MEDAVIE HealthEd ÉduSanté

Reproductive Anatomy

Advanced Care Paramedicine

Module: 10

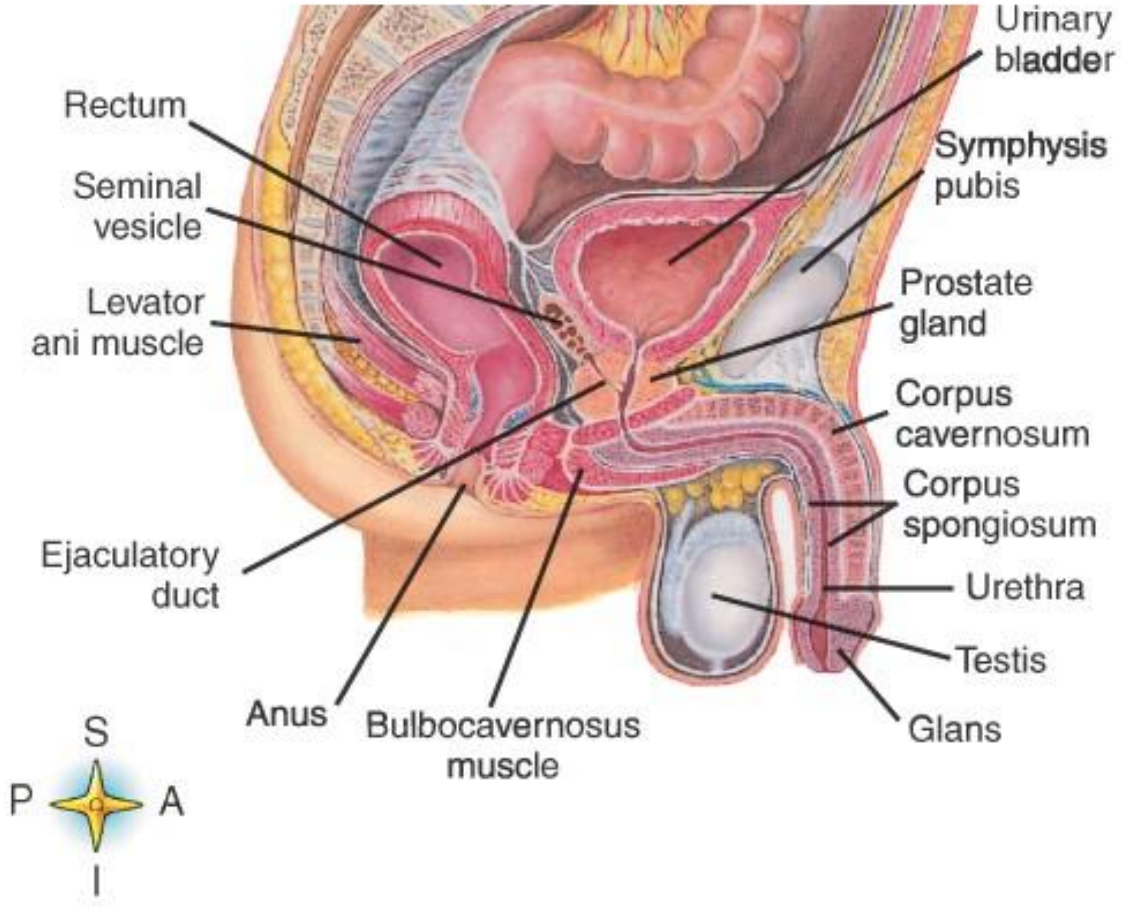
Section: 01

Function

- Produce eggs and sperm cells
- Transport and sustain them
- Nurture the developing offspring
- Hormone production

Male

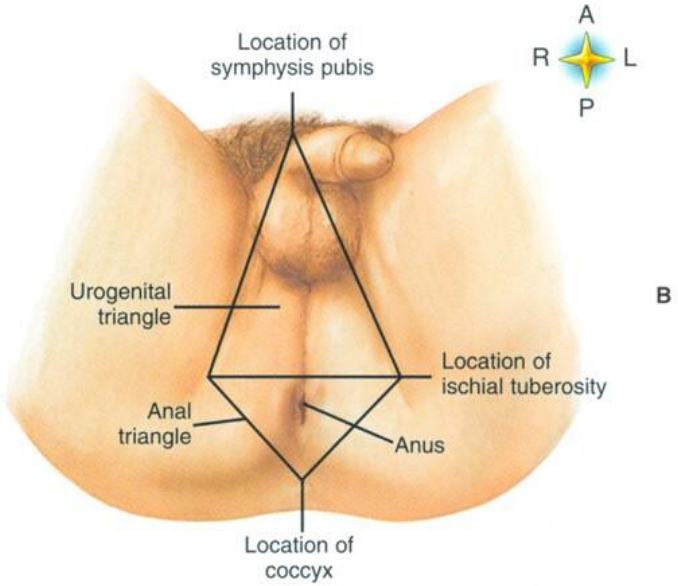
Organs



- Essential
  - Testes (Gonads)
- Accessory
  - Epididymis
  - Vas Deferens
  - Ducts
  - Urethra

Perineum

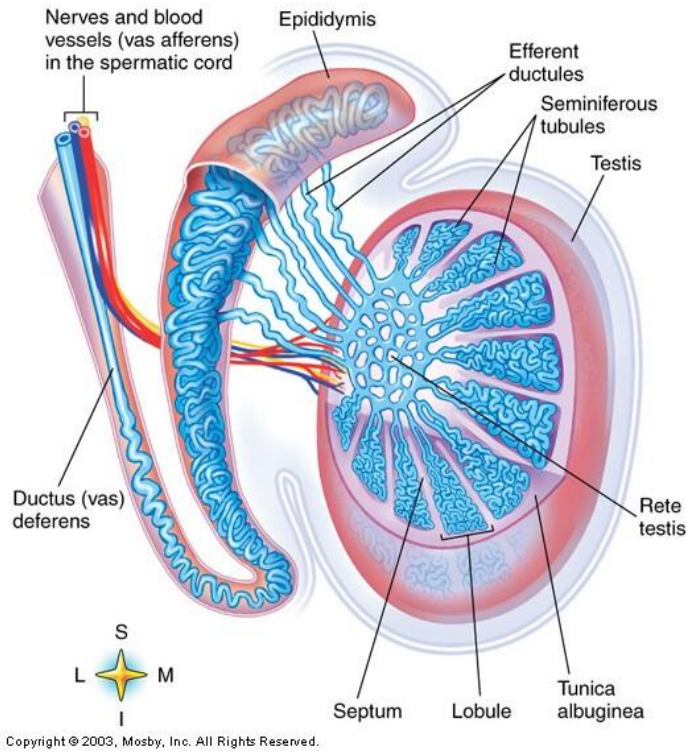
- Diamond shaped area between thighs
- Divided into two distinct regions
  - Urogenital Triangle
  - Anal Triangle



Testes

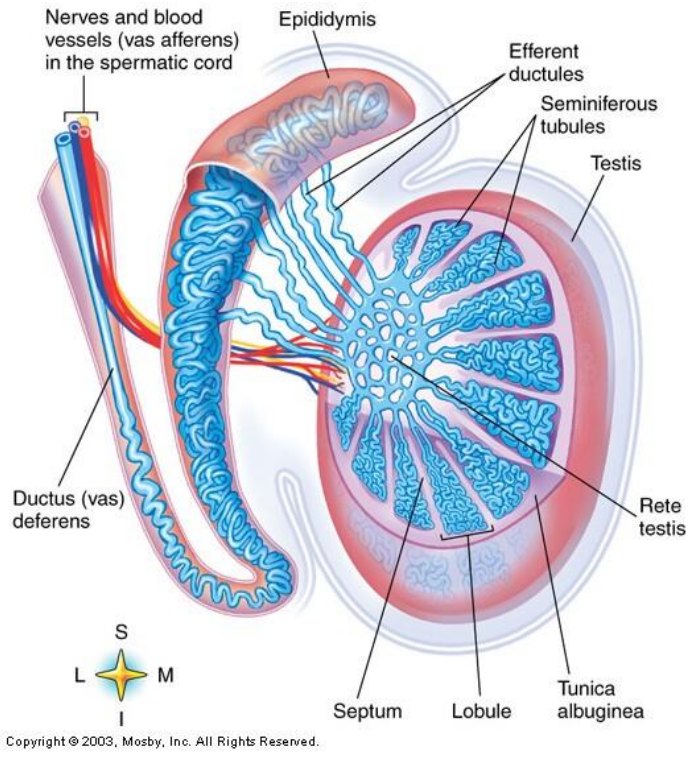
- Male gonads
  - Begin development high in abdominal cavity (near kidneys) and drop into scrotum 2 months before birth or shortly after
  - Scrotum maintains temp 3°C below body temp
  - Testes will be pulled closer to the body if cold or aroused
  - Location of sperm production (spermatogenesis)

Testes



- Suspended in scrotal sac by scrotal tissue and spermatic cords
- Blood vessels (vas afferens) enter through spermatic cord
- Tunica albuginea encases testicle and enters the gland producing lobules
- Lobes contain seminiferous tubules and specialized interstitial cells (cells of Leydig)
  - Hormone Producing

Testes

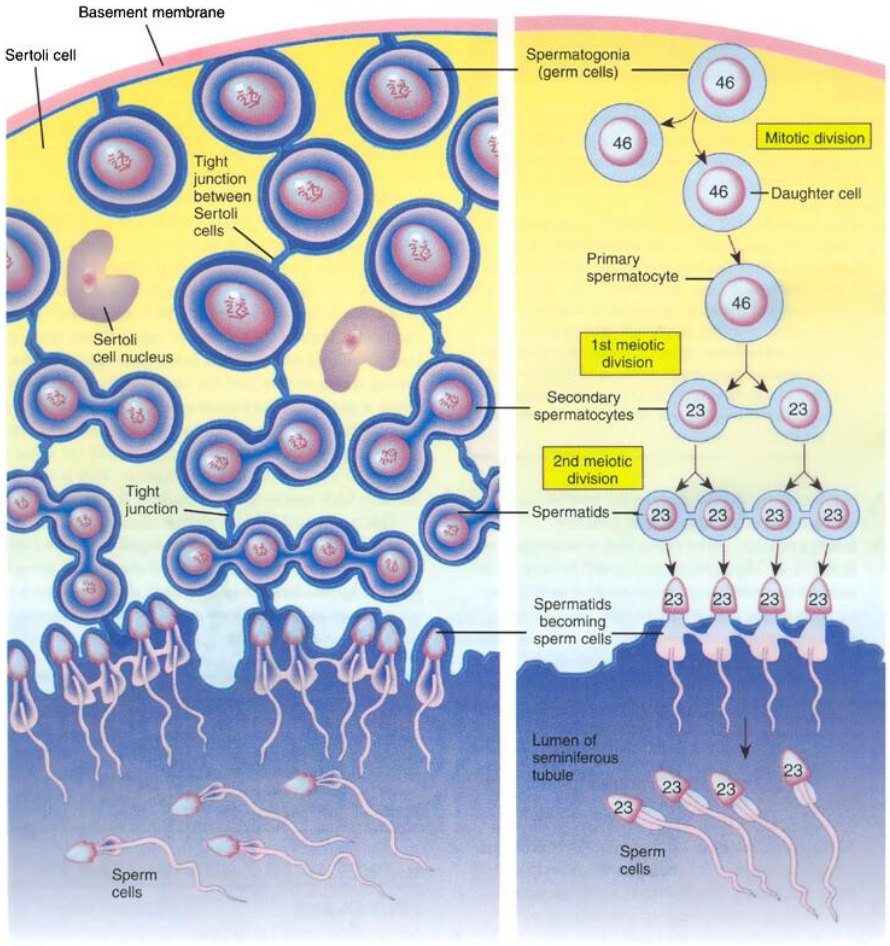


- Tubules form plexus (rete testis)
- Efferent ductules drain rete testis into epididymis
- Sertoli Cells
  - Columnar shaped cells that extend from basement membrane to Lumen surface of seminiferous tubule
  - Tight junction between cells forms blood-testis barrier

Function

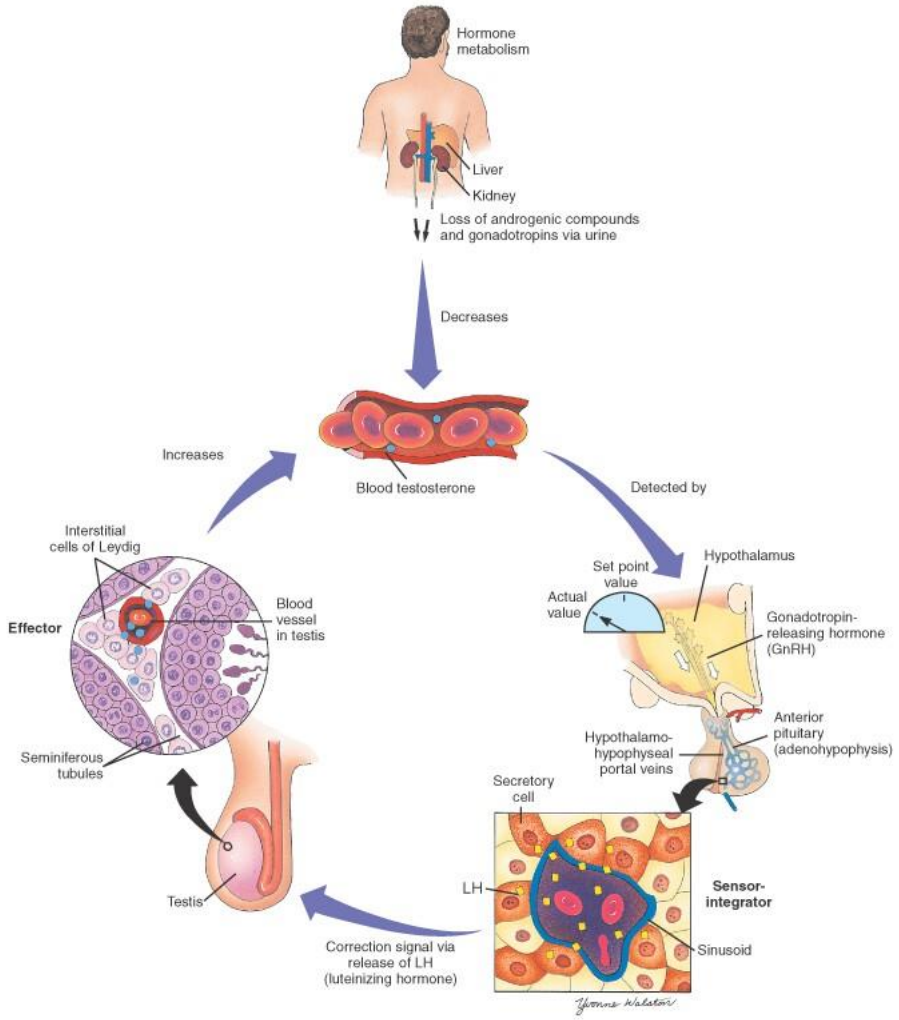
- Spermatogenesis
  - Seminiferous tubules produce the sperm
- Hormone secretion
  - Testosterone from interstitial cells
    - Promotes “maleness”
    - Stimulates protein anabolism (growth of muscles/bones)
    - Stimulates kidneys to retain Na and Water while excreting K
    - High levels of Testosterone Inhibit anterior pituitary gland from secreting FSH and LH
      - High levels of gonadotropins stimulate testosterone secretion
      - Think of impotency in anabolic steroid users…

Spermatogenesis

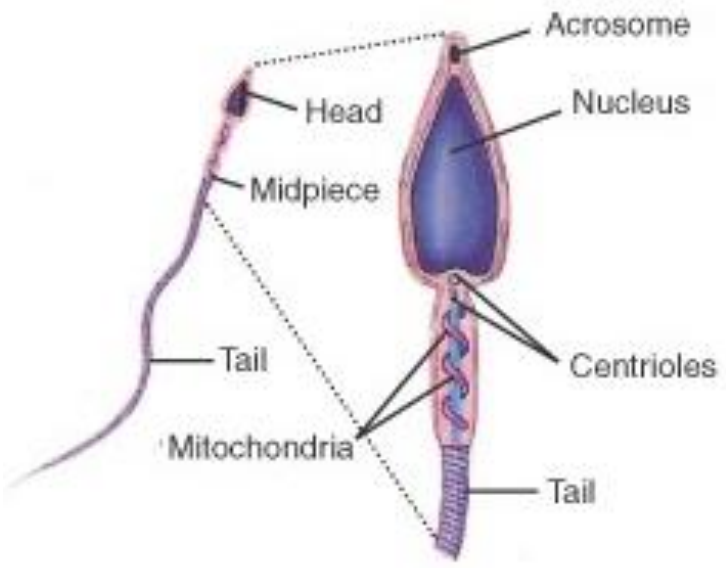


MEDAVIE HealthEd ÉduSanté

Hormone Control

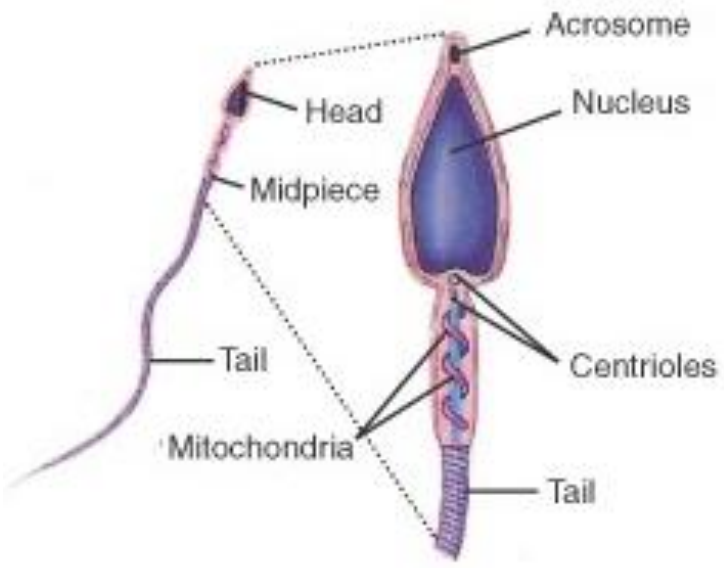


Spermatozoa



- Head (Nuclear region)
  - Contains 23 chromosomes
  - Covered by acrosome (contain splitting enzymes to help penetrate to the egg and into it - capacitation)
    - Break down cervical mucus
    - Break down outer covering of egg
- Mid-piece (Metabolic region)
  - Contains mitochondria to produce ATP
- Tail (Locomotor region)
  - Flagellum for motion

Spermatozoa



- Released from testes into epididymis for maturation
- Sperm production begins at puberty and continues through out life
- Production takes approximately 74 days
- Can live 48 hours in the female reproduction tract

Epididymis

- Single coiled tubule covered with a fibrous casing
- Can measure 20 feet in length
- Lies on top of and behind testis
  - Head
    - Attached to testis by efferent ductules
  - Body
  - Tail
    - Continuous with body and attaches to vas deferens

Function

- Sperm passage
- Allows sperm cells to mature (spermatozoas will spend up to 3 weeks in this area)
- Introduces small amount seminal fluid (5%)

Duct System

- Epididymis
- Ductus Deferens (vas deferens)
  - Continuous with the epididymis
  - Enlarge to form ampulla prior to prostate
  - Sperm are stored in the proximal portion of vas deferens and are propelled by peristaltic movement
- Ejaculatory duct
  - Vas deferens join at the ampulla to form
  - Pass through the prostate and empties into urethra

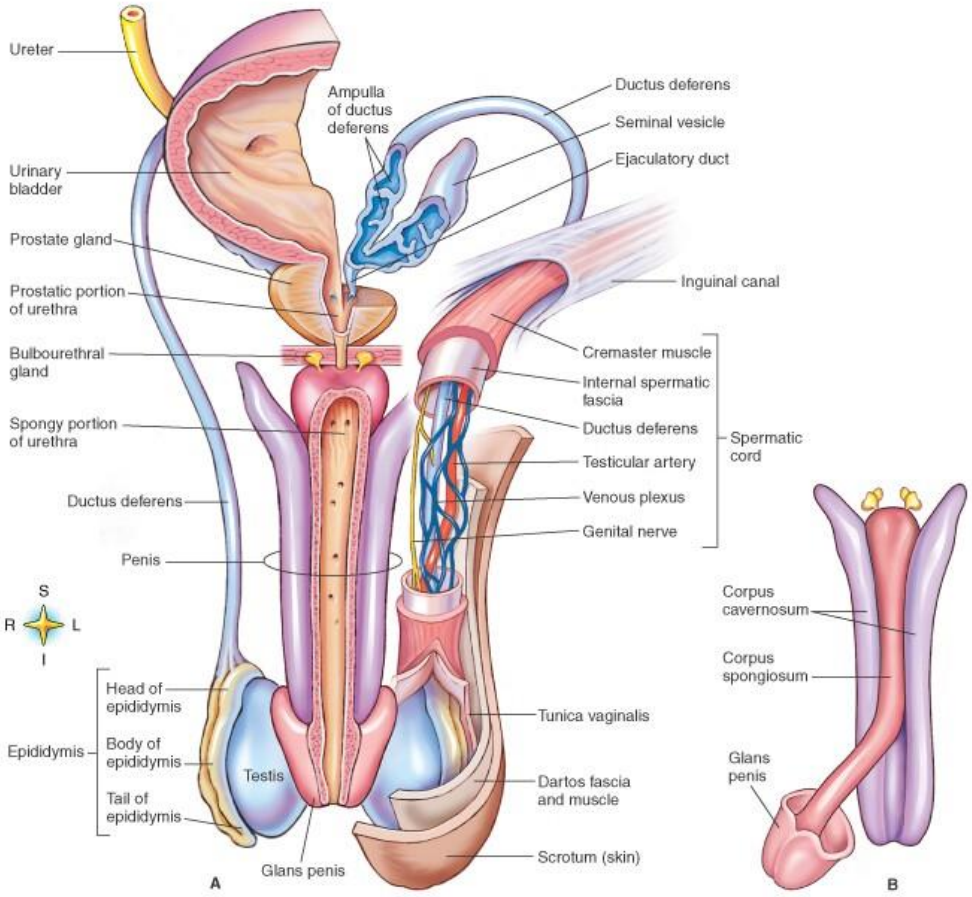
Urethra

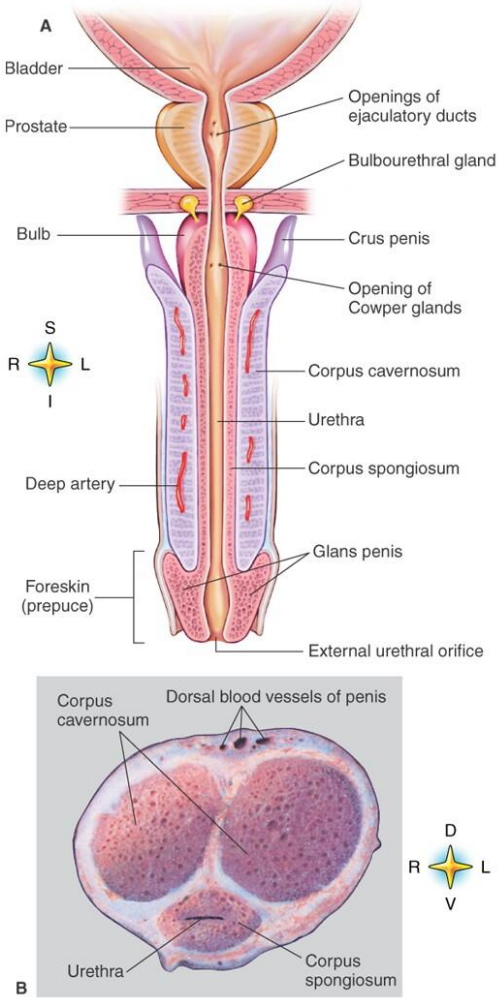
- Extends from bladder to external orifice
- Sphincter control keep urine out of urethra while sperm is being transported

Accessory Glands

- Seminal vesicles
  - Provides a viscous fluid (containing fructose) to the ejaculate – 60%
  - Fructose provides energy for spermatozoa
- Prostate
  - Provide secretions to the ejaculate (milky alkalitic fluid) – 30%
- Bulburetheral Glands
  - During arousal secrete alkaline solution to neutralize urine – 5%
  - Also helps neutralize the vagina
  - Provides some lubrication

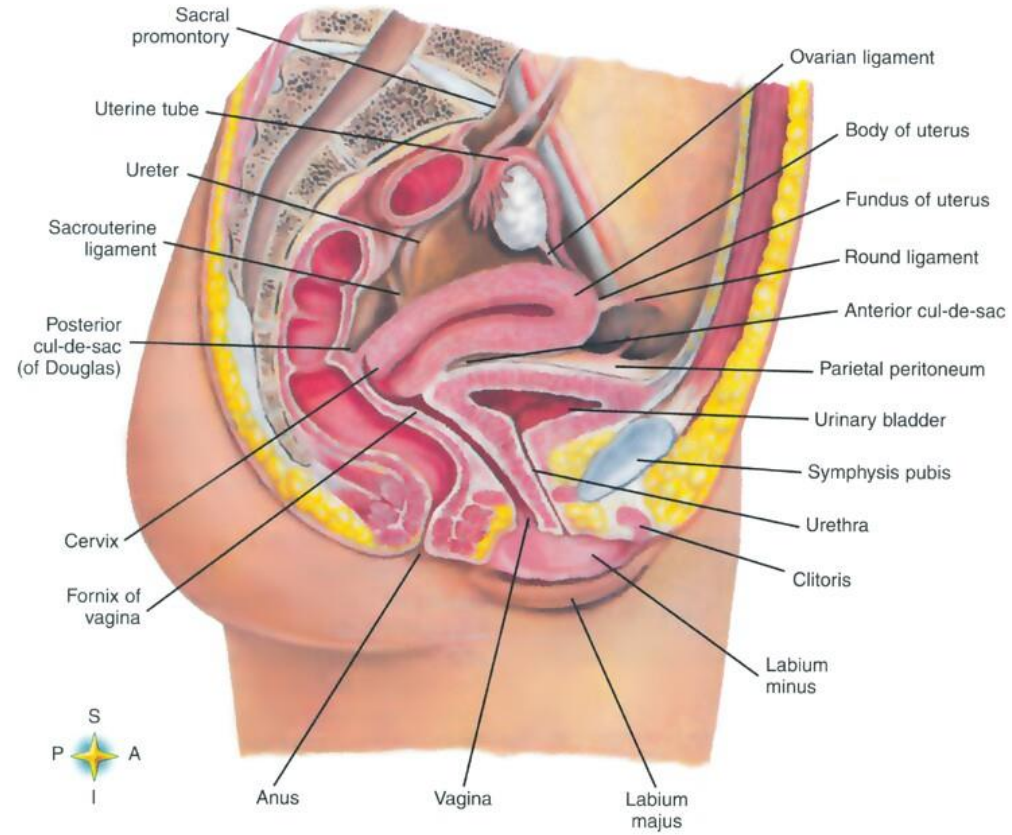
Structures





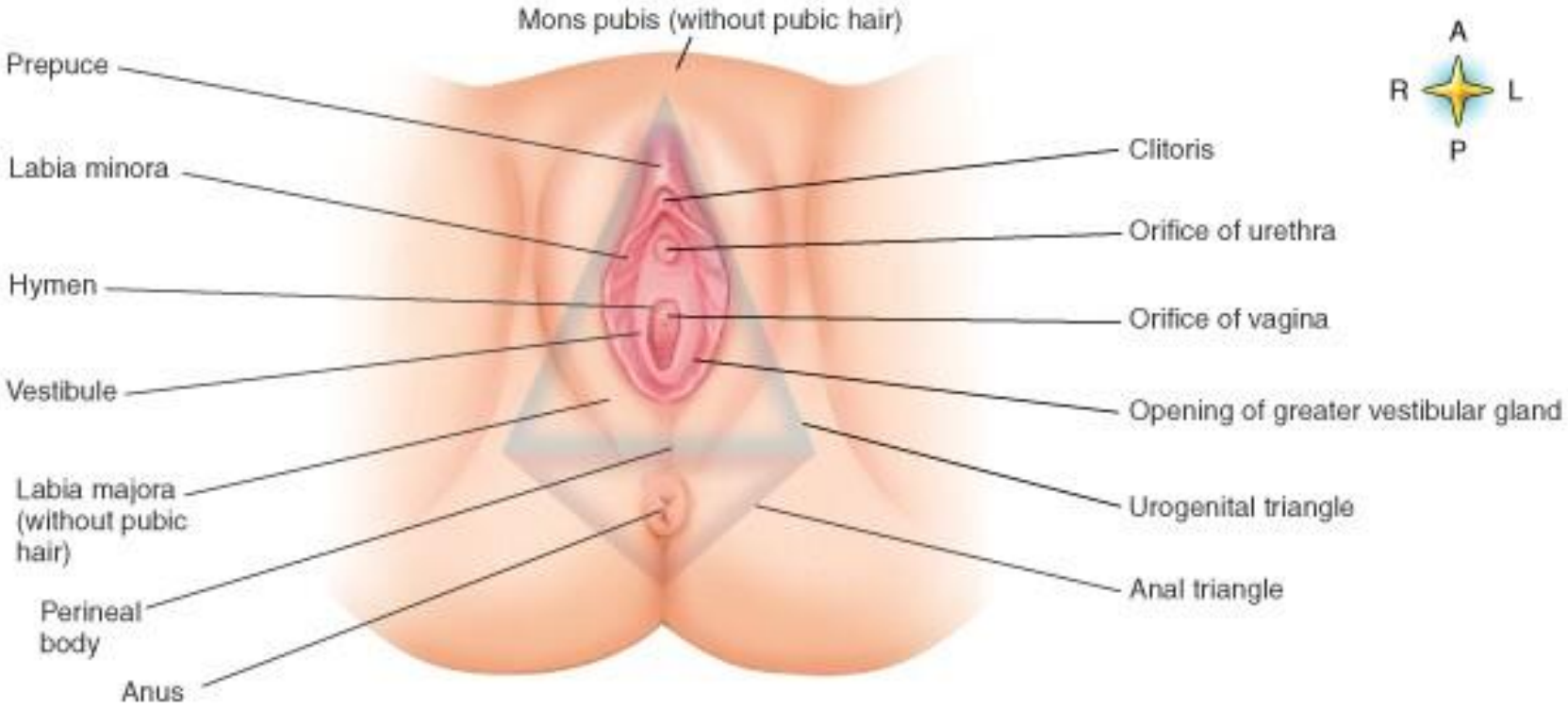
Female

Organs



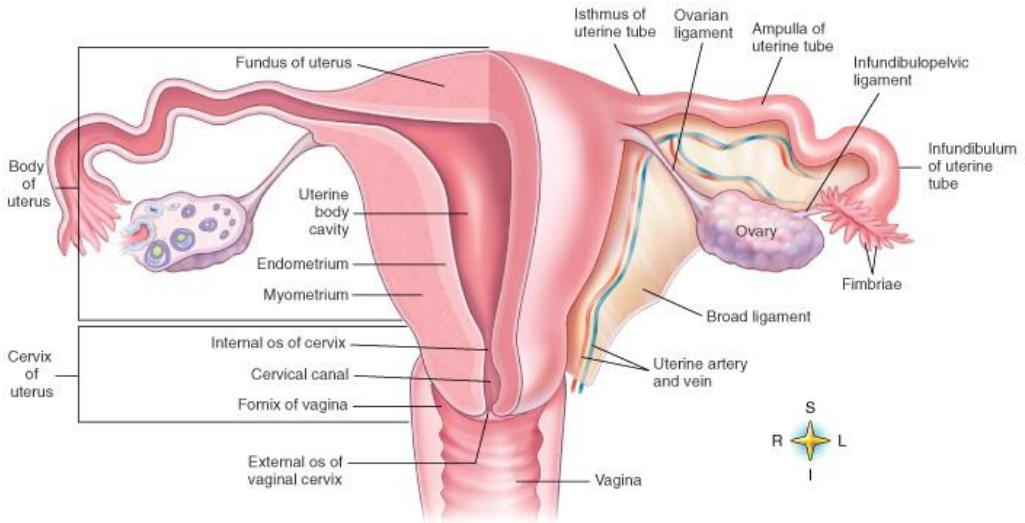
- Essential
  - Ovaries (Gonads)
- Accessory
  - Ducts
    - Fallopian Tubes
    - Uterus
    - Vagina
  - Vulva
  - Glands
    - Mammary

Perineum



Ovaries

- Similar to the male testes
- Nodular glands
- Located on either side of uterus
- Attached to the uterus by the ovarian ligament



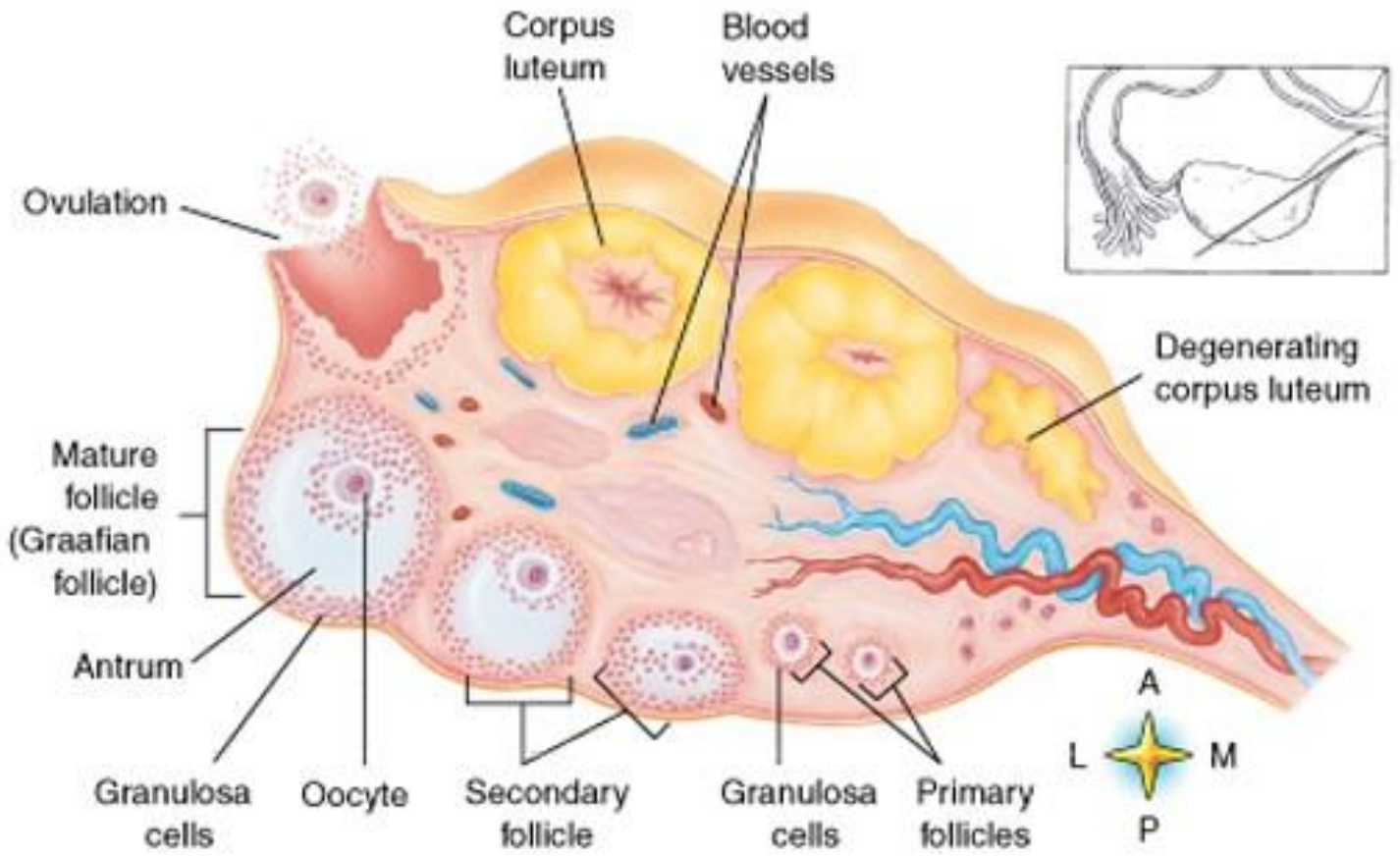
Function

- Production and release of gametes (ova)
  - Production (oogenesis)
  - Release (ovulation)
- Endocrine functions
  - Secrete female sex hormones
    - Estrogen
    - Progesterone
    - Regulate reproductive function

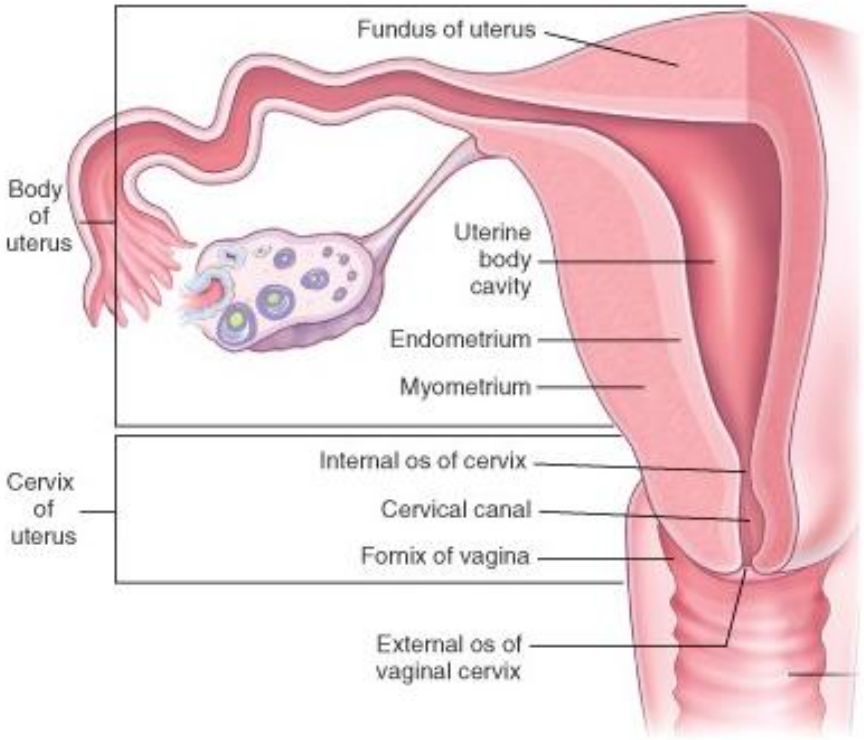
Ovaries

- Germinal epithelium (Outer layer)
- Inner layer (Epithelial cells and Connective tissue)
- Ovarian follicles
  - Found in the connective tissue matrix
- Oocytes are produced before birth
  - both ovaries contain approx 700,000 but declines to approx 400,000 by puberty
- Remain dormant until puberty where FSH influences some to begin meiosis and forms a blister on the ovary
- When blister breaks and releases oocyte
- Oocyte is released into the peritoneal cavity

Ovaries



Uterus



- Size and shape of a pear
- Fundus
- Body
- Cervix
  - Internal Os
  - External Os (Hymen)

Layers

- Endometrium
  - Mucous membrane
    - Stratum compactum
      - Simple columnar cells with cilia
    - Stratum spongiosum
      - Connective tissue
    - Stratum basale
      - Attaches endometrium to myometrium
    - Compact and Spongy are sloughed off after delivery of baby or during menstration
  - Has many exocrine glands that produce mucous
    - Normally acts as a barrier to sperm
    - Changes to facilitate transport of sperm during ovulation
  - Rich in capillaries

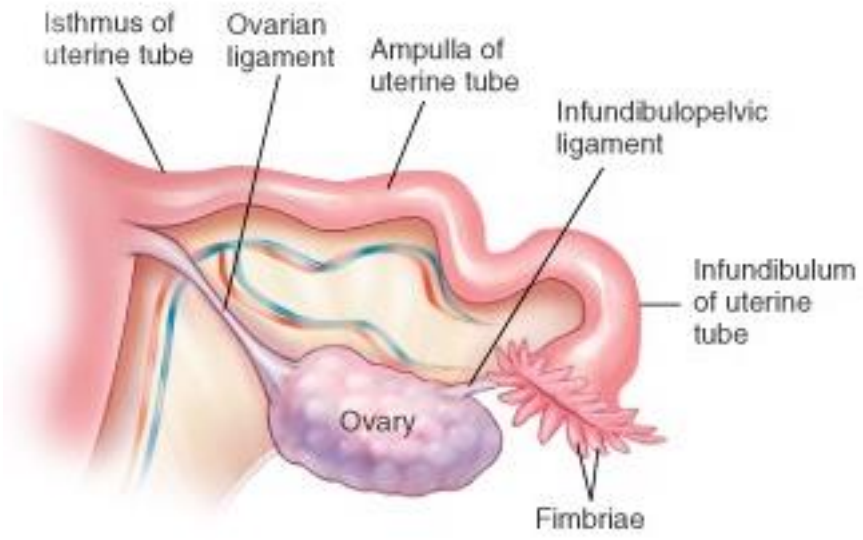
Layers

- Myometrium
  - 3 layers of smooth muscle
    - Thickest in the fundus
      - Helps propel baby during delivery
    - Thinnest in the cervix
      - Allows for dilation
- Parietal peritoneum
  - Incomplete covering
    - Covers only part of the body (all except the lower ¼ of anterior surface)
    - Does not cover the cervix

Function

- Part of the reproductive tract
- Facilitate growth of ova
  - Fertilized ova implant in the lining of the endometrium
  - Produce nutrient secretions to sustain ova until placenta is developed

Uterine Tubes



- AKA fallopian tubes or oviducts
  - Composed of same layers as uterus
- 3 Regions
  - Isthmus
    - 1/3 extends from upper angle of uterus
  - Ampulla
    - Middle 1/3
  - Infundibulum
    - Funnel shaped distal end with fingerlike projections called fimbriae

Uterine Tubes

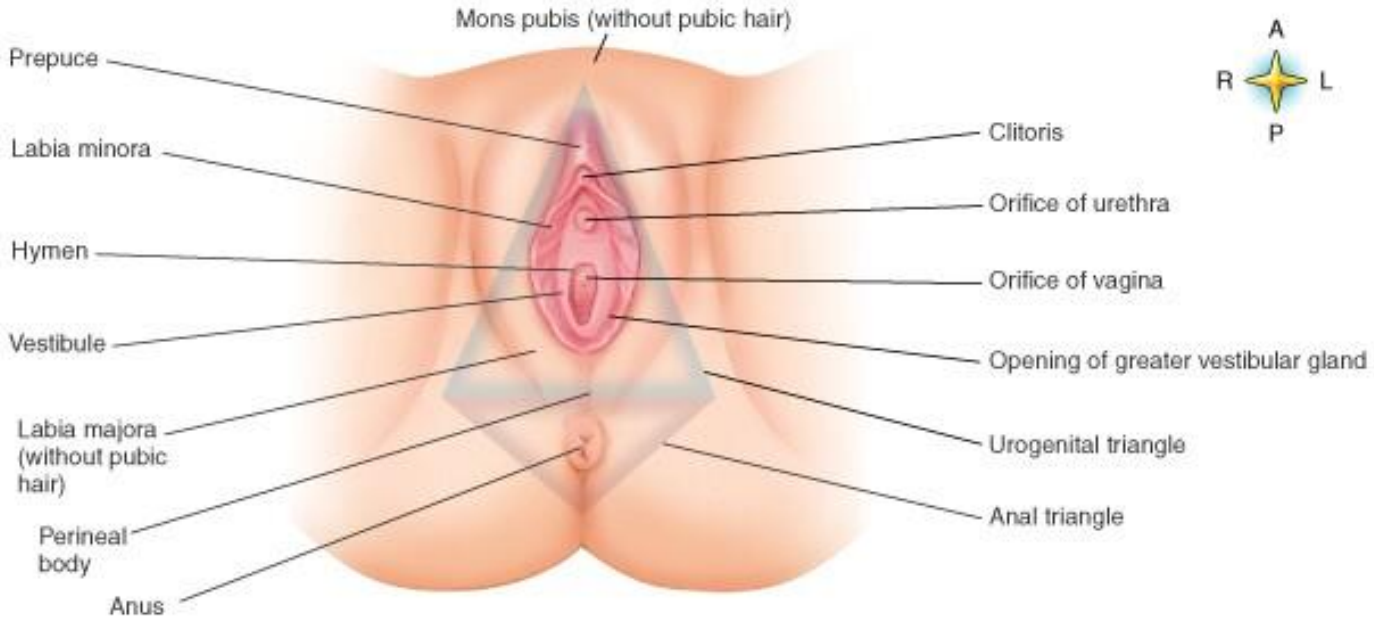
- Fimbriae
  - Are not directly connected to the ovaries
- Once the oocyte enters the oviducts, they are propelled by cilia and by peristaltic motion
- This takes 7 days to travel the tube
- Fertilization usually takes place here

Vagina

- Collapsible tube
- Mostly smooth muscle with mucous membranes arranged in rugae
  - Exocrine glands secreting lubrication

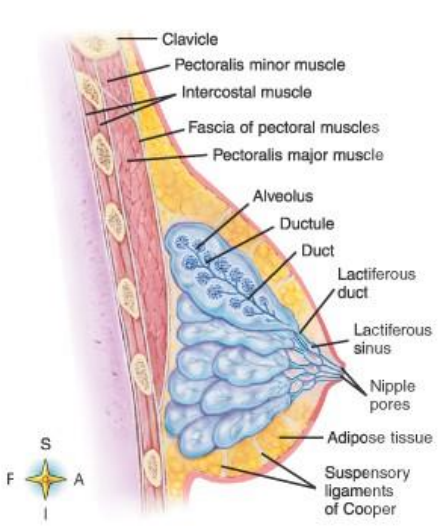
Vulva

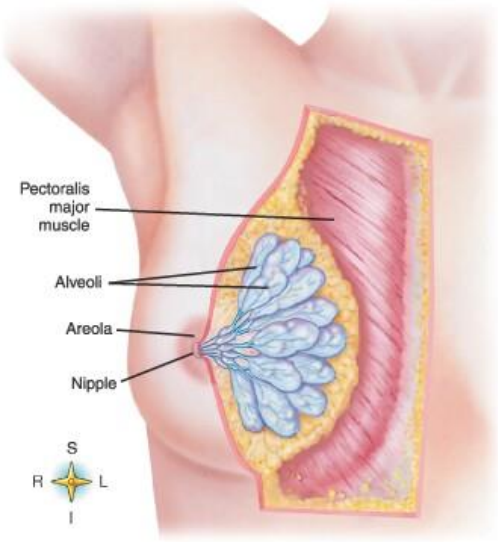
- External structures



Breasts

- Organs of milk production
- A single lactiferous duct divides to form smaller ducts
  - Forms secretion sacs (alveoli) that secrete milk during nursing

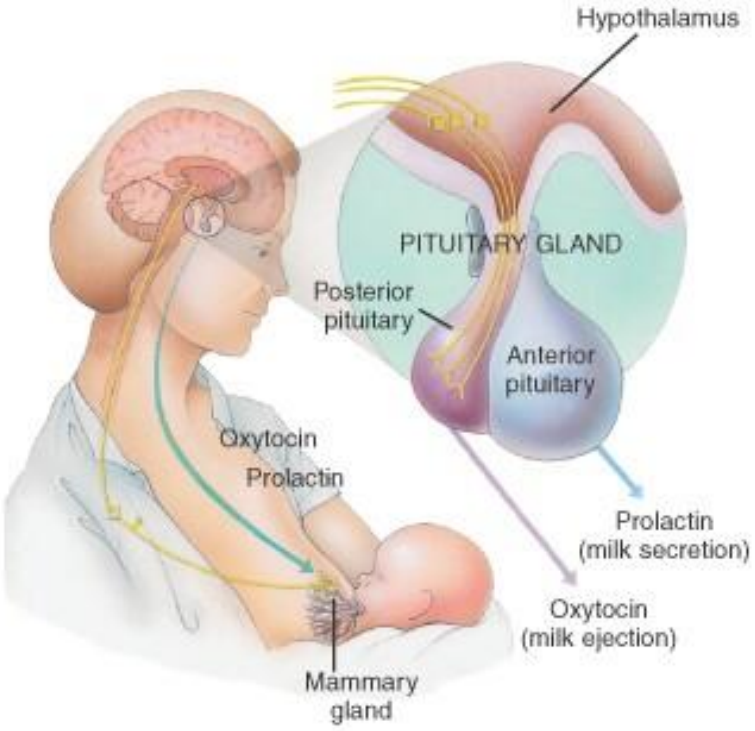


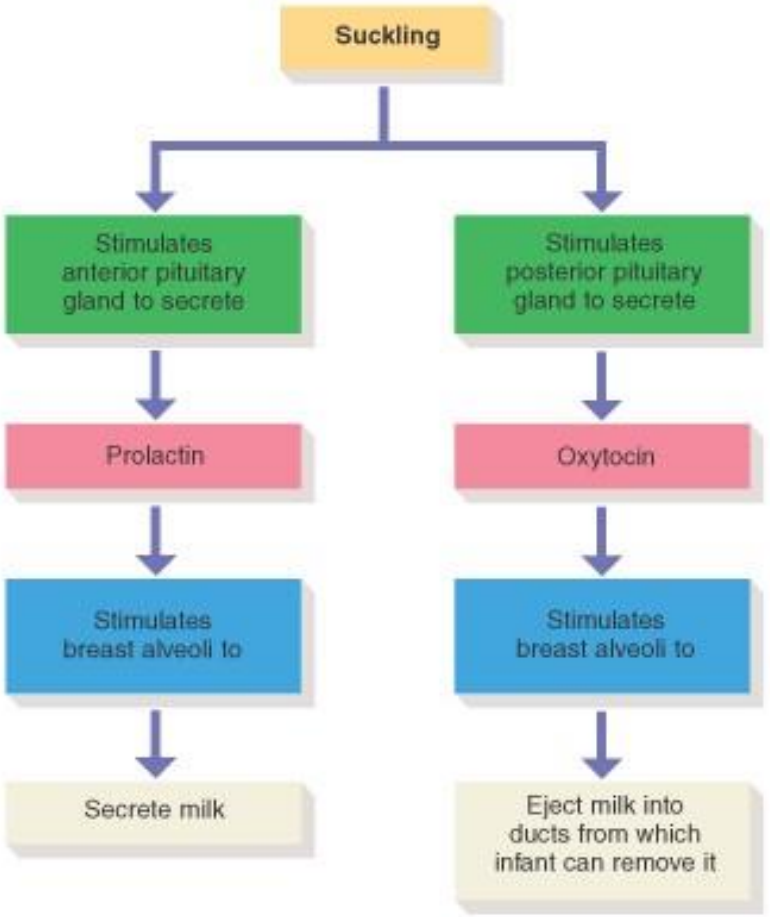


Lactation

- Estrogen and progesterone provide structural development
  - Estrogen develop ducts
  - Progesterone acts on cells ‘primed’ by estrogen to promote completion of ducts and development of alveoli
  - High levels of estrogen inhibit prolactin secretion
- Shedding of placenta after delivery sharply decreases estrogen levels
  - Stimulates ant pituitary to secrete prolactin
  - Suckling aids in stimulation as well as the post pituitary to release oxytocin

Lactation



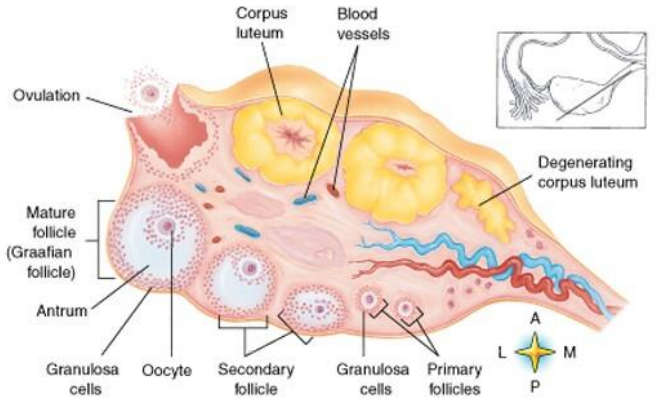


Reproductive Cycles

- Recurrent cycles from onset of menses to menopause
  - Ovarian Cycle
  - Endometrial (Menstrual) Cycle
  - Myometrial Cycle
  - Gonadotropic Cycle

Ovarian Cycle

- Reflects changes in the ovaries
  - Ovarian tissue begin meiosis decreasing # of chromosomes in daughter cells to ½ producing primary follicles with an oocyte suspended in development



Ovarian Cycle

- Once per month (around first day of menstruation)
  - Primary follicle resumes development
  - Follicular cells surrounding it secrete estrogens and small amount of progesterone
  - Maturing follicle moves to outer surface
  - Meiosis again halts prior to ovulation
- Ovulation occurs 14 days prior to next menstrual cycle

Ovarian Cycle

- After ovulation cells of ruptured follicle enlarge and are transform into corpus luteum
  - This continues to grow for 7 – 8 days
  - Will secrete progesterone in increasing amounts (diminishes if fertilization does not occur)
- Nonfunctional corpus luteum are reduced to scar tissue (corpus albicans)
  - Moves into central portion of ovary
  - Eventually disappears

Uterine (Menstrual) Cycle

- Reflects changes in the endometrium
- Phases
  - Menses
  - Postmenstrual
  - Ovulation
  - Premenstrual

Uterine (Menstrual) Cycle

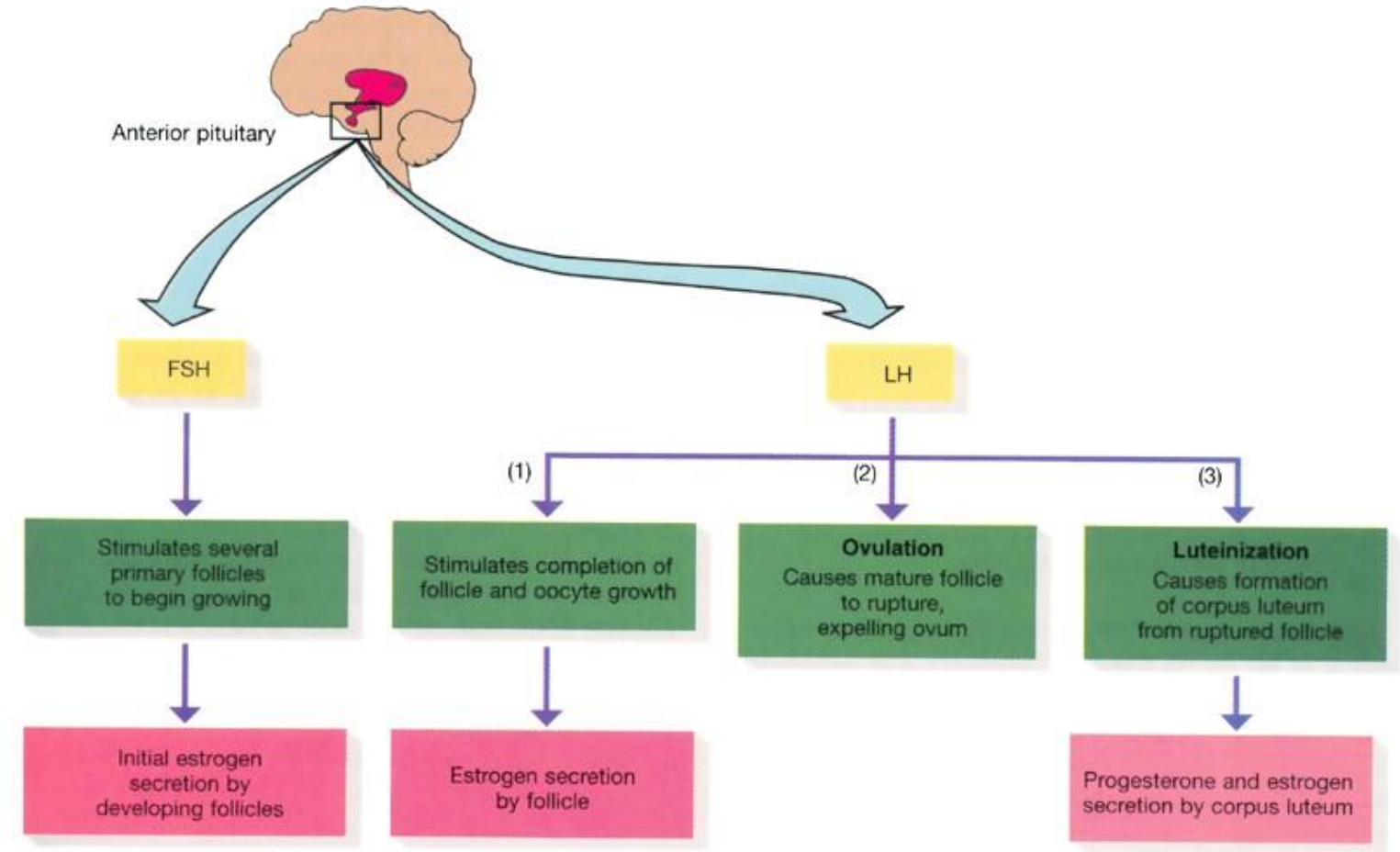
- Menses
  - Occurs on days 1 – 5 of new cycle
- Postmenstrual
  - Occurs between of menses and ovulation
  - Cycle days 6 to 13 or 14
  - Also known as Preovulatory stage or follicular phase
    - FSH release (and some LH) stimulates growth of ovarian follicles
    - Estrogen levels increase (released from follicle)
      - causes appearance, consistency and amount of cervical mucous
  - Also known as Proliferative Phase
    - Begins with the end of Menstrual phase
    - Estrogen stimulates repair of endometrium

Uterine (Menstrual) Cycle

- Ovulation
  - Cycle day 14
- Premenstrual (postovulatory)
  - Cycle days 15 – 28
  - Between ovulation and menses
  - Also known as the Luteal phase (secretory)
    - Corpus luteum secretes progesterone during this time
    - Glands and blood vessels develop
    - Glands release glycogen for embryo nourishment

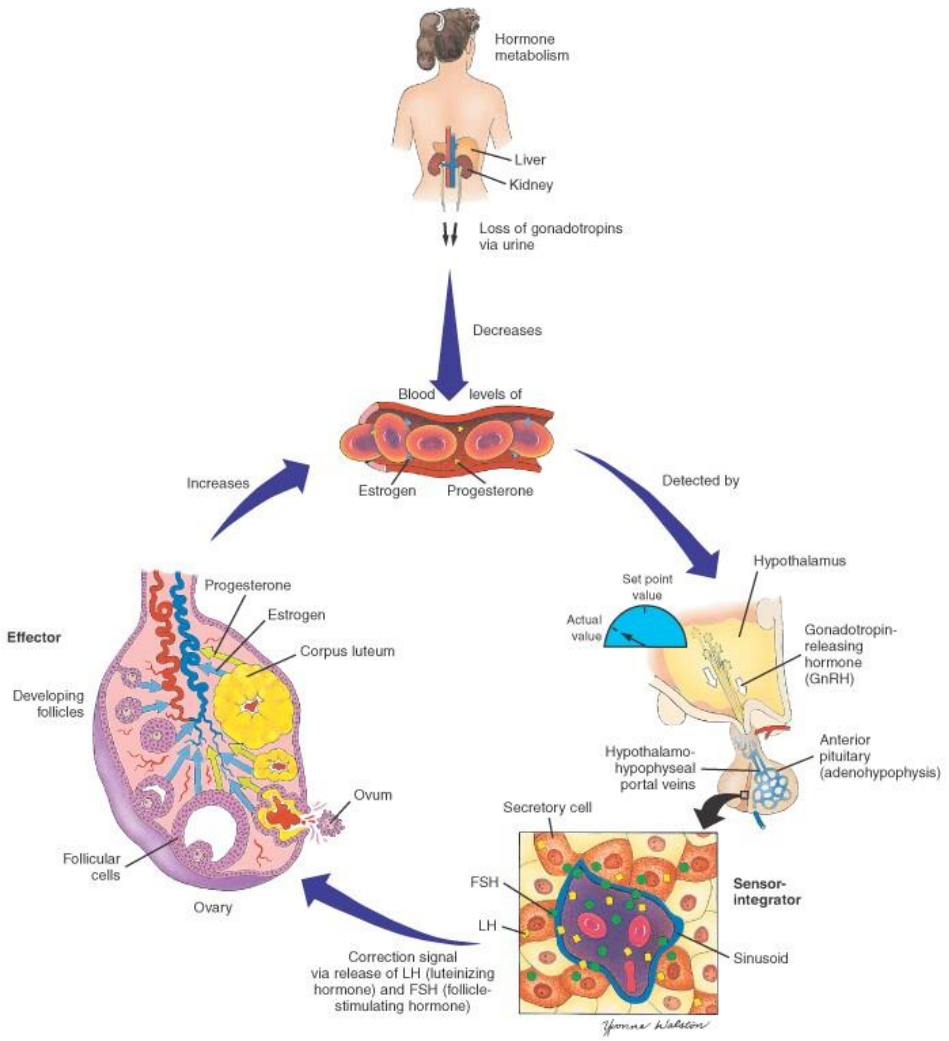
Other Cycles

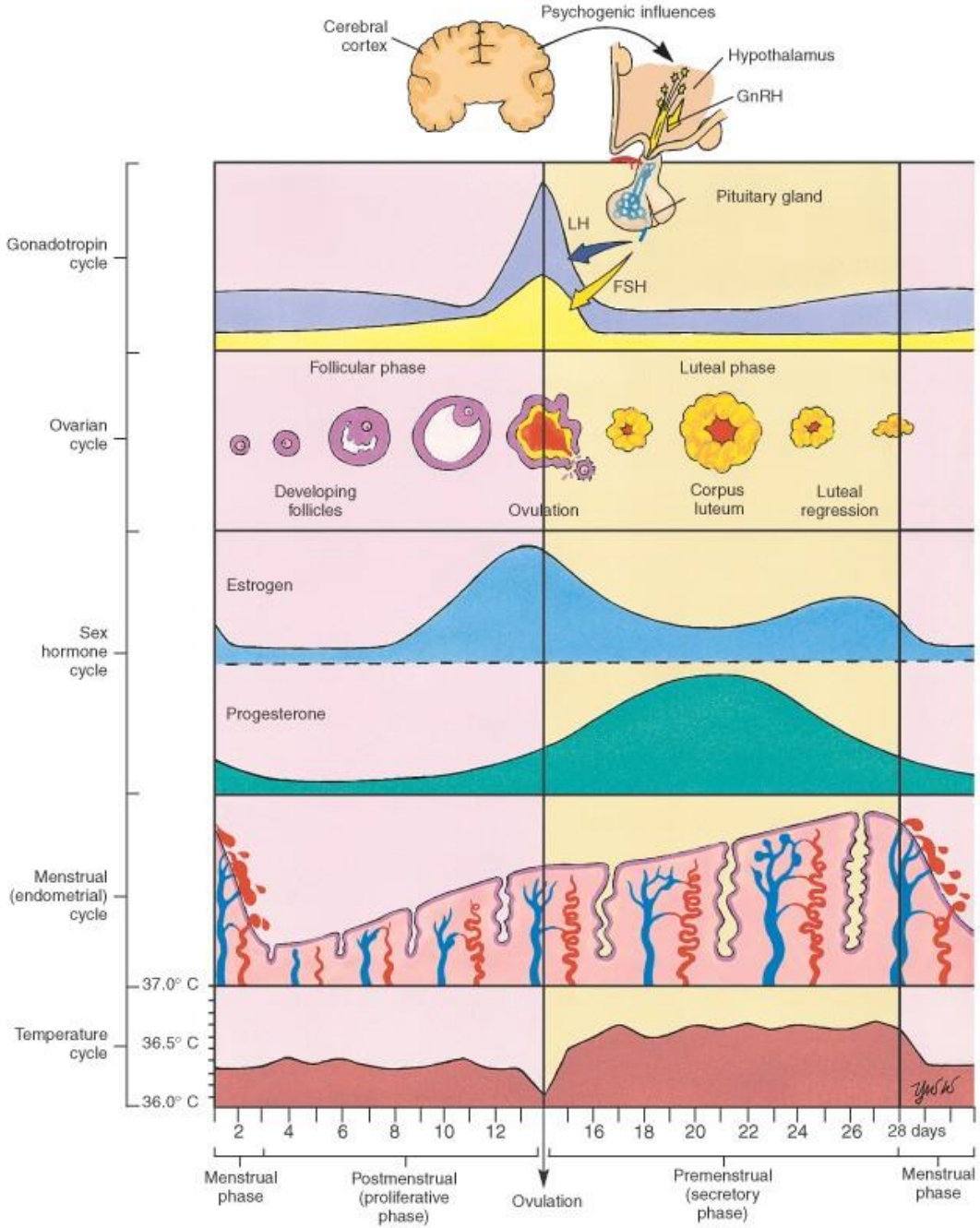
- Myometrial Cycle
  - Myometrium contracts mildly with increasing frequency during 2 weeks prior to ovulation
  - Decrease or disappear between ovulation and next menses
    - To lessen probability of expulsion of fertilized ovum
- Gonadotropic Cycle
  - Anterior pituitary secrets FSH and LH



MEDAVIE HealthEd ÉduSanté

FSH and Estrogen Secretion





Menopause

- The cessation of female reproductive cycles
- First changes are noted in the ovaries
  - Cease responsiveness to FSH and LH at around 45 - 50
- Menstruation cycle soon ceases
- Some will experience, but most will have only a few S/S if any:
  - Hot flashes
  - Diaphoresis
  - Depression
  - Headaches
  - Irritability
  - Insomnia