Safe Maternity and Pediatric Nursing Care, Second Edition.

Chapter 4
Human Reproduction and Fetal Development
**Anatomy and Physiology**



## Female Reproductive System

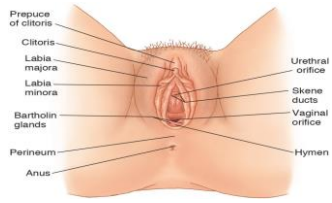
- External organs
  - Mons pubis - pad of fat that lies over the symphysis pubis
  - Labia majora - two folds of tissue that extend from the mons pubis to the sides of the vulva
  - Labia minora - two smaller folds of tissue forming the prepuce, which surrounds the clitoris
  - Clitoris - small sensitive organ with erectile tissue



## Female Reproductive System

- External organs
  - Vestibule of the vagina - the area where the urethra and vagina open
  - Bartholin glands - secrete lubricating fluids
  - Perineum - the skin from vaginal opening to the anus

## Female Reproductive System






## Female Reproductive System

- Internal organs
  - Ovaries
    - Two small glands about the size and shape of almonds that are on either side of the uterus slightly behind and below the fallopian tubes
    - Store approximately one-half million eggs and secrete estrogen and progesterone
  - Fallopian tubes
    - Provide a channel for the sperm to travel to the egg and to transport the fertilized egg into the uterus



## Female Reproductive System

- Internal organs
  - Uterus
    - A muscular triangle-shaped organ that provides the environment for fetal growth
    - Top portion: Fundus
    - Bottom portion: ***Cervix***
      - Provides a protective entrance to the uterus
      - Very elastic and has the ability to stretch to allow for childbirth
    - 2 Coats:
      - Muscular coat
      - Inner mucous membrane (rugae)

## Female Reproductive System

- Internal organs
  - Uterus
    - 3 Layers:
      - ***Endometrium*** - a mucous membrane that lines the cavity of the uterus and is the site where the embryo implants after arriving in the uterus
      - ***Myometrium*** - the middle layer of smooth muscle that contracts and expel the fetus and placenta during childbirth
      - ***Epimetrium*** - a smooth, transparent membrane that lines most of the external surface
    - Ligaments
      - Provide support and stabilize the reproductive organs
      - Includes the broad ligaments, the round ligaments, the cardinal ligaments and the uterosacral ligaments

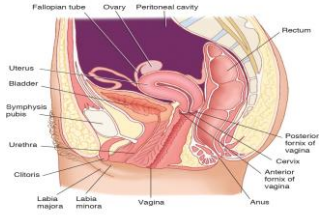


## Female Reproductive System

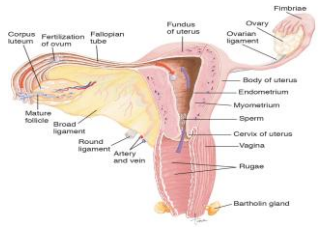
- Internal organs
  - Vagina
    - A 4- to 6-inch elastic muscular tube that extends from the cervix to the external vaginal opening
    - Tissue is composed of smooth muscle and elastic connective tissue, and lined with stratified squamous epithelium
    - Two main functions are for sexual intercourse and childbirth



## Female Reproductive System



## Female Reproductive System






## Female Reproductive System

- Female pelvis
  - Formed posteriorly by the sacrum and coccyx
  - Sides and front formed by the hip bones (ilium, ischium, pubis)
  - Shorter, wider, and more circular than the male pelvis, making it ideal for childbearing



## Female Reproductive System

- Breasts
  - Two glands that secrete milk
  - Begin to develop during puberty and further develop during pregnancy due to pituitary and ovarian hormones
  - Nipple becomes darker in pregnancy
  - ***Colostrum*** - a fluid rich with antibodies; first form of milk that extremely benefits the newborn
  - Milk production typically begins 2 to 3 days after childbirth

## Female Reproductive System

- Female reproductive cycle
  - Begins on the first day of menstrual bleeding and ends on the first day of the next menstrual bleeding
  - Hormones involved include the follicle-stimulating hormone, luteinizing hormone, estrogen, and progesterone



## Female Reproductive System

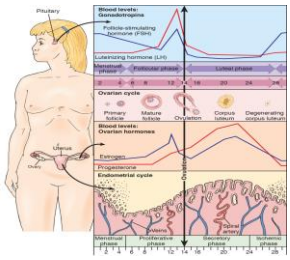
- Female reproductive cycle
  - Follicular phase:
    - Anterior lobe of pituitary secretes ***follicle-stimulating hormone (FSH)***, which stimulates the development of a follicle in the ovary
    - Maturing egg follicle secretes ***estrogen***, which thickens the endometrium to prepare for the implanting of the fertilized egg
    - Elevated estrogen levels cause FSH to stop and luteinizing hormone (LH) is released by the pituitary gland



## Female Reproductive System

- Female reproductive cycle
  - Luteal phase:
    - Begins on the day the egg is released
    - ***LH*** peaks on approximately day 14 of the cycle, causing ovulation or the release of the egg from the follicle
    - LH converts the ruptured follicle into the ***corpus luteum***, which secretes progesterone
    - ***Progesterone*** completes the development of the uterine lining in preparation for a fertilized egg
    - If egg is not fertilized, the corpus luteum degenerates, dropping levels of progesterone and estrogen
    - Uterine lining sheds and menstrual cycle begins again

## Female Reproductive System



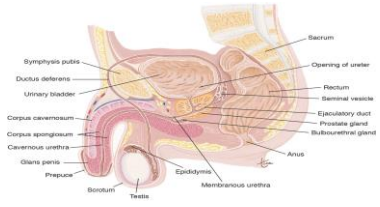



## Male Reproductive System

- External organs:
  - Scrotum - made of two sacs that hold the testicles, the epididymis, and the beginning of a spermatic cord
  - Penis - made of cavernous tissue that allows erection, and expels semen upon sexual climax (ejaculation)



## Male Reproductive System



## Male Reproductive System

- Internal organs:
  - Testicles
    - The reproductive glands of the male
  - Testes
    - Have cells that produce ***testosterone***, which promotes the development of male reproductive organs and the secondary male characteristics
  - Seminiferous tubules
    - The site of germination and maturation of cells into spermatozoa
  - Epididymis
    - Facilitates sperm motility



## Male Reproductive System

- Internal organs (continued):
  - Vas deferens
    - Ducts that transport mature sperm from the epididymis to the ejaculatory ducts
  - Prostate gland
    - Provides additional fluid to the sperm
  - Seminal vesicles
    - Two pouch-like sacs that create sugar-rich fluid to provide energy to the sperm



## Male Reproductive System

- Internal organs (continued):
  - Ejaculatory ducts
    - Formed by the fusion of vas deferens and the seminal vesicles, and empty into the urethra
  - Urethra
    - Carries urine and semen out of the body

## Male Reproductive System

- Male reproductive cycle
  - ***FSH*** - stimulates sperm production in the testes
  - ***LH*** - stimulates testosterone production
  - Both hormones are released from the anterior pituitary gland
  - ***Testosterone*** - allows development of spermatozoa to mature sperm cells during a 72-day process



## Fertilization

- Occurs when the sperm and the egg (gametes) meet in the same place at the same time after intercourse
- Fertilization occurs in the outer third portion of the fallopian tube
- Only one sperm will penetrate the egg's outer layer and fertilize the ovum



## Fertilization

- Each gamete typically has one set of 23 single chromosomes; When fused, a total of 46 chromosomes produce the zygote
- Embryo sex is determined at fertilization by the male gamete; XX chromosome for genetically female, XY chromosome for genetically male

## Fertilization

- Upon fertilization, the zygote divides during mitosis and travels down the fallopian tube to implant in the uterine lining
- Estrogen and progesterone levels remain high
- ***Human chorionic gonadotropin (hCG)*** is produced to support the development of the embryo
- Elevated levels of hCG can be detected by a blood test 11 days after conception and in urine tests 12-14 days after conception



## Fertilization

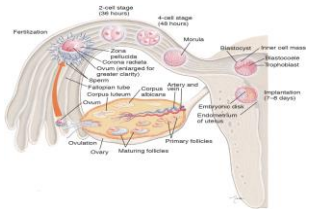
- ***Embryo***
  - The stage of development between the fertilized ovum and the fetus
- ***Blastocyst***
  - A maturing embryo in which some cell differentiation has occurred
  - In blastocyst stage, embryo implants 7-10 days after fertilization into the uterine endometrium



## Fertilization

- ***Placenta***
  - An organ that develops at the site of implantation to sustain the fetus during intrauterine life or the gestation period

## Fertilization






## Clicker Check

**Which hormone is produced to support the developing embryo?**

A. Estrogen
B. Testosterone
C. Progesterone
D. Human chorionic gonadotropin



## Clicker Check

**Correct answer: D**

hCG is produced to support the developing embryo. Levels of hCG are detected in the blood 11 days after conception and in the urine about 12-14 days after conception. Estrogen, progesterone, and testosterone support the female and male reproductive systems.