Ch. 16: The Reproductive System

* Gonads: primary sex organs
  * Males:
  * Females:
  * Gonads produce gametes (sex cells) and secrete hormones
    * Males:
    * Females:

I. Male Reproductive System Overview

A. Testes

- Each lobule contains one to four seminiferous tubules that
  * Function as sperm-forming factories.
  * Interstitial cells in the seminiferous tubules produce androgens such as

B. Duct System

1. Epididymis
  * Functions to mature and store sperm cells (at least 20 days).

2. Vas Deferens (Ductus Deferens)
  * Carries sperm from the epididymis to the ejaculatory duct.
  * Moves sperm by
  * Terminates in the ejaculatory duct which unites with the urethra.
  * Ejaculation: smooth muscle in the walls of the vas deferens create peristaltic waves to squeeze sperm forward.
  * Vasectomy: cutting of the vas deferens at the level of the testes to prevent transportation of sperm (form of birth control).

3. Urethra
  * Extends from the base of the urinary bladder to the tip of the penis.
  * Carries both
  * Sperm enters from the ejaculatory duct.

C. Accessory Organs

1. Seminal Vesicles
2. Prostate
   * Encircles the upper part of the
     - Prostatitis: inflammation of the prostate.
   * Prostate cancer: most common cancer in males.

3. Bulbourethral Glands

D. Semen
   * Mixture of and (Seminal Vesicles, Prostate, Bulbourethral Glands)
   * Advantages of accessory gland secretions:
     - Fructose provides for sperm cells.
     - Alkalinity of semen helps neutralize the acidic environment of vagina.
     - Semen inhibits bacterial multiplication.
     - Elements of semen enhance sperm motility (ability to move).
     - Lubrication during sexual intercourse.

E. External Genitalia
   1. Scrotum
     - Divided sac of skin outside the abdomen.
     * Maintains testes at °C than normal body temperature to protect sperm viability.

2. Penis
   - Delivers sperm into the female reproductive tract.
   * Regions of the penis:
     a. Shaft
     b. Glans penis (enlarged tip)
     c. Prepuce (foreskin)
        - Folded cuff of skin around
        - Often removed by
- Internally there are three areas of spongy erectile tissue around the urethra.
- Erections occur when this erectile tissue fills with during sexual excitement.

F. Sperm

1. Spermatogenesis
   * Production of sperm cells:
     - Begins at and continues throughout life.
     - Occurs in the
   * After maturing, spermatids become sperm cells.
   * Spermatogenesis takes to days.
   * Sperm contribute of a baby’s 46 chromosomes.

2. Sperm Anatomy
   * The only human flagellated cell.
   - Head
     * Contains

G. Testosterone

- The most important hormone of the
- Production activated at
* Functions of testosterone:
  1. Stimulates reproductive organ development.
  2. Underlies sex drive.
  3. Causes secondary sex characteristics:
    a. Deepening of
    b. Increased
    c. Enlargement of skeletal
    d. Thickening of
II. Female Reproductive System

A. Ovaries

- Composed of ovarian follicles (sac-like structures)
- Each follicle consists of
  1. (immature egg)
  2. Follicular cells—surround the

* Ovulation:
  * When an egg is mature, the follicle ruptures and

* Occurs about every ___ days

B. Duct System

1. Uterine (Fallopian) Tubes

- Fimbriae: Finger-like projections at the distal end of the uterine tube that receive the ovulated oocyte from the ovary and channel it into the uterine tube.

  (Little or no contact between ovaries and uterine tubes.)

* Inside the uterine tube slowly move the oocyte towards the
  (takes ___ to ___ days).

* Fertilization occurs inside the ___ since oocyte lives about 24 hours.

2. Uterus

- Organ
- The uterus receives, retains, and nourishes the fertilized egg.

* Cervix: Narrow outlet that protrudes into the

- Walls of the Uterus consists of three layers:

  *1. Endometrium

    - Allows for implantation of a
    - Sloughs off if no pregnancy occurs
3. **Vagina**
   * Extends from \_\_\_\_\_\_\_\_\_ to exterior of body.
   - Located between bladder and rectum.
   * Serves as the \_\_\_\_\_\_\_\_\_.
   * Receives the \_\_\_\_\_\_\_\_ during \_\_\_\_\_\_\_\_.
   * Hymen:

**C. External Genitalia (Vulva)**

1. **Mons Pubis**
   - Fatty area overlying the pubic symphysis.
   - Covered with pubic hair after puberty.

*2. **Labia** (skin folds)
   a. **Labia Majora**
      - Hair-covered skin folds.
      - Enclose the **Labia Minora**.
      - Also encloses the vestibule.
   b. **Labia Minora**
      - Delicate, hair-free folds of skin.

**3. Vestibule & Greater Vestibular Glands**
   - Enclosed by
   - Contains external openings of the
   - Greater vestibular glands:
      - One is found on each side of the
   * Secretes lubricant during
4. **Clitoris**
   * Contains
   * Similar to the penis in that it is:
     a. Hooded by a prepuce.
     b. Composed of
     c. Becomes swollen with blood during

**D. Oogenesis & the Ovarian Cycle**
* The total supply of eggs are
* Ability to release eggs begins at
* Reproductive ability ends at
* Oocytes are matured in developing ovarian follicles.
  - Follicle stimulating hormone (FSH) causes some primary follicles to mature each month.
* Cyclic monthly changes constitute the ovarian cycle.

**E. Uterine (Menstrual) Cycle**
* Cyclic changes of the
* Regulated by cyclic production of and
* Both menstrual and ovarian cycles are about days in length.
* Ovulation typically occurs about through cycle on day
  - Stages of the Uterine (Menstrual) Cycle
    *1. Menstrual phase
      - Days to
      - Functional layer of the endometrium is sloughed.
      - Bleeding occurs for to days.
      - By day 5, growing ovarian follicles are producing more estrogen.
2. Proliferative stage
   - Days to
   - Regeneration of functional layer of the endometrium.
   - Estrogen levels
   - Ovulation occurs in the ovary at the end of this stage.

3. Secretory stage
   - Days to
   - Levels of rise and increase the blood supply to the endometrium.
   - Endometrium increases in size and readies for

   F. Hormone Production by the Ovaries

1. Estrogens cause secondary sex characteristics:
   a. Enlargement of accessory organs of the female reproductive system.
   b. Development of
   c. Appearance of axillary and pubic hair.
   d. Increase in fat beneath the skin, particularly in

   e. Widening and lightening of the
   f. Onset of

2. Progesterone
   * Major effects
     a. Helps maintain
     b. Prepare the breasts for
G. Mammary Glands

* Present in __________, but only function in __________.

* Modified sweat glands:
  - Function is to produce __________.
  - Stimulated by sex hormones (mostly estrogens) to increase in size.

* Mammograms: x-ray examination that detects breast cancers too small to feel.

III. Introduction to Pregnancy & Development

* Pregnancy: time from __________ until infant is __________.

* Embryo: period of time from fertilization until week 8.

* Fetus: week 9 until birth.

* Gestation period: from __________ until birth
  (approximately __________ days ( __________ weeks)).

A. Accomplishing Fertilization

* The oocyte is viable for __________ to __________ hours after ovulation.

* Sperm are viable for __________ to __________ hours after ejaculation.

* For fertilization to occur, sexual intercourse must occur no more than __________ days before ovulation and no later than __________ hours after.

* Sperm cells must make their way to the __________ for fertilization to be possible.
  - Membrane receptors on an oocyte pull in the head of the first sperm cell to make contact.

* The membrane of the oocyte does not permit a second sperm head to enter.

* The oocyte then undergoes its second meiotic division to form the ovum and a polar body.

* Fertilization occurs when the genetic material of a sperm combines with that of an oocyte to form a zygote.
B. The Zygote
* cell of a new individual.
* The result of the fusion of DNA from sperm and egg.
- The zygote begins rapid mitotic cell divisions.
* The zygote stage is in the tube, moving toward the uterus.

C. Events of Embryonic & Fetal Development
* Embryo: period of time from until week
* Fetus: week until

D. Development After Implantation

1. Initial Development
* Amnion: fluid-filled sac that surrounds the
* Umbilical cord:
  1. Blood vessel-containing stalk of tissue.
  2. Attaches the embryo to the

2. Functions of the Placenta
* Forms a barrier between mother and embryo (blood is
* Delivers
* Removes from embryonic blood.
* Becomes an endocrine organ (produces hormones) and takes over for the corpus luteum (by end of second month) by producing:
  a.
  b.
  c. Other hormones that maintain pregnancy.
3. The Fetus (weeks)
   * All organ systems are formed by the end of the eighth week.
   * Activities of the fetus are and organ
   * This is a stage of tremendous growth and change in appearance.

E. Effects of Pregnancy on the Mother
   * Pregnancy: From conception to birth.

1. Anatomical Changes
   * Enlargement of the
     * Accentuated curvature (lordosis).
   * Relaxation of the pelvic ligaments and pubic symphysis due to production of

2. Physiological Changes
   a. Gastrointestinal System
      * Morning sickness is common due to elevated progesterone and estrogens.
      * Heartburn is common because of organ crowding by the fetus.
      * Constipation is caused by declining motility of the digestive tract.
   b. Urinary System
      * Kidneys have additional burden and produce more urine.
      * The uterus compresses the bladder, causing stress incontinence.
   c. Respiratory System
      - Nasal mucosa becomes congested and swollen.
      * Vital capacity and respiratory rate increase.
      * Dyspnea (difficult breathing) occurs during later stages of pregnancy.
d. Cardiovascular System
   * Blood volume increases by to percent.
   * Blood pressure and pulse
   * Varicose veins are common.

F. Childbirth (Parturition)
   * Labor: the series of events that expel the infant from the uterus.
   * Rhythmic, expulsive contractions.
   * False Labor: contractions are weak, irregular uterine contractions.