Chapter 2

Human Reproductive Anatomy and Physiology

Puberty

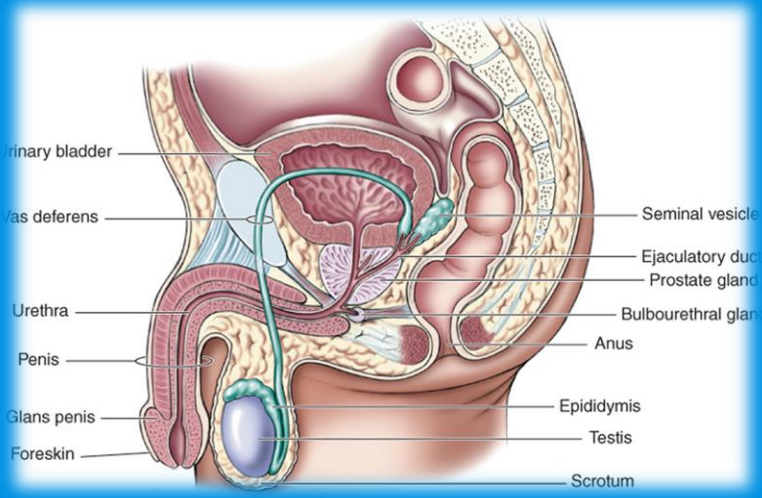
- Involves changes in the whole body and psyche
- Reproductive system matures and becomes capable of reproduction
- Secondary sex characteristics appear
- Ends when
  - Mature sperm are formed in males
  - Menstrual cycles become regular in females

Puberty

- Celebrated in many cultures as a rite of passage into adulthood
- Other cultures lack this ritual
  - Has led to confusion for some adolescents in many industrialized nations

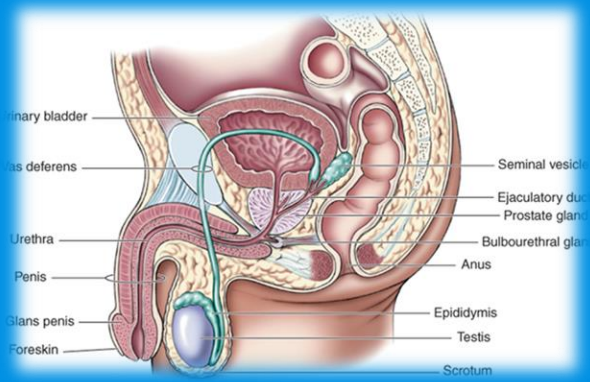
The Male

- Hormonal changes begin between 10 and 16 years of age
- Outward changes
  - Penis and testes increase in size
  - Grows taller, more muscular
  - Secondary sex characteristics
    - Pubic and facial hair
    - Deeper voice
- Testosterone levels become constant
- Nocturnal emissions (“wet dreams”) may occur



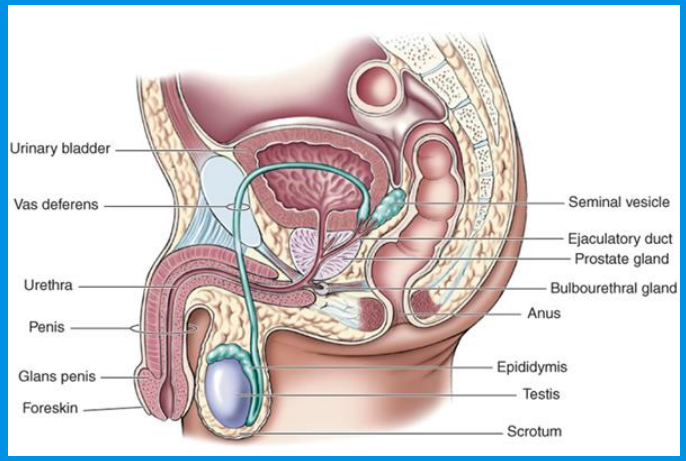
External Genitalia

- Penis
  - Expels urine from bladder
  - Deposits sperm into female's vagina
  - Contains erectile tissue
  - Blood is trapped within the spongy erectile tissue to enable erection
- Scrotum
  - Sac that contains the testes
  - Suspended from the perineum
  - Helps keeps testes cooler than the rest of the body
  - Necessary for spermatogenesis



Internal Genitalia

- Testes
  - Manufacture male germ cells
- Spermatozoa or sperm
  - Secrete male hormones
    - Androgens

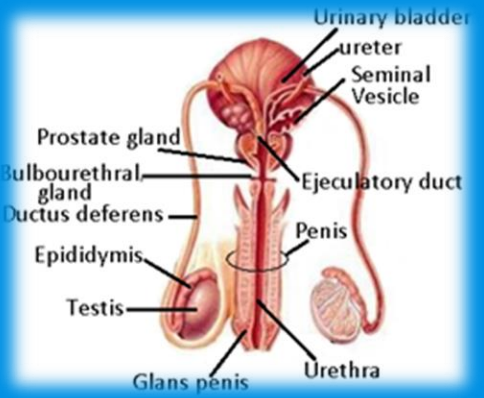


Testosterone

- Has the following effects, not related to sexual reproduction
  - Increases muscle mass and strength
  - Promotes growth of long bones
  - Increases basal metabolic rate (BMR)
  - Enhances production of RBCs
  - Produces enlargement of vocal cords
  - Affects the distribution of body hair

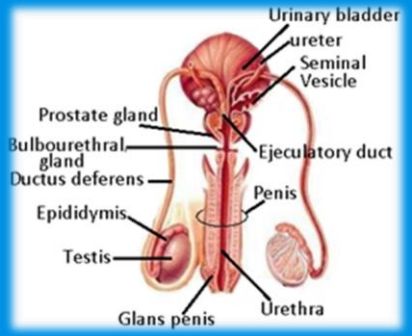
Ducts

- Epididymis
  - One from each testicle
  - Stores and carries sperm to the penis
- Stores sperm for 2 to 10 days
  - Sperm mature and then move to the vas deferens
- The urethra transports both urine (from the bladder) and semen (from the prostate) to be expelled
  - But not at the same time



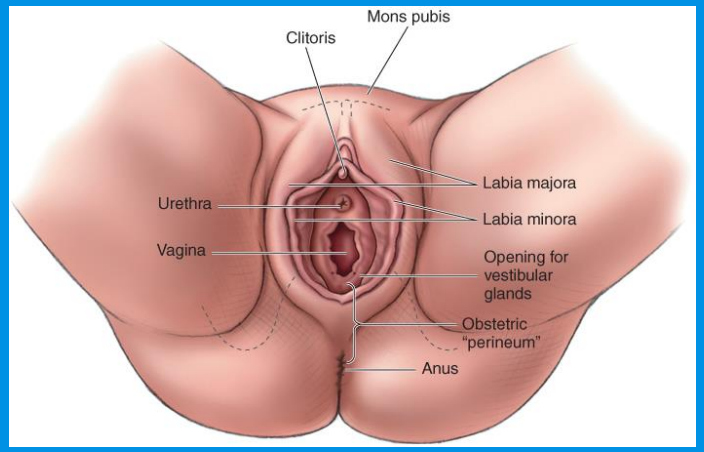
Accessory Glands

- Seminal vesicles
- Prostate gland
- Bulbourethral glands (a.k.a. Cowper's glands)
- Job is to produce secretions to
  - Nourish sperm
  - Protect sperm from acidic environment within woman's vagina
  - Enhance motility of sperm
- Semen is seminal plasma and sperm together



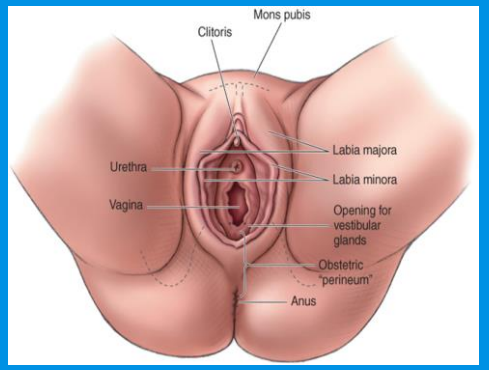
External Genitalia

- Collectively called the *vulva*
  - Includes
    - Mons pubis
    - Labia majora
    - Labia minora
    - Fourchette
    - Clitoris
    - Vaginal vestibule
    - Perineum



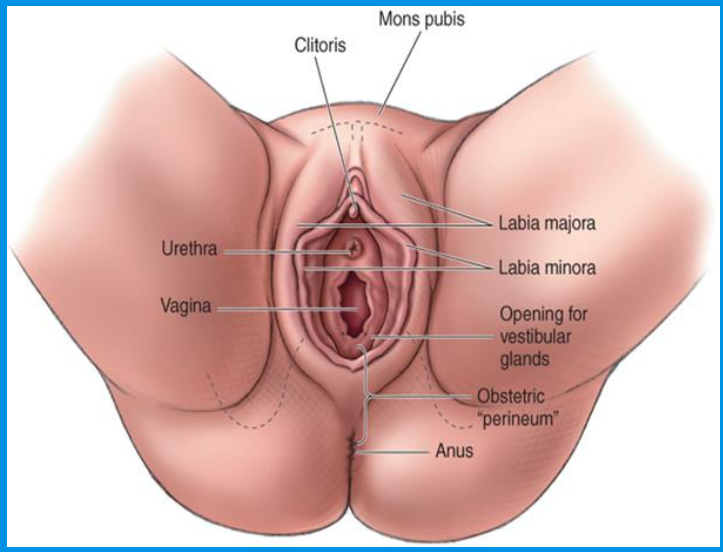
External Genitalia

- Mons pubis
  - Pad of fat tissue covered by coarse skin and pubic hair
  - Protects symphysis pubis
- Labia majora
  - Two folds of fatty tissue on each side of vaginal vestibule
  - Many small glands in this area
- Labia minora
  - Two thin, soft folds of tissue
    - Secretions from sebaceous glands
      - Bactericidal
      - Lubricate and protect the skin of the vulva



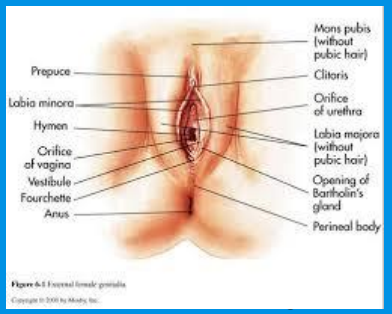
External Genitalia

- Fourchette
  - Fold of tissue just below vagina
  - Known as *obstetrical perineum*
- Clitoris
  - Erectile body
  - Most sensitive part of female genitalia, produces smegma (a cheese-like secretion of sebaceous glands)



External Genitalia

- Vaginal vestibule
  - Urethral meatus—exit for urine
  - Skene's ducts—lubricate urethra and vaginal orifice
  - Vaginal introitus—divides the external and internal genitalia
  - Hymen—thin elastic membrane that closes vagina from vestibule
  - Ducts of Bartholin's glands—lubricate introitus during sexual arousal, not normally visible
- Perineum
  - Strong muscular area between vaginal opening and anus
  - Allows stretching for birth
  - Site of episiotomy

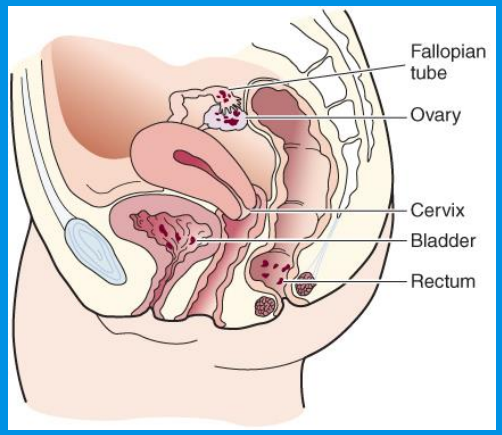


Vagina

- Tubular structure
  - Muscle and membranous tissue
  - Connects external genitalia to uterus
- Rugae
  - Enables stretching during sexual intercourse
  - Delivery of fetus
- Self-cleansing
  - During reproductive years, pH 4 to 5
- Functions
  - Provides passageway for sperm to enter the uterus
  - Allows drainage of menstrual fluids and other secretions
  - Provides a passageway for delivery of fetus

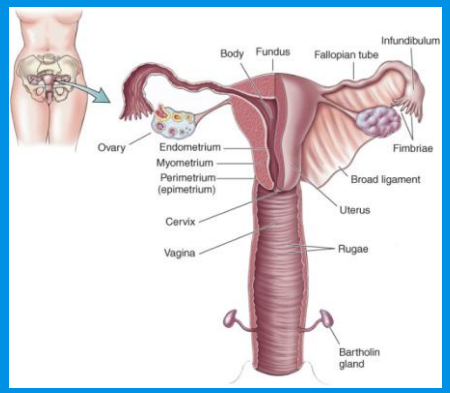
Uterus

- Hollow muscular organ
  - Fertilized ovum implants and develops into an embryo
- Shaped like an upside-down pear
- Lies between the urinary bladder and rectum, above the vagina
- Supported by the following ligaments
  - Broad
  - Round
  - Cardinal
  - Uterosacral
- Autonomic nerve supply
- Not under voluntary or conscious control
- Various motor and nerve roots supply sensation to the uterus
  - Important in pain management during labor



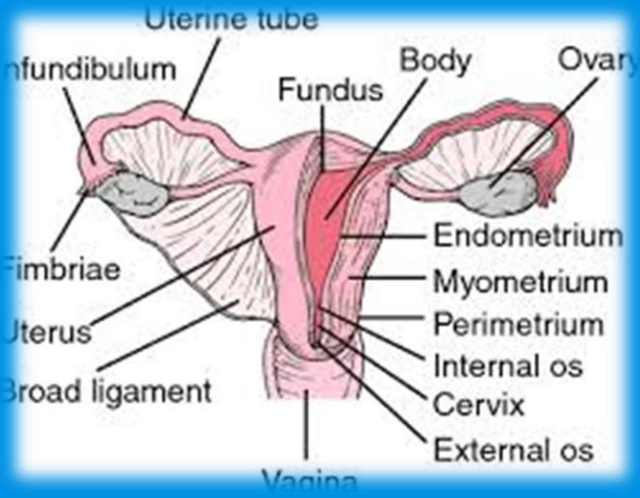
Uterus

- Fundus and corpus (body of the uterus)
  - Have three distinct layers
    - Perimetrium
    - Myometrium
    - Endometrium—governed by cyclical hormonal changes



Uterus

- Cervix (neck or lower part of uterus)
- Consists of cervical canal with an internal opening near uterine corpus (internal os)
- Opening into vagina (external os)
- Mucosal lining has four functions
  - Lubricates vagina
  - Acts as a bacteriostatic agent
  - Provides alkaline environment to shelter deposited sperm
  - Produces a mucus plug in cervical canal during pregnancy



Fallopian Tubes

Four sections

Interstitial

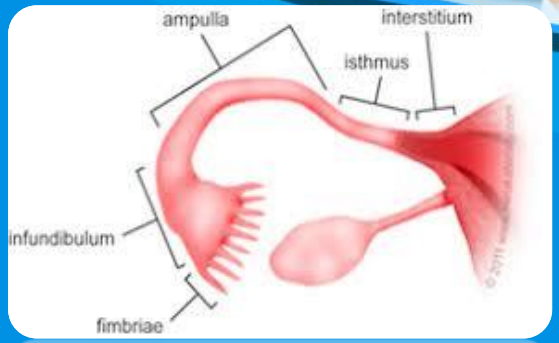
Isthmus

Ampulla

Infundibulum

And then the:

- Fingerlike projections called *fimbriae* capture the ovum (egg) as it is released from the ovary



Four functions

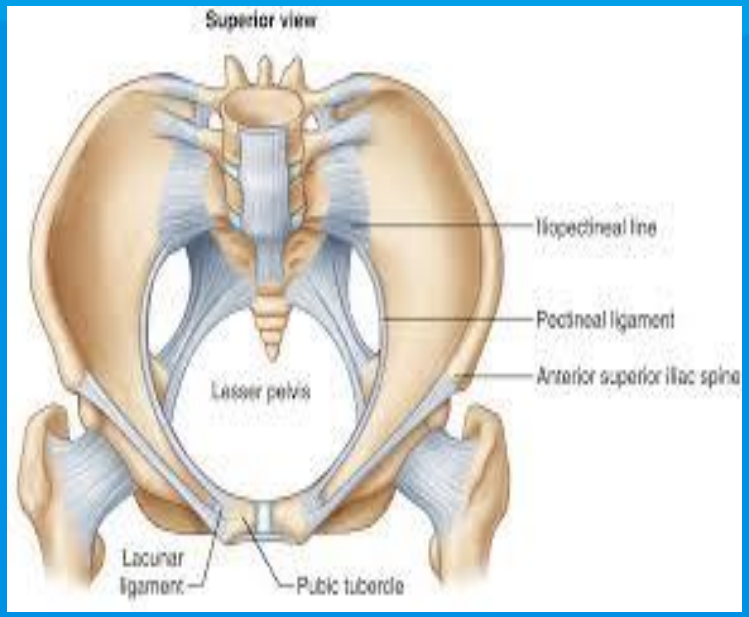
- Passageway for sperm to meet the ovum
- Site of fertilization
- Safe, nourishing environment for the ovum or zygote (fertilized ovum)
- Means of transporting ovum or zygote to the corpus of the uterus

Ovaries

- Almond-shaped
- Size of a walnut
- Held in place by ovarian and uterine ligaments
- Two functions
  - Production of hormones
    - Mainly estrogen and progesterone
  - Stimulate maturation of an ovum during each reproductive cycle
- At birth, every female has all the ova that she will have throughout her reproductive years (around 2 million)
- By adulthood, number of ova is in the thousands
- By climacteric (menopause), the ova no longer mature in response to hormonal stimulation

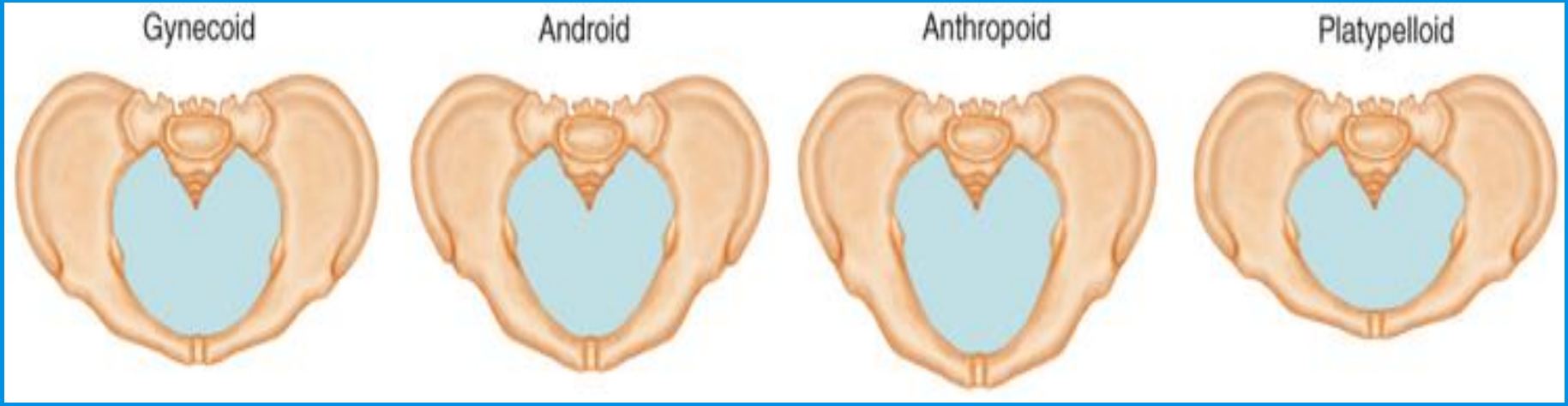
Functions of the Bony Pelvis

- Parts
  - Two innominate bones, sacrum, and coccyx
- Support and distribute body weight
- Support and protect pelvic organs
- Form the birth passageway



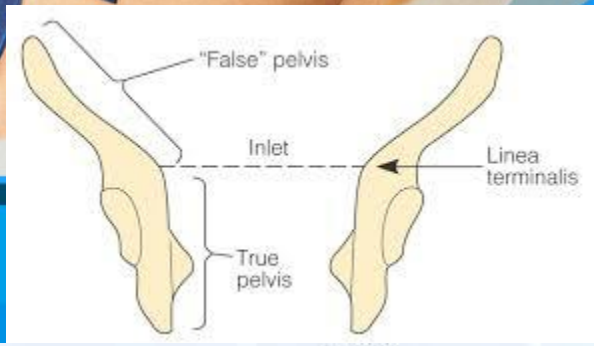
Types of Female Pelves

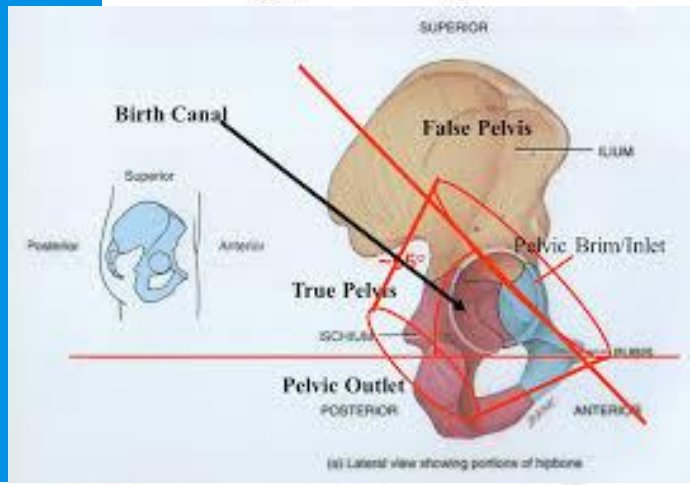
- Gynecoid most favorable for vaginal delivery
- Platypelloid is unfavorable for vaginal delivery

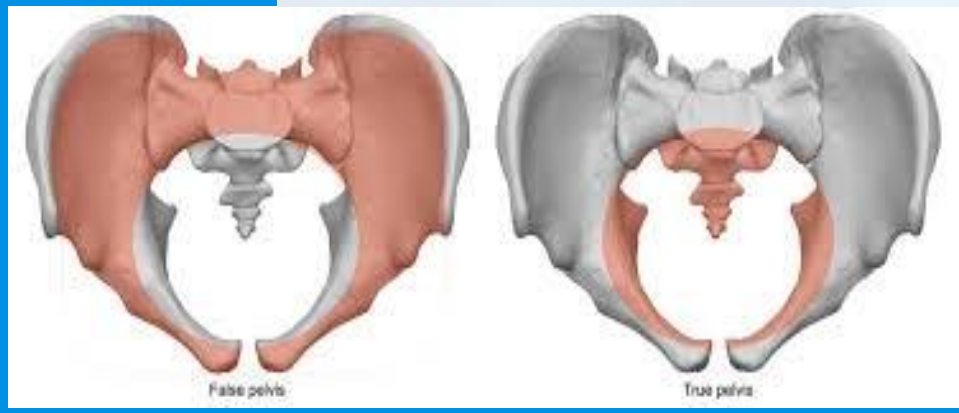


True and False Pelves

- Separated by an imaginary line, the linea terminalis
- False pelvis
  - Supports the enlarging uterus
  - Guides fetus into true pelvis
- True pelvis
  - Dictates the bony limits of the birth canal

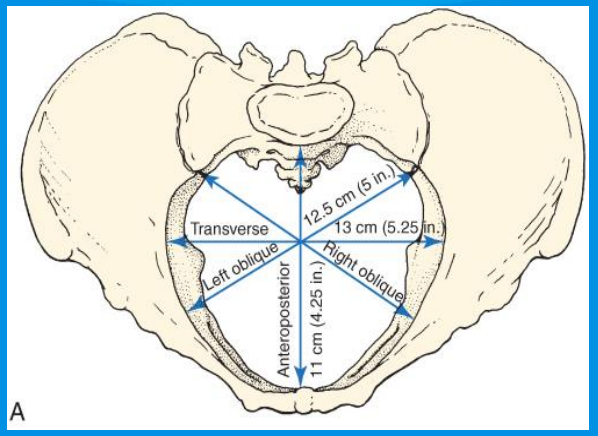






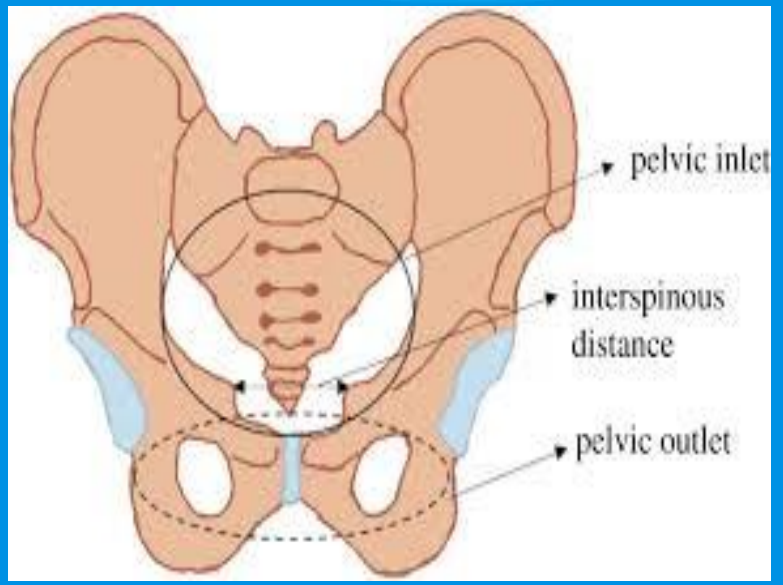
Pelvic Inlet

- Diagonal conjugate
  - Assessed during a manual exam
- Obstetric conjugate (smallest diameter)
  - Determines if the fetus can pass through the birth canal
- Transverse diameter (largest diameter)
  - Determines the inlet's shape



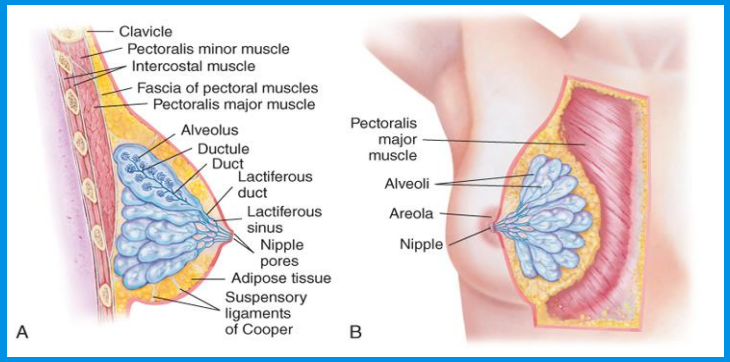
Pelvic Outlet

- Coccyx can move or break during passage of fetal head
- Immobile coccyx can decrease the size of the pelvic outlet
  - Can make vaginal birth difficult
- Adequate pelvic measurements are essential for successful vaginal birth



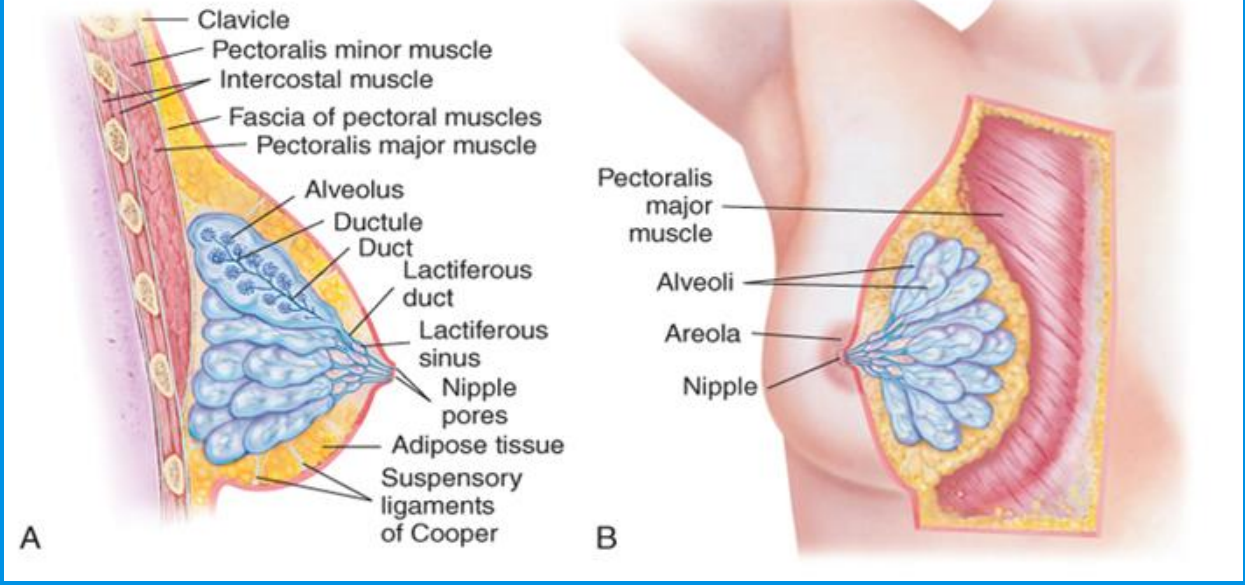
Breasts

- Accessory organs of reproduction
  - Produce milk after birth
    - Provides nourishment for the infant
    - Provides maternal antibodies to infant
- Montgomery's glands
  - Small sebaceous glands
  - Secrete a substance to lubricate and protect breasts during lactation



Breasts

- Secretes milk—alveoli (lobules)
- Carries milk—lactiferous ducts
- Stores milk—ampulla (lactiferous sinuses)



Reproductive and Menstruation Cycle

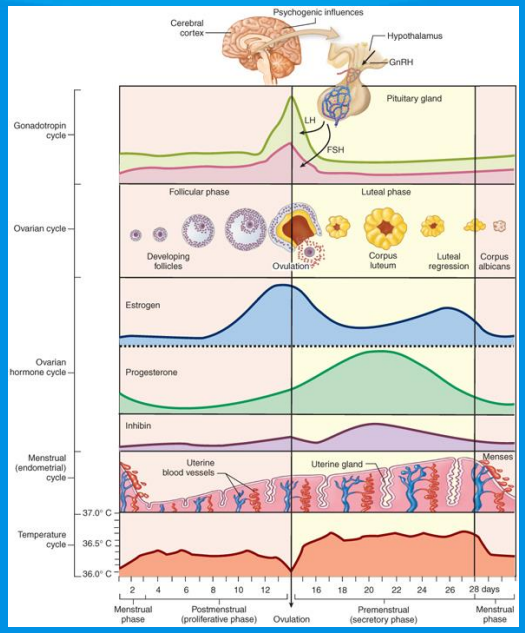
- Cycle consists of regular changes in secretions of the anterior pituitary gland, ovary, and endometrial lining of uterus
- FSH and LH stimulate maturation of ovarian follicle
  - Maturing ovum and corpus luteum produce increased amount of estrogen and progesterone
- Surge of LH stimulates final maturation
  - Release of ovum

Reproductive Cycle and Menstruation

- Development of breasts occurs first
- First menstrual period (menarche) occurs approximately 2 to 2.5 years later (around 11 to 15 years of age)
- Growth spurt ends earlier than the male
- Hips broaden
- Pubic and axillary hair appear

Female Reproductive Cycle

- Ovulation
  - Mature ovum released from follicle about 14 days before onset of menstrual period
  - Corpus luteum turns yellow
  - Secretes increased quantities of progesterone
- Corpus luteum degenerates if the ova is not fertilized
  - Progesterone and estrogen levels decrease
  - Causes endometrium to break down
  - Results in menstruation
- New cycle begins again



Human Sexual Response

- Four phases
  - Excitement
  - Plateau
  - Orgasmic
  - Resolution

Physiology of the Male Sex Act

- Massaging action of intercourse stimulates nerves
  - Parasympathetic: relaxation of penile arteries leads to increased blood flow to shaft (erection)
  - Urethral glands secrete mucus to aid in lubrication for sperm motility
  - Rhythmic contraction of penile erectile tissues, urethra, and skeletal muscles leads to expulsion of semen (ejaculation)

Physiology of the Male Sex Act

- After orgasm (resolution)
  - Erection ceases
  - Cavernous sinuses empty
  - Arteries contract
  - Penis becomes flaccid
- Sperm can reach fallopian tubes within 5 minutes
  - Can remain viable in female for up to 4 to 5 days

Physiology of Female Sex Act

- Female psyche can initiate or inhibit sexual response
- Local stimulation of breasts, vulva, vagina, and perineum increases sexual sensations
  - Parasympathetic nerves signal erectile tissue around vaginal introitus
  - Dilation and filling of arteries leads to tightening of vagina around penis
  - Stimulates Bartholin's glands to secrete mucus (aids in vaginal lubrication)

Physiology of Female Sex Act

- Posterior pituitary gland secretes oxytocin
  - Stimulates contraction of uterus and dilation of cervical canal
- Orgasm believed to aid in transport of sperm into fallopian tubes
  - Egg lives 24 hours after ovulation
  - Sperm must be available during that time for fertilization to occur