Male Reproductive System

Organs:

- 2 Testes – produce sperm and sex hormones. Hormones influence sperm production and secondary sex traits.
- 2 Epididymides – sperm maturation, storage
- 2 Vas Deferentia – rapid transport of sperm
- 2 Ejaculatory Ducts – conduct sperm to penis
- 1 Penis – sexual intercourse organ

Male Reproductive System (continued)

Accessory Glands:

- 2 Seminal Vesicles – secrete fructose (sperm use this sugar for energy) and prostaglandins (induce muscles to contract)
- 1 Prostate Gland – secretes most of the liquid part of semen (sperm + glandular secretions). May help buffer the low pH (3.5-4.0) of vaginal fluid.
- 2 Bulbourethral (Cowper's) Glands – a mucus-rich lubricant

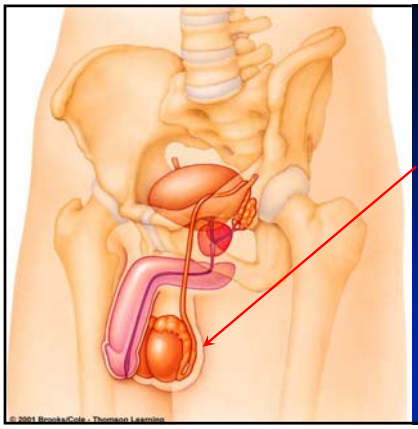


Figure 39.12(a) from page 656 of your text

SCROTUM
Outpouching of skin that contains both testes; can be moved closer to or farther from body to help maintain temperature suitable for sperm formation.

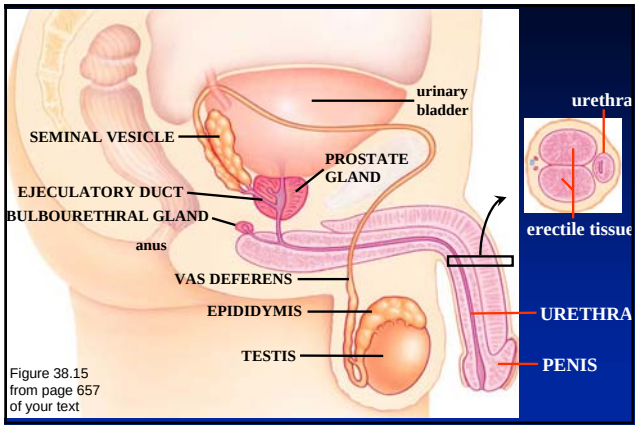


Figure 38.15 from page 657 of your text

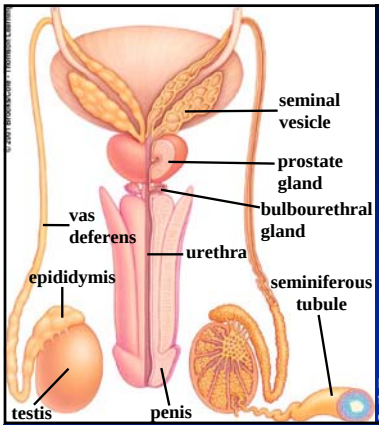


Figure 38.16 from page 658 of your text

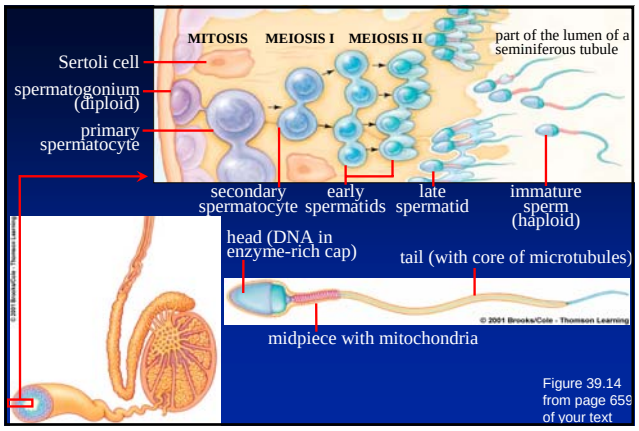
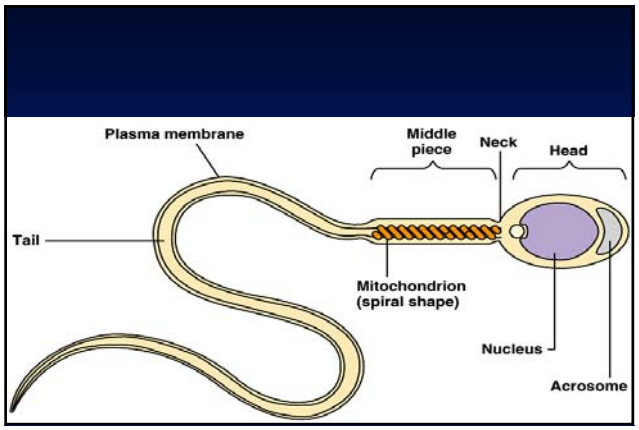


Figure 39.14 from page 659 of your text

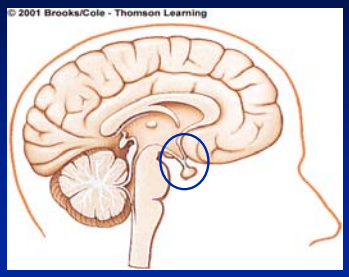
Sperm

- Head is packed with DNA; cap has enzymes to penetrate membrane surrounding egg.
- Mitochondria behind head provides energy for flagellum.
- Produced continuously from puberty to death.
- Millions are in different stages of development at any time.
- Takes 9-10 weeks for each sperm to form.
- Meiosis occurs inside the spermatogonia in seminiferous tubules inside the testes.



Hormonal control of sperm production

Hypothalamus and Anterior Pituitary



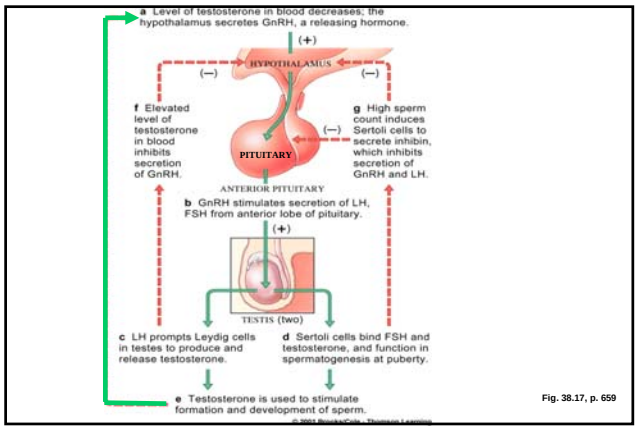


Fig. 38.17, p. 659

Prostate Cancer

1. Second leading cause of death in American men.
2. Detection
   - Digital rectal exam by physician
   - Blood tests for prostate-specific antigen (PSA), a tumor marker

Testicular Cancer

1. About 5,000 U.S. cases per year
2. Can be detected by self-exam
   - Men should check testes monthly
   - Check for hardening, lumps
   - Changes should be reported to physician

Female Reproductive System

Organs:

2 Ovaries – oocytes (immature egg); produced sex hormones.

2 Oviducts – conduct oocyte from ovary to uterus; fertilization occurs in oviducts.

Uterus – chamber for developing fetus, endometrial lining.

Cervix – opening of uterus; secretes mucus that: a) facilitates sperm and b) block bacteria.

Vagina – organ of sexual intercourse; birth canal.

Clitoris – sex organ responsive to stimulation.

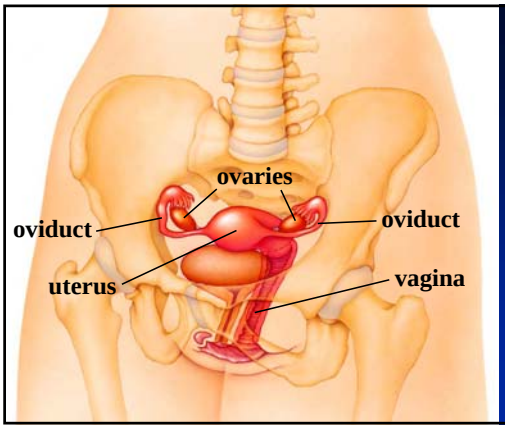
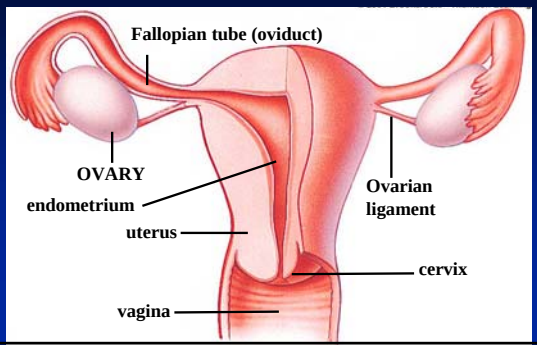


Figure 38.18 from page 660 of your text

Female Reproductive Organs



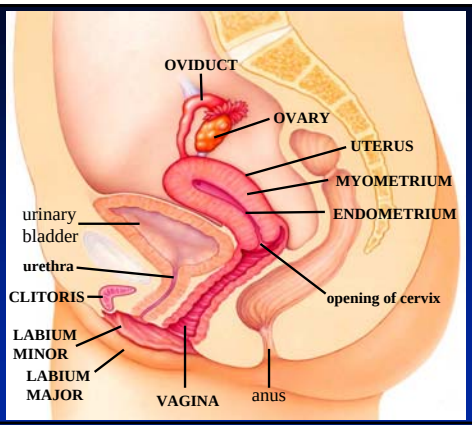


Figure 38.19 from page 661 of your text

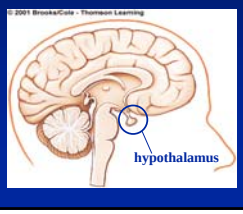
Menstrual Cycle
21-35 days

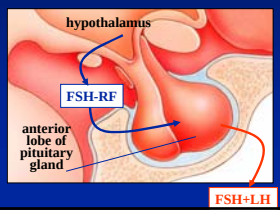
1. Menstruation
2. Follicular Phase – Follicle develops in ovary.
3. Ovulation – Egg released from follicle/ovary.
4. Luteal phase – follicle becomes corpus luteum.

Menstrual Cycle
hormonal control

Hypothalamus regulates thirst, hunger, sleep, libido and endocrine functions.

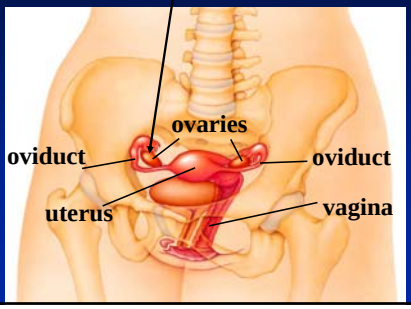
Hypothalamus releases Follicle stimulating hormone releasing factor (FSH-RF), which induces the pituitary to secrete Follicle stimulating hormone (FSH) and a little Leutenizing hormone (LH).





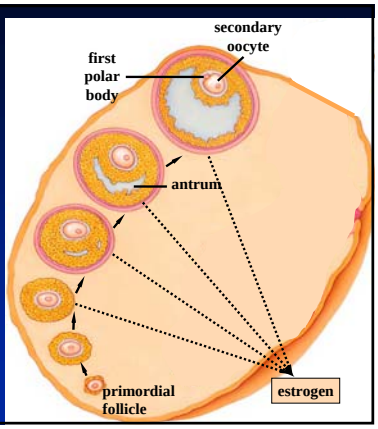
Menstrual Cycle
hormonal control

1. FSH and LH stimulate a follicle to begin maturing.



Ovarian cycle

1. Follicle grows and matures.
2. Follicle begins releasing estrogen.
3. Estrogen trigger a thickening of the uterine lining.
4. As estrogen levels increase hypothalamus releases LH-RF), which stimulates pituitary to secrete Leutenizing hormone.
5. LH tell mature follicle to burst and release egg (Ovulation)



Ovarian cycle – The follicle

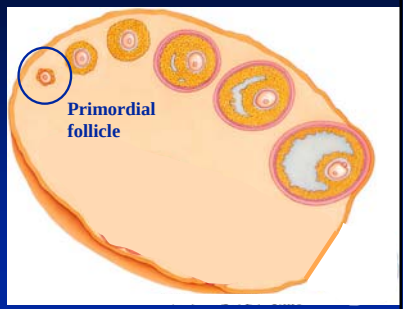
Women are born with ~450,000 egg containing follicles. It is believed that no new eggs are produced after birth, but it is known that other mammals can produce eggs after birth so it may be possible.

Women can release up to 500 eggs during a lifetime.

1. Primary oocyte is an immature egg that is suspended at prophase I of meiosis I.

Ovarian cycle – The follicle

Primordial follicle consists of primary oocyte and layer of cells nourishing oocyte.



Ovarian cycle – The follicle

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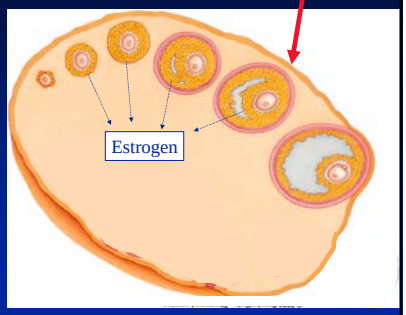
Women can release up to 500 eggs during a lifetime.

1. Primary oocyte is an immature egg that is suspended at prophase I of meiosis I.
2. FSH + LH stimulate Primordial follicle to begin maturing
   - Cells around oocyte begin duplicating
   - Oocyte completes Meiosis I with most cytoplasm distributed to 1 of the 4 eggs produced and called the secondary oocyte. The remaining eggs become polar bodies and degenerate.

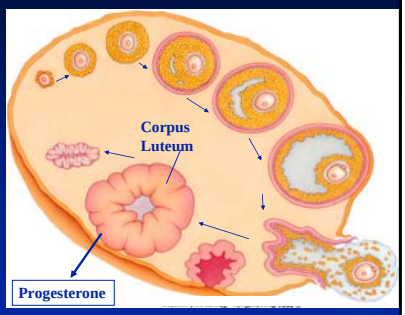
Ovarian cycle – The follicle

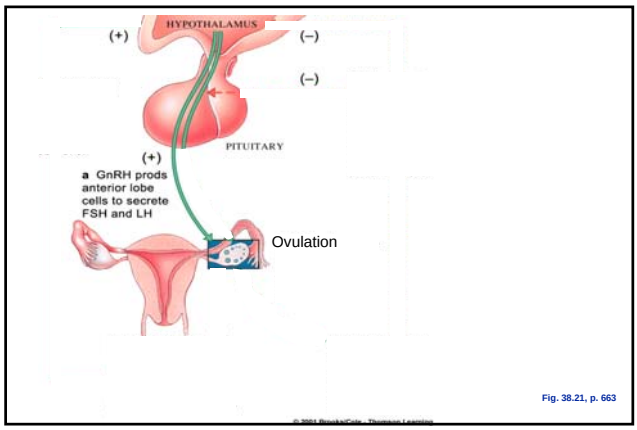
3. As the follicle matures its cells begin releasing estrogen.
4. As estrogen levels increase Pituitary releases a burst oh LH.
5. In response to the elevated LH the follicle bursts releasing the egg from the ovary into the fallopian tube.

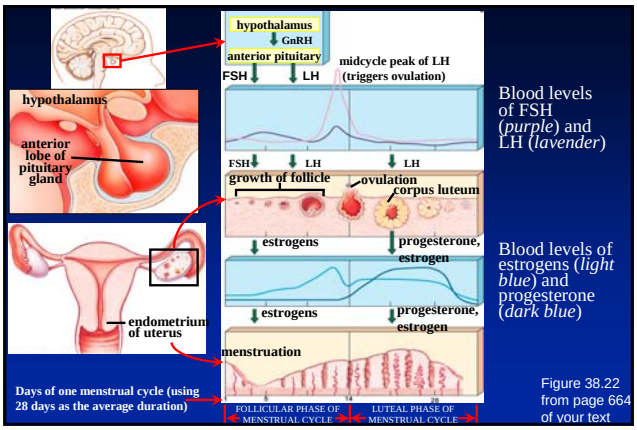


Ovarian cycle – The follicle

6. After releasing the egg the follicle becomes a "corpus luteum".
7. The corpus luteum begins producing progetsrone, which prepare the uterus & endometrium for pregnancy.
8. If no pregnancy occurs the corpus luteum degenerates and stop producing progesterone.







Fate of the egg

1. If the egg is fertilized in the fallopian tube and successfully implants into the endometrium of the uterus, The embryo begins producing Human Chorionic Gonadotropin (HCG).
2. HCG maintains the Corpus Luteum, which results in the continued release of progesterone, which maintains the uterus during pregnancy.

Pregnancy test kit

1. Purify HCG
2. Inject purified HCG into mouse
3. Collect blood serum from mouse
4. Purify HCG specific antibodies
5. Attach antibodies to color producing proteins.
6. Place antibody complex on a test platform.
7. When urine of pregnant women comes into contact with platform HCG binds to the antibody complex producing a color.

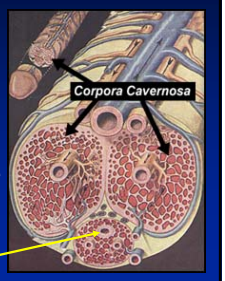
The Act of Sex

Under natural conditions, the fertilization of a human egg by a spermatozoon requires sexual intercourse.

The Act of Sex

How does a human penis become erect?

The penis has two chambers that run the length of the penis called “Corpa Cavernosa”. They are filled with a spongy tissue composed of smooth muscles, fibrous tissues, spaces, veins and arteries collectively called “Erectile tissue”.

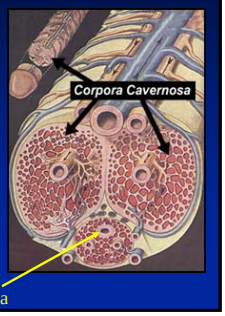


The Act of Sex

When relaxed, the arteries that feed the penis are constricted and the smooth muscles regulating the tiny blood vessels within the penis are contracted.

During arousal, the CNS signals the relaxation of the smooth muscles in the penis, allowing blood to flow into the tiny pool-like sinuses of the corpa cavernosa and flood the penis.

The chamber of the corpa cavenrosa expands with blood. The pressure from the engorged chambers squeezes the surrounding veins and blocks the normal draining of blood from the penis. This results in a rigid erect penis.



The Act of Sex

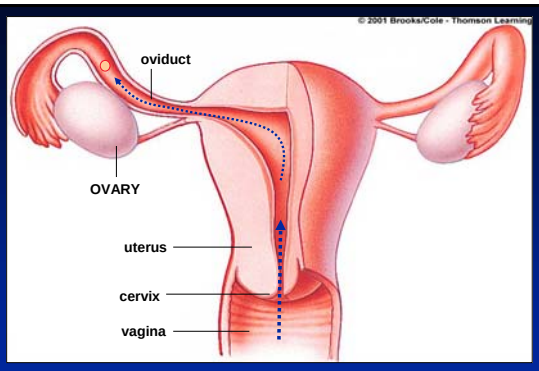
To deliver sperm cells to the female reproductive system the penis must release semen into the vaginal cavity. This is achieved during the ejaculatory response.

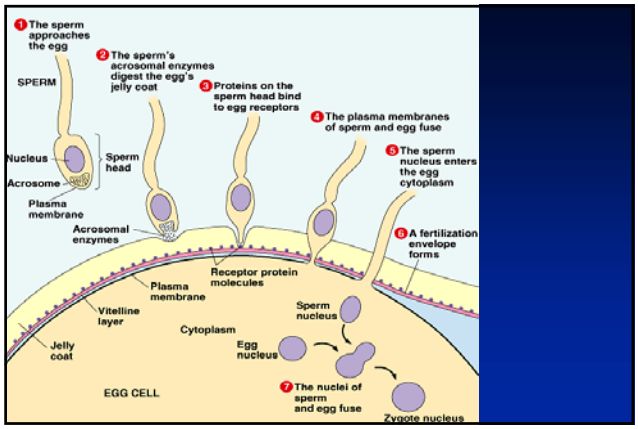
Ejaculation has two phases: emission & ejaculation proper. During emission, the vas deferentia contract to propel sperm from the epididymis (where it was stored) up to the ampullas at the top end of each vas deferens. The sperm then passes through the ejaculatory ducts and is mixed with fluids from the seminal vesicles, the prostate, and the bulbourethral glands to form the semen. During ejaculation proper, the semen is ejected through the urethra with rhythmical contractions.

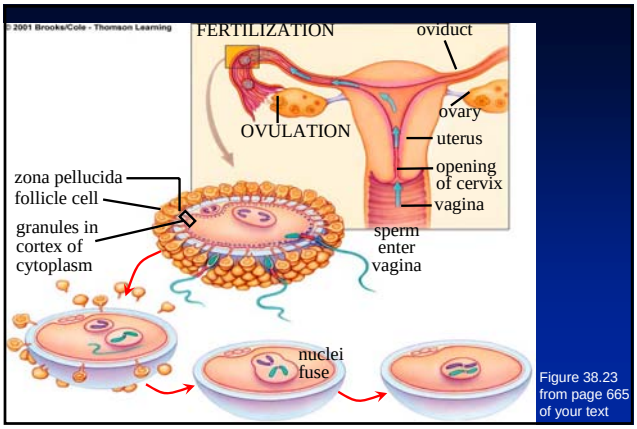
The ejaculation reflex is controlled by the sympathetic nervous system while an erection is controlled by the parasympathetic nervous system.

The Act of Sex

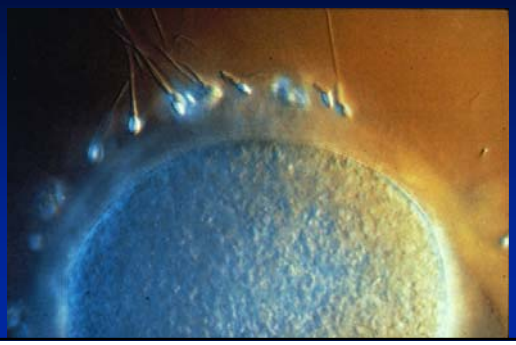
Female arousal is accompanied by many of the same physiological responses experienced by males. The sympathetic nervous system is responsible for the elevated temperature, blood flow, heart rate, breathing, and secretion of lubricating fluids to facilitate intercourse.





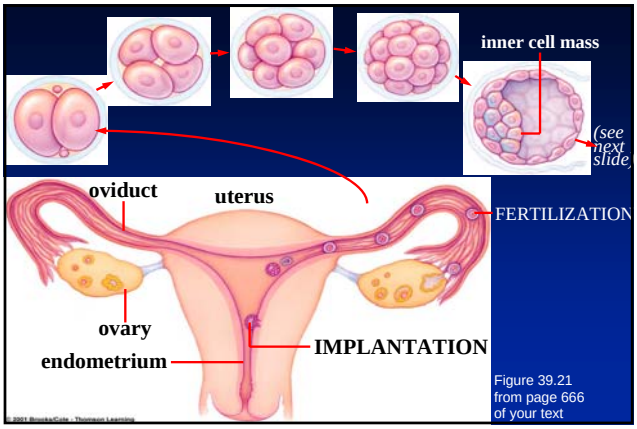


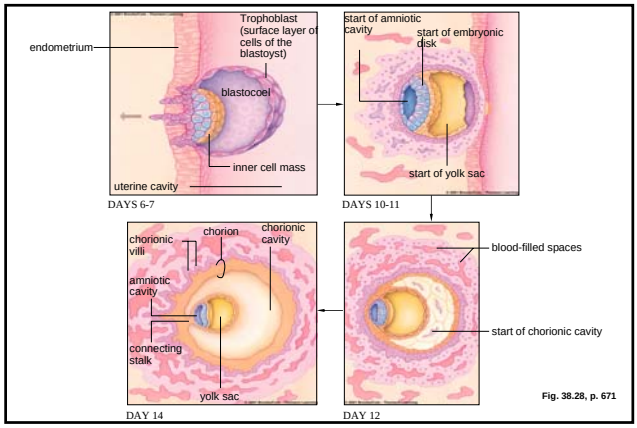
Sperm Blocked at Fertilization Membrane

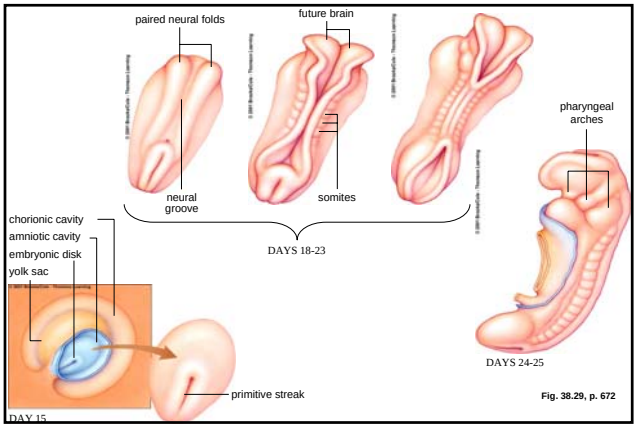


Unsuccessful Sperm on Outside Surface of Egg

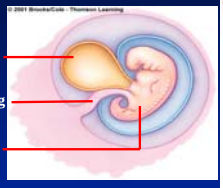
Pregnancy







Week 4



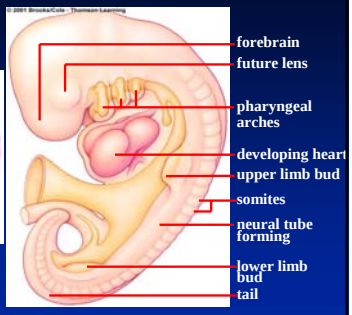


Figure 38.31
from page 674
of your text

Weeks 5-6

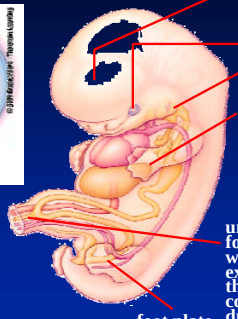


Figure 38.31
from page 674
of your text

Week 8

1. final week of embryonic period; embryo looks distinctly human compared to other vertebrate embryos
2. upper and lower limbs well-formed; fingers and then toes have separated
3. primordial tissues of all internal, external structures now developed
4. tail has become stubby

Figure 38.31
from page 675 of your text

WEEK 38 (full term)

Length: 50 cm (20 inches)

Weight: 3,400 grams (7.5 pounds)

Figure 38.31
from page 675 of your text

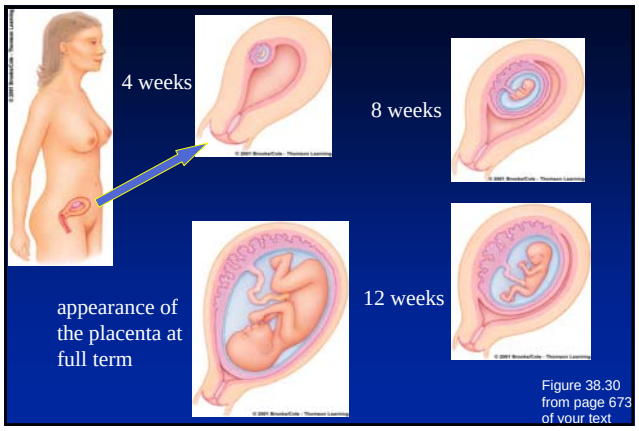
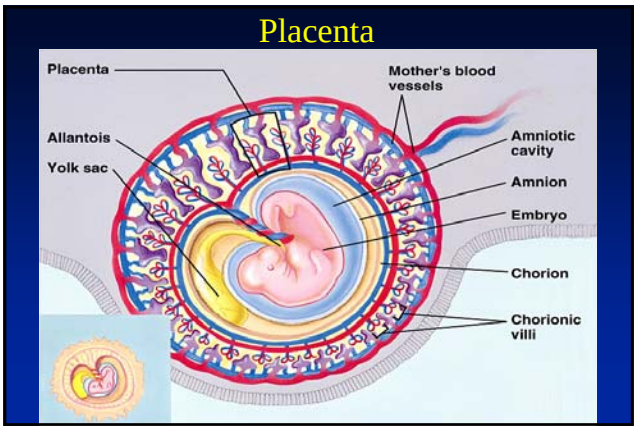


Figure 38.30 from page 673 of your text



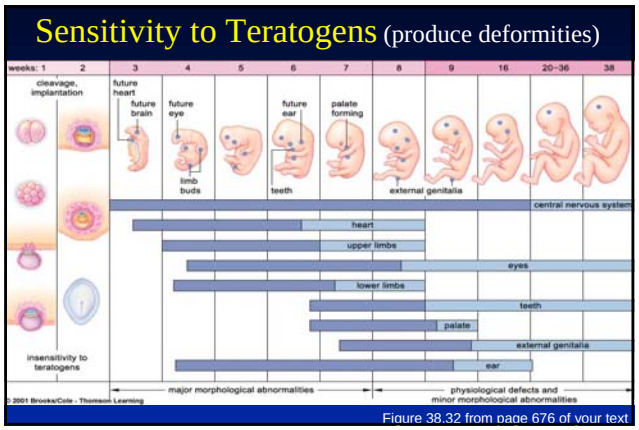


Figure 38.32 from page 676 of your text

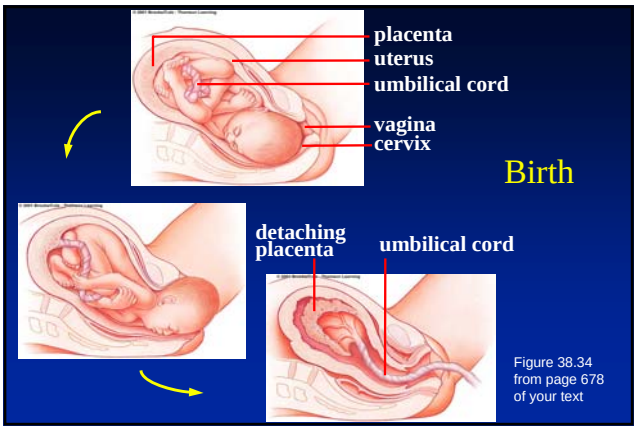


Figure 38.34 from page 678 of your text

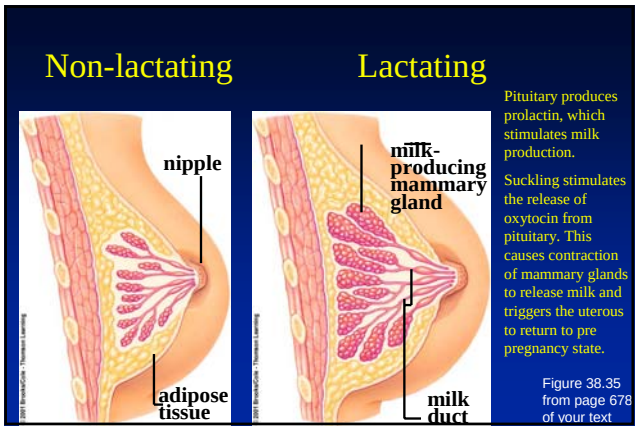


Figure 38.35 from page 678 of your text

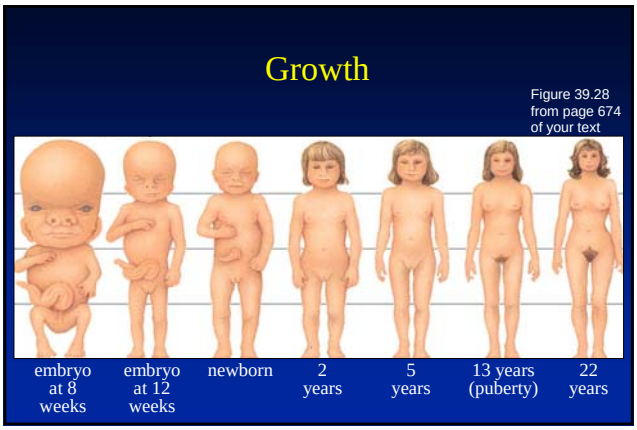


Figure 39.28 from page 674 of your text

Birth Control Options

Prevent fertilization

Prevent ovulation

Block implantation

Contraception Failure Rates

- Implants and injectables 2-4%
- Oral contraceptives 9%
- Diaphragm and cervical cap 13%
- Male condom 15%
- Periodic abstinence 22%
- Withdrawal 26%
- Spermicides 28%

Sexually Transmitted Diseases (STDs)

1. Worldwide epidemic of STDs
2. Women are most affected
3. Can cause infertility, pain, and even death

Causative Agents of STDs

1. Viruses
   - AIDS (HIV)
   - Genital herpes (*Herpes simplex*)
   - Genital warts (HPV)
1. Bacteria
   - Gonorrhea (*Neisseria gonorrhoeae*)
   - Syphilis (*Trepnema pallidum*)
   - Chlamydial infections

AIDS

1. Virus attacks T cells
2. Immune system is destroyed
3. Opportunistic infections and cancers eventually cause death
4. Treatment is available, but there is no vaccine and no cure

AIDS Test

1. Should know HIV status of potential partner
2. A person can test negative and still have and transmit the virus
3. Test detects antibodies that appear weeks to months after infection

Genital Herpes

1. Caused by *Herpes simplex* Type II
2. Periodic eruption of small, painful blisters on genitals
3. Infection requires contact with fluid from these sores
4. Antiviral drugs can reduce pain but there is no cure

Human Papillomaviruses

1. HPV can cause bumplike warts on the genitals and anus
2. One strain, 16 HPV, does not cause symptoms
3. It can lead to cancers of cervix, vagina, vulva, penis, and anus
4. There is no cure

Gonorrhea

1. Caused by the bacterium *Neisseria gonorrhoeae*
2. Females often symptom-free in early stages, males discharge pus
3. Can cause sterility if untreated
4. Can be cured with antibiotics

Syphilis

1. Caused by the spirochete *Treponema pallidum* (a kind of bacterium)
2. Early symptoms are painless chancres; later an extensive rash
3. In some, immune response to infection causes damage to brain and spinal cord
4. Passage from mother to infant can cause stillbirth, infection of newborn

Chlamydial Infections

1. Most common reported STD in U.S.
2. A variety of diseases caused by bacterium
3. Leads to inflammation of cervix in female, burning urination in both sexes
4. In females, can spread to uterus and oviducts to cause PID

Pelvic Inflammatory Disease (PID)

1. Complication of many bacterial STDs
2. Bacteria infect uterus, oviducts, ovaries
3. Symptoms include bleeding, vaginal discharge, pain in lower abdomen
4. Increases likelihood of ectopic pregnancy
5. Can cause sterility