

## **Female Reproductive System**

The female gonads, or ovaries, produce ova and the hormones estrogens and progesterone. They are situated on either side of the uterus and anchored by several ligaments. The ovary is covered with fibrous connective tissue called the tunica albugenia. Within the ovaries are tiny saclike structures called ovarian follicles each containing an immature egg or oocyte. These follicles are at different levels of maturation:

- primordial follicle has an oocyte surrounded by a single layer of epithelial cells (follicle cells).
- primary follicle has an oocyte surrounded by several layers of cells (granulosa cells)
- secondary follicle has a fluid filled space around the granulosa cells. This space is called the antrum.
- Graafian follicle is the mature stage and bulges from the outside of the ovary.

At ovulation the Graafian follicle ruptures and the egg with its surrounding cells, the corona radiata, are released. The ovum is then swept into the fallopian (uterine) tubes by fingerlike fimbriae. The fallopian tubes join the uterus laterally. Most of the uterus makes up the corpus. Above the point where the fallopian tubes join is called the fundus. The distal end of the uterus narrows and protrudes into the vagina and is called the cervix. The slight narrowing between the corpus and the cervix is the isthmus. The small pocket formed between the vagina and the cervix is the fornix. The vagina, the female organ of copulation, is about 10cm. It ends at the vestibule and, in pre-coital females, may have an incomplete membrane called the hymen at the distal end. It is composed largely of smooth muscle with rugae (ridges).

The uterine wall is composed of three layers: the outermost perimetrium is the serous visceral layer. The myometrium is the thick middle layer composed of smooth muscle. The endometrium is composed of simple columnar epithelium over a thick layer of connective tissue. The endometrium has two strata. The strata functionalis is sloughed off during menstruation and the strata basalis forms a new functionalis.

### **External Genitalia**

The female external genitalia are referred to as the vulva. It consists of the mons pubis, a rounded area of underlying adipose overlaying the pubi symphysis. Inferior and posterior to the mons are two larger skin folds, the labia majora. Within the labia majora are two smaller folds, the labia minora, which surround an area called the vestibule found at the vaginal entrance. Within the vestibule are the urinary meatus and the greater vestibular glands which secrete mucus during sexual arousal lubricating the vagina. Anterior to the vestibule is the clitoris composed of erectile tissue. Where the labia minora join, they form a hood over the clitoris called the prepuce. The area from the pubic arch anteriorly to the coccyx posteriorly is called the perineum.

### **Mammary Glands**

Mammary glands are modified sweat glands contained within the breast. About two dozen lobes within the breast contain glandular alveoli which produce milk during lactation. From the alveoli milk passes into lactiferous ducts which enlarges to a lactiferous sinus before opening to the outside through the nipple. The nipple is surrounded by pigmented skin called the areola which contain sebaceous glands. The sebum keeps the nipple soft and supple during nursing. The lobes of the breast are divided by connective tissue which form suspensory ligaments which attach the breast to the underlying muscle fascia. Breast size is determined largely by the amount of adipose tissue deposited in the breast.

Milk is a complex mixture composed of nutrients proportioned appropriately for newborns. During the first week of lactation, breast milk is called colostrum that is higher in protein, fat-soluble vitamins, minerals and antibodies.

The risk of developing breast cancer in a woman is about 12%. (Men account for less than 1% of breast cancers.) About 80% of breast cancer is infiltrating ductal carcinoma which originates in the epithelial lining of the mammary ducts. About 10% of these are caused by mutations in two genes BRCA1 and BRCA 2. Treatment often involves surgery followed by radiation therapy and/or chemotherapy. A lumpectomy refers to the removal of the cancerous tissue. A simple mastectomy removes only the breast tissue and some of the axillary lymph nodes. A radical mastectomy removes breast tissue plus all of the underlying muscles, fascia, and associated lymph nodes.

### **Differentiation of Male and Female Genitalia**

At about week seven of embryonic development, differentiation of the external genitalia and accessory glands begins depending on the presence or absence of testosterone produced by the testes. Embryonic tissues giving rise to the clitoris will give rise to the penis in the presence of testosterone, the labia majora to the scrotum. The greater vestibular glands are homologous to the bulbourethral glands. The prepuce of the clitoris is homologous to the prepuce of the penis.

### **STD's**

Genital warts (condyloma) are caused by Human Papilloma Virus (HPV). Of the more than 60 serotypes, a few are carcinogenic (causing primarily cervical cancer). Vaccines have been developed for these strains.

Genital herpes is usually caused by herpes simplex virus type 2 causing painful lesions on the genitals. The virus may remain latent in nerve cells and recurrences of the disease may be common if left untreated. The virus may cross the placental barrier and cause spontaneous abortion or mental retardation.

Syphilis is caused by a spirochete, *Treponema pallidum*. Primary stages are characterized by a hard chancre found at the site of infection. If late stages develop, the cardiovascular system, brain and other organs may be affected.

Gonorrhea is caused by the bacteria *Neisseria gonorrhoeae*. In males, a purulent discharge from the penis forms within a few days of infection. Most females do not exhibit clinical symptoms. Untreated, an infection may lead to sterility in both sexes.