Reproductive system

Premedical Biology
Reproductive System

- Primary sex organs (gonads) – testes in males, ovaries in females
- Gonads produce sex cells called gametes and secrete sex hormones
- Accessory reproductive organs
- Sex hormones – androgens (males), and estrogens and progesterone (females)
Sex hormones play roles in:
The development and function of the reproductive organs
Sexual behavior
The growth and development of many other organs and tissues

Reproductive System
Male reproductive system

- **Sperm** are delivered to the exterior through a system of ducts: *epididymis*, *ductus deferens*, *ejaculatory duct* and the *urethra*

- **Accessory sex glands:**
  Empty their secretions into the ducts during ejaculation
  Include the *seminal vesicles*, *prostate gland*, and *bulbo-urethral glands*
Scrotum

- Its external position keeps the testes in 3°C lower temperature than core body temperature (needed for sperm production)
- Contains paired testicles
Testes

- **Seminiferous tubules:** interstitial tissue cells surround the seminiferous tubules

- **Luteinizing hormone** promotes the development of the **interstitial tissue (Leydig cells)** of the testes and hence promotes the secretion of the **male sex hormone, testosterone**. It may be associated with FSH in this function.
Sustentacular Cells (Sertoli Cells) - to nurture the developing sperm cells, has also been called the "mother" or "nurse" cell, act as phagocytes.
Epididymis

- the superior aspect of the testis characterized by sperm reservoir and mature

Ductus deferens

- **two ducts**, connecting the left and right epididymis to the ejaculatory ducts
- collect secretions from the male accessory sex glands such as the seminal vesicles, prostate gland and the bulbo-urethral glands
Accessory Glands

secrete 60% of the volume of semen viscous alkaline fluid containing fructose, ascorbic acid, coagulating enzyme (vesiculase), and prostaglandins protects and activates sperm, and facilitates their movement

Sperm and seminal fluid mix in the ejaculatory duct
Prostate gland produce milky, slightly acid fluid, which contains citrate, enzymes, and prostate-specific antigen (PSA);

Plays a role in the activation of sperm

Bulbourethral Glands (Cowper’s Glands) produce thick, clear, alkaline mucus that neutralizes traces of acidic urine in the urethra
Prostaglandins in semen:

Decrease the viscosity of mucus in the cervix
Stimulate reverse peristalsis in the uterus
Facilitate the movement of sperm through the female reproductive tract

Only 2-5 ml of semen are ejaculated, but it contains 20 mil sperm/ml
Female Reproductive Anatomy

- **Ovaries** are the primary female reproductive organs
- Make female **gametes** (ova)
- Secrete **female sex hormones** (estrogen and progesterone)
- Accessory ducts include **fallopian tubes**, **uterus**, and **vagina**,

Internal genitalia – ovaries and the internal ducts
External genitalia – external sex organs
Uterus

Hollow, thick-walled organ located in the pelvis

- **Body** – major portion of the uterus
- **Fundus** – rounded region superior to the entrance of the uterine tubes
- **Isthmus** – narrowed region between the body and cervix
- **Cervix**
Female Reproductive System:
Uterine Wall

Composed of three layers

- **Perimetrium** – outermost serous layer; the visceral peritoneum
- **Myometrium** – middle layer; interlacing layers of smooth muscle
- **Endometrium** – mucosal lining of the uterine Cavity

**single layer of columnar cells**
Endometrium

- Has numerous uterine **glands** that change in length as the endometrial thickness changes
- **Two layers:** one (**functionalis**) undergoes cyclic changes in response to ovarian hormones and is shed during menstruation
- The second (**basalis**) does not respond to ovarian hormones

Degeneration and regeneration of spiral **arteries** causes the functionalis to shed during menstruation – two system of arteries
Ovaries

- Paired organs on each side of the uterus
- Embedded in the ovary cortex are **ovarian follicles**
- Each follicle consists of an **immature egg called an oocyte**
- Cells around the oocyte are called:
  - Follicular cells (one thick layer of cell)
  - Granulosa cells (when more than one layer is present)
Ovaries

- **Graafian follicle** – secondary follicle at its most mature stage that bulges from the surface of the ovary

- **Ovulation** – ejection of the oocyte from the ripening follicle

- **Corpus luteum** – ruptured follicle after Ovulation

- **Corpus albicans**
Fallopian Tubes and Oviducts

- Receive the ovulated oocyte and provide a site for fertilization
- The tubes have no contact with the Ovaries

The oocyte is carried toward the uterus by peristalsis and ciliary action
Gametogenesis

Prior migration of primordial germ cells to the gonads during early fetal development

Formation of gametes (meiosis)

Gametogenesis is controlled by pituitary (gonadotropins) and ovarian hormones
Pituitary gland - hypophysis

Anterior pituitary – adenohypophysis
Adrenocorticotropic hormone (ACTH)
Thyroid-stimulating hormone (TSH)
Growth hormone
Prolactin
Luteinizing hormone - Lutropin
Follicle stimulating hormone
Melanocyte–stimulating hormones

These hormones are released from the anterior pituitary under the influence of the hypothalamus.

Posterior pituitary – neurohypophysis
stores and releases
Oxytocin
Antidiuretic hormone - vasopressin
Menstrual cycle

(B) ovarian and
(D) uterine cycles is controlled by
(A) the pituitary and
(C) the ovarian hormones
Ovarian and uterine cycle

Pituitary and ovarian hormones

**Follicular phase** – the egg matures within the follicle and uterine is getting prepared to receive the blastocyst.

The mature egg is released around 12 - 14 day - ovulation.

**Luteal phase** – uterine is prepared to receive the blastocyst. If the blastocyst does not implant in the uterus, the uterine wall begins to break down, leading to menstruation.

**Menses**
Uterine glands produce "infertile" mucus is thick (dense) and acidic. This mucus blocks sperm from entering the uterus.

For several days around the time of ovulation, "fertile" types of mucus are produced. Methods of thinning the mucus may help to achieve pregnancy.
In cervix is changing the epithel of **single layer of columnar cells** into epithel of **squamous stratified cells**

In the place of junction very often occurs **Cervical cancer** with influence of **Human papillomavirus (HPV)** infection

**Vagina**

Provides a passageway for birth, menstrual flow, and is the organ of copulation

**Stratified squamous epithelium** - mucosa
External Genitalia:

Vulva (Pudendum)
Lies external to the vagina and includes the mons pubis, labia, clitoris, and vestibular structures

Labia majora – elongated, hair-covered, fatty skin folds homologous to the male scrotum

Labia minora – hair-free skin folds lying within the labia majora; homologous to the ventral penis

Clitoris (homologous to the penis)
Erectile tissue, the exposed portion is called the glans

Perineum diamond-shaped region between the pubic arch and coccyx
Pubic hair
Hair that grows during puberty and surrounds the female organs

Clitoris
Sensitive ball of tissue creating sexual pleasure

Urethra
Opening where liquid waste (urine) leaves the body

Inner lips (labia minora)
Two folds of skin, inside the outer lips, that extend from the clitoris

Outer lips (labia majora)
Two folds of skin, one on either side of the vaginal opening, that protect the female organs

Vaginal opening

Anus
Thank you for your attention