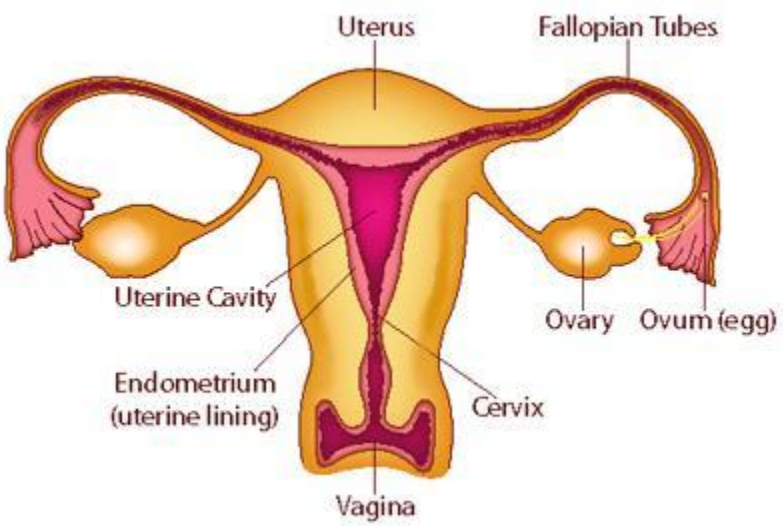
Female Reproductive Structures

1. OVARIES: female gonads, oval-shaped organs that produce eggs and estrogen
   Eggs are barely visible to the naked eye and are 75,000 times larger than sperm. Every human female is born with 400,000 immature eggs.



2. FOLLICLES: tiny sac containing one immature egg. Follicles rupture when egg matures.

3. OVULATION: the process through which a mature egg ruptures its follicle and is released from the surface of the ovary

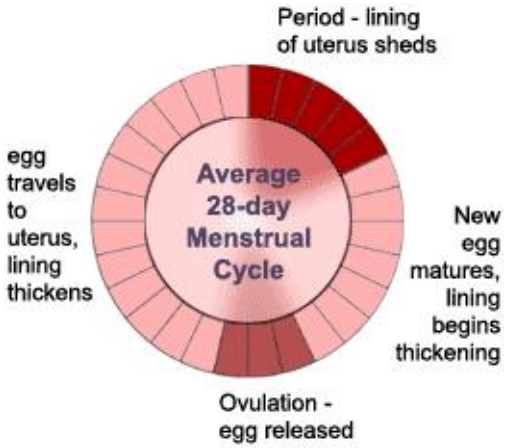


4. Near each ovary, but not connected to it, is the funnel-shaped opening to the FALLOPIAN TUBE (oviduct): tubes leading from each ovary to the uterus, usually the site of fertilization
5. UTERUS: pear-shaped, muscular, thick-walled organ, the site of fetal development if the egg is fertilized
6. CERVIX: narrow neck or lower opening of the uterus
7. The cervix opens into the VAGINA: the tube leading to the outside of the body
8. VULVA: external female genitalia, composed of the inner and outer labia (folds of skin) and the clitoris

   The clitoris is homologous to the penis, both organs originate with the same embryonic tissue.

6:3 The Menstrual Cycle

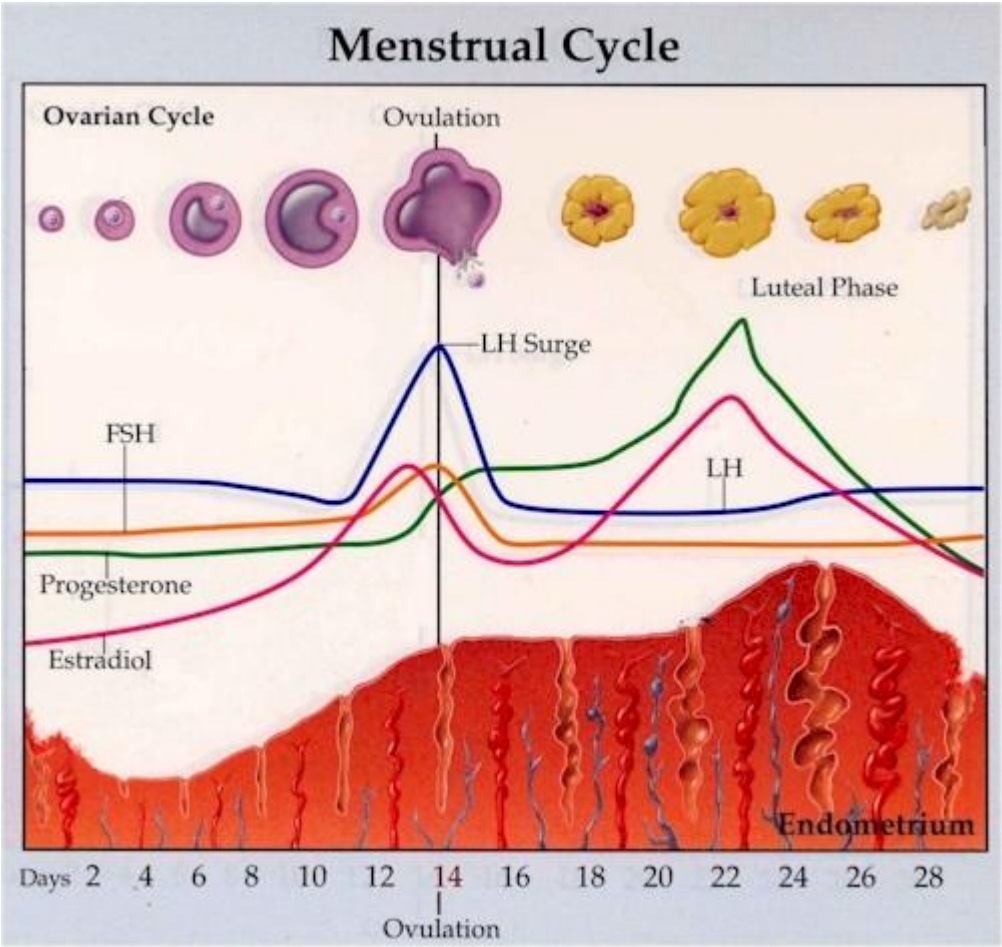
MENSTRUAL CYCLE: monthly series of changes during which the female reproductive system, through hormones, controls the maturation of an egg, its release from the ovary, and its removal from the body if not fertilized.

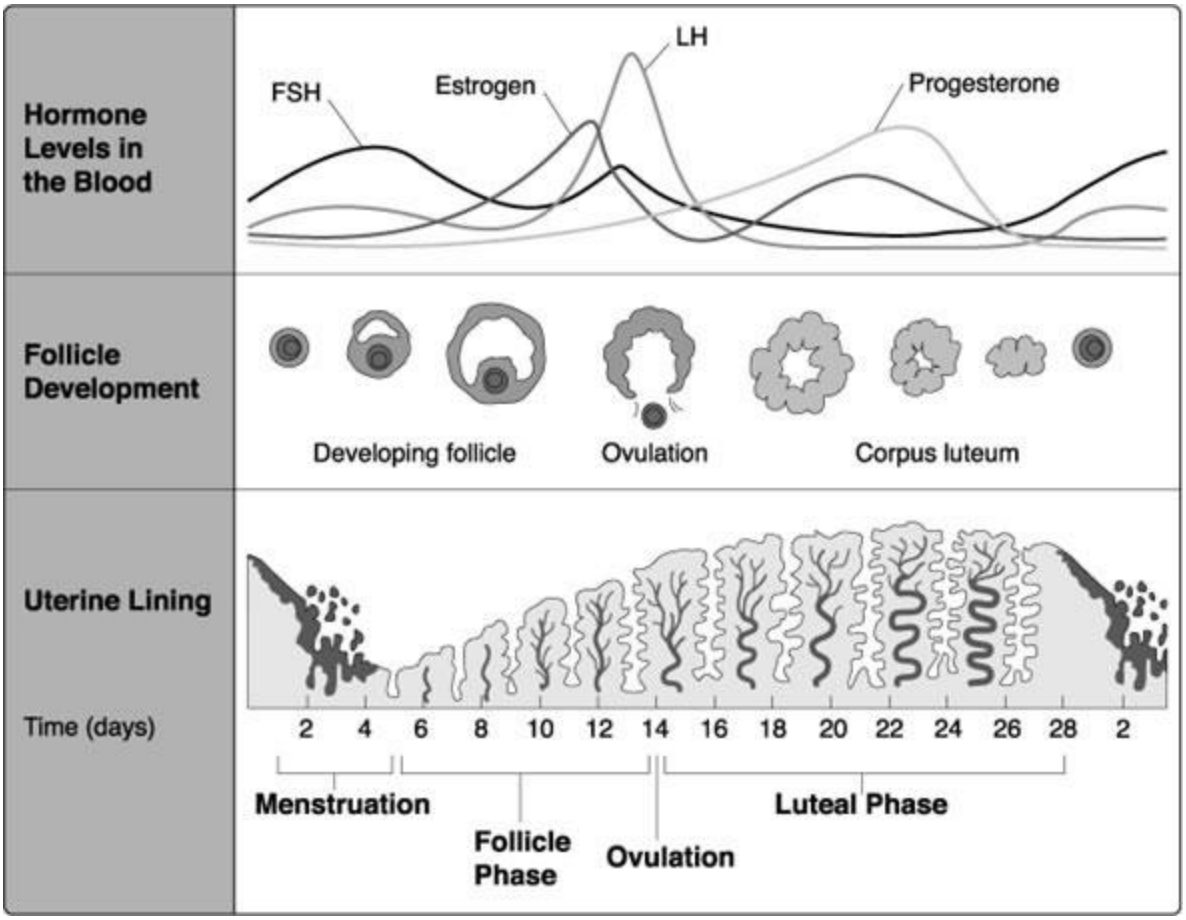


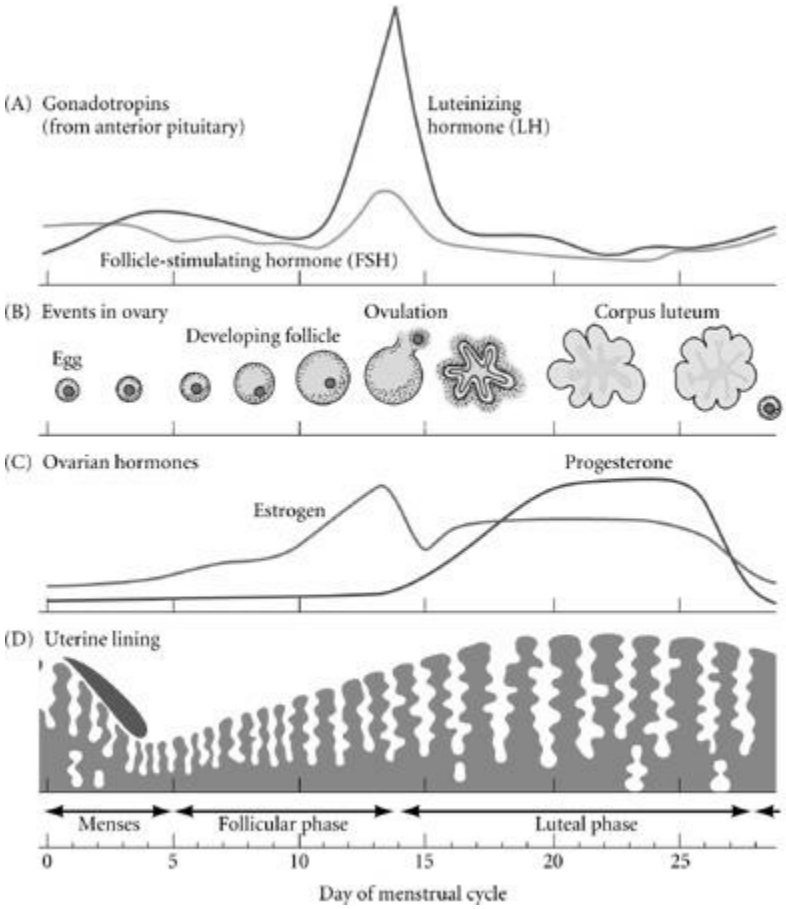
The hormones that control the activities of the menstrual cycle are produced by the hypothalamus and pituitary gland in the brain and the ovaries.

The menstrual cycle begins at puberty, ceases temporarily during pregnancy, and stops permanently between ages 45-70.

<u>MENOPAUSE</u>: permanent cessation of the menstrual cycle



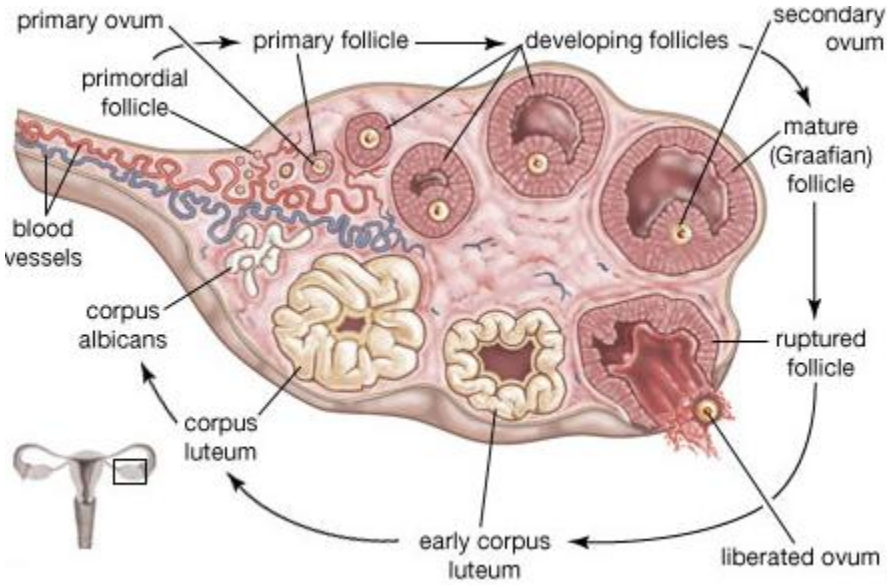

Hormone Levels in the Blood
FSH
Estrogen
LH
Progesterone
Follicle Development
Developing follicle
Ovulation
Corpus luteum
Uterine Lining
Time (days)
2 4 6 8 10 12 14 16 18 20 22 24 26 28 2
Menstruation
Follicle Phase
Ovulation
Luteal Phase


(A) Gonadotropins (from anterior pituitary)
Luteinizing hormone (LH)
Follicle-stimulating hormone (FSH)
(B) Events in ovary
Egg
Developing follicle
Ovulation
Corpus luteum
(C) Ovarian hormones
Estrogen
Progesterone
(D) Uterine lining
Menses
Follicular phase
Luteal phase
0 5 10 15 20 25
Day of menstrual cycle

Stages of the Menstrual Cycle

1. Follicular Stage
   - Follicle stimulating hormone is secreted by the pituitary gland
   - FSH causes several follicles in the ovary to develop, with only one usually maturing
   - As follicle develops it secretes estrogen
   - Estrogen causes the uterine lining to thicken with mucus and a rich supply of blood vessels

2. Ovulation
   - High level of estrogen in the blood causes pituitary gland to decrease production of FSH and increase production of luteinizing hormone
   - LH causes follicle to move to the wall of the ovary and rupture, releasing egg
   - Egg is drawn into the fallopian tube, where it remains for about 4 days and may be fertilized
   - The egg or zygote moves through the fallopian tube and into the uterus

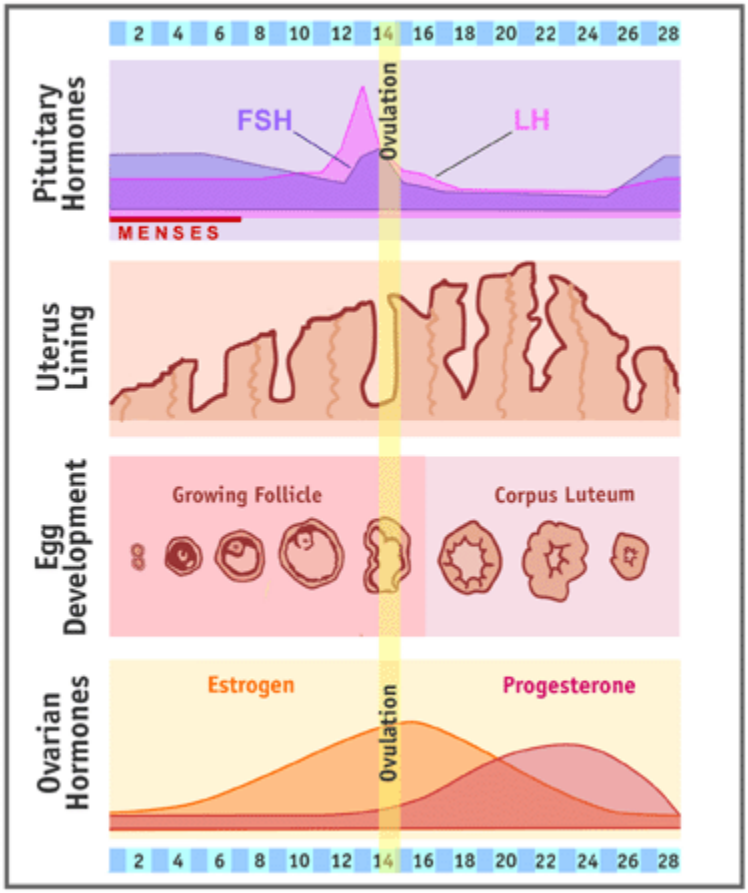


3. Luteal Stage

- Pituitary stops making FSH
- LH causes the ruptured follicle to fill with cells and form the corpus luteum
- The corpus luteum sends out estrogen and progesterone
- Increased levels of estrogen and progesterone maintain thickened uterine lining

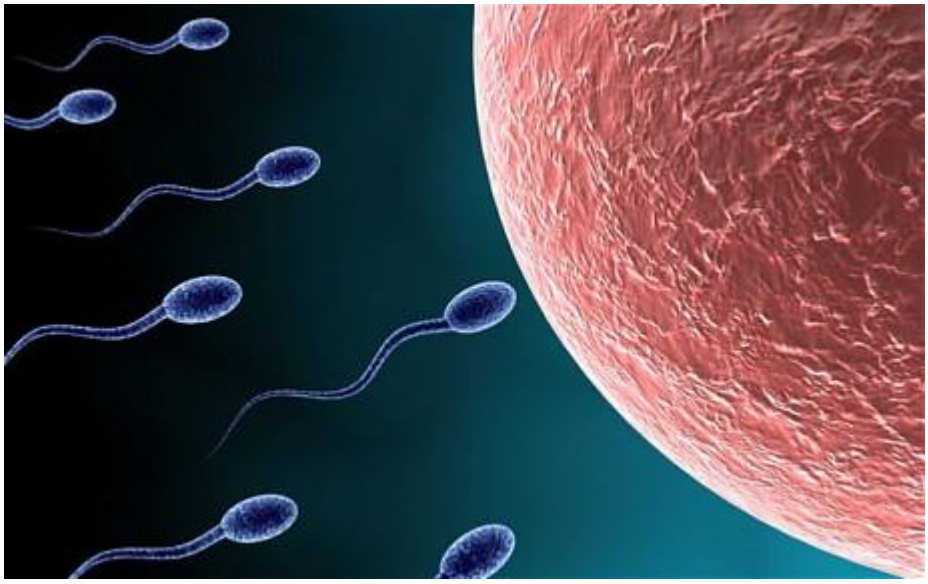
4. Menstruation

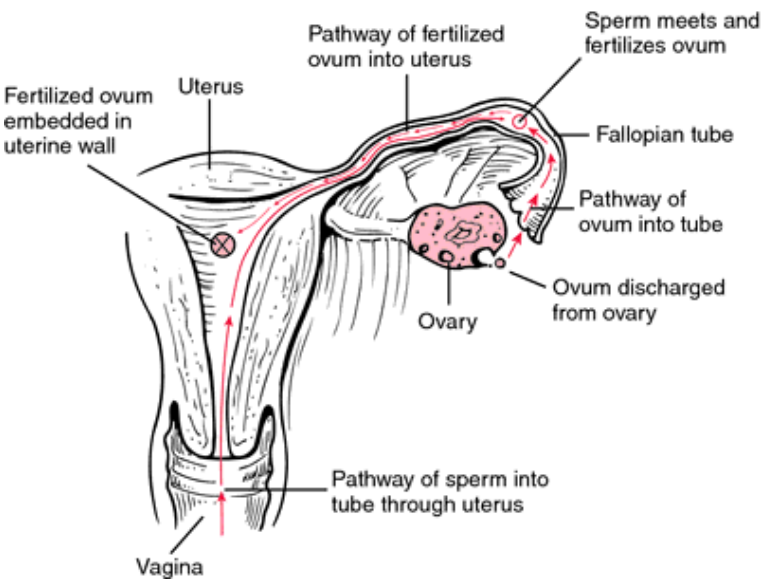
- If egg is not fertilized, corpus luteum stops producing progesterone
- When progesterone levels drop the uterus cannot maintain the thick lining
- The extra uterine lining, unfertilized egg, and a small amount of blood are discharged through the cervix and vagina
- The amount of estrogen in the blood is dropping, and the pituitary increases its production of FSH



6:4 Fertilization, Implantation, and Development

During sexual intercourse, hundreds of millions of sperm are ejaculated into the vagina; then travel through the cervix, across the uterus, and into the fallopian tubes.





If an egg is in the fallopian tube, fertilization occurs.

FERTILIZATION: fusion of a sperm and an egg nucleus

ZYGOTE: fertilized egg undergoes mitosis as it travels through the fallopian tube and enters the uterus in 5-10 days.

Zygote is nourished by food in the egg until implantation. After zygote implants it becomes an embryo.

IMPLANTATION: attachment of embryo to wall of uterus

EMBRYO: developing human from implantation until about 8 weeks gestation

PREGNANCY: period of time from implantation to birth during which the developing baby is carried in the uterus

GESTATION PERIOD: length of pregnancy, 40 weeks from 1st day of last menstrual period in humans

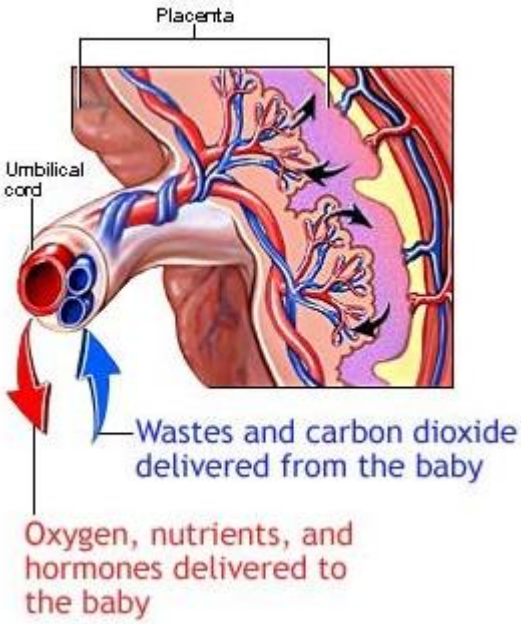
FETUS: developing human from 8 weeks gestation until birth

The blood of the fetus and the mother do not mix, but the fetus receives food and oxygen through a temporary organ, the PLACENTA.

UMBILICAL CORD: structure connecting fetus to placenta, contains two arteries and one vein

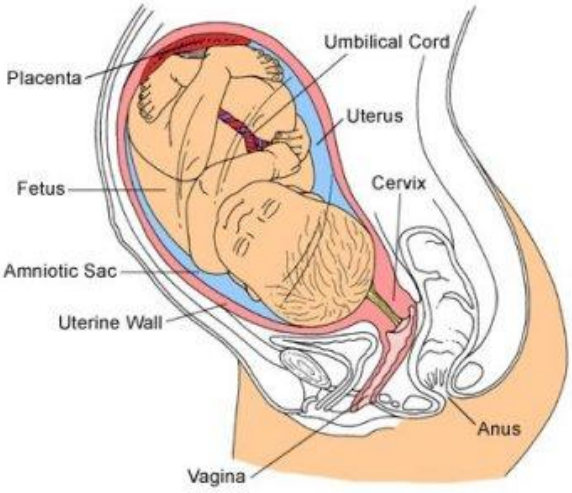
UMBILICAL ARTERIES: blood vessels carrying wastes from fetus to placenta

UMBILICAL VEIN: blood vessel carrying nourishment and oxygen from placenta to fetus

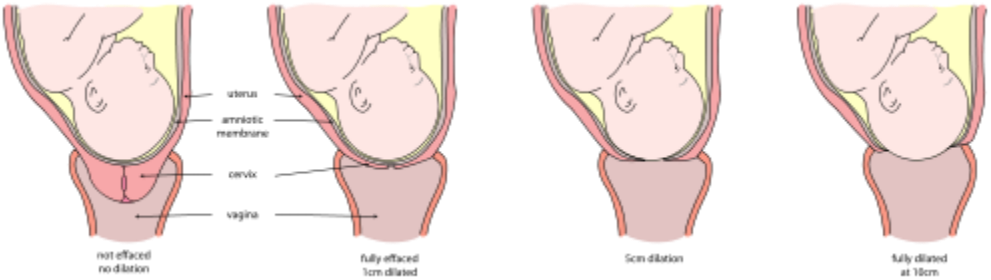


These functions are opposite normal arteries and veins.

The developing fetus is contained within the amniotic sac and surrounded by amniotic fluid.



LABOR: slow, rhythmic contractions of the uterine muscles; forces the fetus through the birth canal



During labor the diameter of the cervix expands to 11-12 cm, allowing the head and shoulders of the baby to pass through.