Learning Outcomes

After viewing this slide presentation, you should be able to:

- describe the normal renal and urogenital anatomy and physiology
- describe the phases of and the hormonal regulation of the menstrual cycle

Anatomical Review

Functional Anatomy

Renal-urinary system
- kidneys
- ureters
- bladder
- urethra

Functional Anatomy

Renal-urinary system
- filters the blood
- regulates body fluids
- eliminates metabolic waste from the blood
Kidneys
• remove waste products and excess water from the blood
• regulate electrolyte levels in the body
• contribute to homeostasis
  • provide hormonal and osmotic (fluid balance) control of blood pressure
  • regulate red blood cell production
  • regulating calcium levels

Urine normally contains water, salt, and the by-products of protein metabolism
• urea
• creatine
• various acids
Urine may also contain small amounts of
• glucose
• dead cells
• crystallized salts
• mucus

Urine should NOT contain
• blood cells
• whole proteins

Kidneys play a dual role in the control of blood pressure (BP)
• they secrete the hormone renin which leads to an increase in BP
• they eliminate excess fluid to maintain a consistent fluid level in the body and the blood
  • the regulation of fluid level directly affects BP

If the overall fluid level drops (such as with severe bleeding or dehydration) BP decreases
The drop in BP causes the kidneys to release renin to restore BP
If the kidneys are unable to remove excess fluid from the body or if the blood retains excess fluid (hypervolemia), BP increases as the increased volume of fluid in the vascular system exerts more pressure on the vascular walls

Damage to the kidneys can affect their ability to filter
Over time, the build up of metabolic by-products in the blood damages other organ-systems
The most notable effects occur in the cardiovascular and neurological systems
Functional Anatomy

Reproductive System
- male genital system
  - prostate gland
  - spermatic cord
  - testes
  - epididymis
  - vas deferens
  - seminal vesicles
  - urethra
  - penis

Female genital system
- ovaries
- fallopian tubes
- uterus
- cervix
- vagina

Organs of the genital system are stimulated by hormones from the hypothalamus and pituitary to release gender specific hormones
- testes produce testosterone
- ovaries produce estrogen
- both sexes have small circulating amounts of the opposite gender’s hormones

The “sex hormones”
- induce puberty
- develop sexual maturation
- develop secondary sex characteristics
- regulate sexual health and function

Testosterone
- stimulates development of penis, prostate, and seminal vesicles during puberty
- causes enlargement of larynx and thickening of the vocal cords
- influences the growth of face and body hair, aggressive behaviors, muscular development, and sebaceous gland activity

Estrogen
- stimulates uterine and ovarian blood flow and growth
- causes enlargement of the breasts, breast ducts, and vagina
- increases libido (sexual motivation) in both sexes.
- secondary female characteristics (narrow shoulders, broader hips, higher-pitched voice, less body hair) develop as a result of the absence of testosterone and other androgens

Several hormones produced by the hypothalamus regulate menstruation
- Hypothalamus hormones stimulate the pituitary to release hormones that affect estrogen and progesterone production in the ovaries
Estrogen and progesterone interact to produce endometrial development in the presence of ovulation (the release of an ovum from the ovaries that occurs approximately two weeks before menses).

Thickening of the endometrium is needed to nurture a fertilized ovum in the event of pregnancy.

When estrogen and progesterone levels decrease, the thick, blood-rich endometrium is expelled (menses) to prepare the uterus for the next cycle.

The menstrual cycle is very sensitive to hormonal levels and nutrition. Amenorrhea, the absence of menses, occurs with pregnancy, endocrine disorders, and malnutrition.