ORGAN SYSTEMS OF THE BODY

DEFINITIONS AND CONCEPTS

A. **Organ** – a structure made up of two or more kinds of tissues organized in such a way that they can together perform a more complex function that can any tissue alone
B. **Organ system** – a group of organs arranged in such a way that they can together perform a more complex function than can any organ alone
C. A knowledge of individual organs and how they are organized into groups makes more meaningful the understanding of how a particular organ system functions as a whole

ORGAN SYSTEMS

A. Integumentary system

a. Structure: organs
   i. Skin
   ii. Hair
   iii. Nails
   iv. Sense receptors
   v. Sweat glands
   vi. Oil glands
b. Functions:
   i. Protection
   ii. Regulation of body temperature
   iii. Synthesis of chemicals; ex: vitamin D
   iv. Sense organ

B. Skeletal system

a. Structure:
   i. Bones
   ii. Joints
b. Functions
   i. Support
   ii. Movement (with joints and muscles)
   iii. Storage of minerals
   iv. Blood cell formation (Hemopoiesis)

C. Muscular system

i. Muscles
   1. Voluntary or striated
   2. Involuntary or smooth
   3. Cardiac
ii. Functions
   1. Movement
   2. Maintenance of posture
   3. Production of heat

D. Nervous system

i. Structure

1. Brain
2. Spinal cord
3. Nerves
4. Sense organs

ii. Functions
1. Communication
2. Integration
3. Control
4. Recognition of sensory stimuli

iii. System functions by production of nerve impulses caused by stimuli of various types

iv. Control is fast-acting and of short duration

E. Endocrine system

i. Structure
1. Pituitary gland
2. Pineal gland
3. Hypothalamus
4. Thyroid gland
5. Parathyroid glands
6. Thymus gland
7. Adrenal glands
8. Pancreas
9. Ovaries (female)
10. Testes (male)

ii. Functions
1. Secretion of special substances called hormones directly into the blood
2. Same as nervous system – communications, integration, control
3. Control is slow and of long duration
4. Examples of hormone regulation:
a. Growth
b. Metabolism
c. Reproduction
d. Fluid and electrolyte balance

F. Cardiovascular (circulatory) system

i. Structure
1. Heart
2. Blood vessels
a. Arteries
b. Capillaries
c. Veins

ii. Functions
1. Transportation

2. Regulation of body temperature
3. Immunity (body defenses)

G. Lymphatic system

i. Structure
   1. Lymph nodes
   2. Lymphatic vessels
   3. Thymus
   4. Spleen

ii. Functions
   1. Transportation
   2. Immunity (b0dy defense)

H. Respiratory system

i. Structure
   1. Nose
   2. Pharynx
   3. Larynx
   4. Trachea
   5. Bronchi
   6. Lungs

ii. Functions
   1. Exchange of waste gas (carbon dioxide) for oxygen in the lungs
   2. Area of gas exchange in the lungs called alveoli
   3. Filtration of irritants from inspired air
   4. Regulation of acid-base balance

I. Digestive system

i. Structure
   1. Primary organs
      a. Mouth
      b. Pharynx
      c. Esophagus
      d. Stomach
      e. Small intestine
      f. Large intestine
      g. Rectum
      h. Anal canal
   2. Accessory organs
      a. Teeth
      b. Salivary glands
      c. Tongue
      d. Liver
      e. Gallbladder
      f. Pancreas
      g. Appendix

3. Functions
    a. Mechanical and chemical breakdown (digestion) of food
    b. Absorption of nutrients
    c. Undigested waste product that is eliminated is called feces
    d. Appendix is a structural but not a functional part of digestive system
    e. Inflammation of appendix is called appendicitis

J. Urinary system

i. Structure
    1. Kidneys
    2. Ureters
    3. Urinary bladder
    4. Urethra

ii. Functions
    1. Clearing or cleaning blood of waste products – waste product excreted from body is called urine
    2. Electrolyte balance
    3. Acid-base balance
    4. In male, urethra has urinary and reproductive functions

K. Reproductive system

i. Structure

1. Male
    a. Gonads – testes
    b. Genital ducts – vas deferens, urethra
    c. Accessory organ – prostate
    d. Supporting structure – genitalia (penis and scrotum)

2. Female
    a. Gonads – ovaries
    b. Accessory organs – uterus, uterine (fallopian) tubes, vagina
    c. Supporting structures – genitalia (vulva) and mammary glands (breasts)

ii. Function
    1. Survival of the species
    2. Production of sex cells (male: sperm; female: ova)
    3. Transfer and fertilization of sex cells
    4. Development and birth of offspring
    5. Nourishment of offspring
    6. Production of sex hormones

INTEGRATION OF BODY ORGAN SYSTEM FUNCTIONS

A. No one body system functions entirely independently or other systems
B. All body systems are structurally and functionally interrelated and interdependent

ORGAN REPLACEMENT

A. Loss of function in non-vital organs is not immediately life threatening; loss of function in vital organs is immediately life threatening
B. Loss of function in organs can be treated by organ replacement
    a. Artificial organs (prosthesis)
    b. Organ transplantation
    c. Free-flap surgery
    d. Stem cell treatment

Vocabulary:

Appendix	gastrointestinal (GI) tract	hormone	nerve impulse
Cardiovascular	genitalia	Integumentary	stimuli
Endocrine	lymphatic	urine	feces
Appendicitis	dialysis	immunosuppressive	prosthesis
Cochlear implant	hemopump		

Organ Systems of the Body

CHAPTER SYNOPSIS

This chapter presents information concerning the 11 major systems of the body and the organs that compose each system. The body is viewed as an integrated whole, not just as an accumulation of individual parts. Organization is the component that provides a state of homeostasis throughout life.

LEARNING OBJECTIVES WITH RATIONALE

the student will be able to:

1. Define and contrast the terms organ and organ system.

An organ is a structure made up of two or more kinds of tissues, organized in such a way that together these tissues perform a more complex function than can any one tissue alone.

An organ system is a group of organs arranged in such a way that together they perform a more complex function than can any one organ alone.

2. List the 11 major organ systems of the body.

The 11 major organ systems of the body are:

(1) integumentary,
(2) skeletal,
(3) muscular,
(4) nervous,
(5) endocrine,
(6) circulatory,
(7) lymphatic,
(8) respiratory,
(9) digestive,
(10) urinary, and
(11) reproductive systems.

3. Identify and locate the major organs of each major organ system.

Integumentary system—skin, hair, nails, sense receptors, sweat glands, oil glands

Skeletal system—bones, joints

Muscular system—muscles

Nervous system—brain, spinal cord, nerves

Endocrine system—pituitary gland, pineal gland, hypothalamus, thyroid gland, parathyroids, thymus, adrenals, pancreas, ovaries, testes

Circulatory system—heart, blood vessels

Lymphatic system—lymph nodes, lymphatic vessels, thymus, spleen

Respiratory system—nose, pharynx, larynx, trachea, bronchi, lungs

Digestive system—mouth, pharynx, esophagus, stomach, intestines, rectum, anal canal, teeth, salivary glands, tongue, liver, gallbladder, pancreas, appendix

Urinary system—kidneys, ureters, bladder, urethra

Reproductive system—(male) testes, vas deferens, urethra, prostate, penis, scrotum; (female) ovaries, uterus, uterine tubes, vagina, vulva, mammary glands

4. Briefly describe the major functions of each major organ system.

The **integumentary system** *supports and protects,* regulates body temperature, makes chemicals and hormones, and acts as a sense organ.

The **skeletal system** *supports and protects*, makes movement easier (with joints), stores minerals, and makes blood cells.

The **muscular system** brings about *body movement*, maintains posture, and produces heat.

The **nervous system** allows a person to *communicate* with the environment and integrates and controls the body.

The **endocrine system** *secretes hormones* into the blood that serve to communicate with, integrate, and control mechanisms.

The **circulatory system** *transports* substances through the body and establishes immunity.

The **lymphatic system** is a subdivision of the circulatory system. It does not contain blood, but rather lymph, which is formed from the fluid surrounding body cells and diffused into lymph vessels. The major functions of the lymphatic system are the movement of fluid and its critical role in the *defense mechanism of the* body against disease.

The **respiratory system** *exchanges oxygen* from the air for the waste product carbon dioxide, which is eliminated from the body.

The **digestive system** *breaks down food,* absorbs nutrients, and excretes solid waste.

The **urinary system** *cleans* waste products from blood in the form of urine and maintains electrolyte balance, water balance, and acid-base balance.

The **reproductive system** *produces sex cells*, allows transfer of sex cells and fertilization to occur, permits development and birth of offspring, nourishes *offspring*, and produces sex hormones.

5. Identify and discuss the major subdivisions of the reproductive system.

<u>Male reproductive system</u>

- Consists of testes, vas deferens, prostate, penis, and scrotum.
- Primary functions are to produce sperm cells and transport them to the female reproductive tract.

<u>Female reproductive system</u>

- Consists of ovaries, uterus, uterine tubes, vagina, vulva, and mammary glands.

• Primary functions are to produce egg cells; receive sperm; permit fertilization; transfer sex cells to uterus; and allow for development, birth, and nourishment of offspring.

LECTURE OUTLINE

I. DEFINITIONS AND CONCEPTS

A. Organ—a structure made up of two or more kinds of tissues organized in such a way that they can together perform a more complex function than can any tissue alone

B. Organ system—a group of organs arranged in such a way that they can together perform a more complex function than can any organ alone

C. A knowledge of individual organs and how they are organized into groups facilitates the understanding of how a particular organ system functions as a whole

II. ORGAN SYSTEMS

A. Integumentary system (Figure 4-2)
1. Structure—organs
    a. Skin
    b. Hair
    c. Nails
    d. Sense receptors
    e. Sweat glands
    f. Oil glands
2. Functions
    a. Protection
    b. Regulation of body temperature
    c. Synthesis of chemicals
    d. Sense organ

B. Skeletal system (Figure 4-3)
1. Structure
    a. Bones
    b. Joints
2. Functions
    a. Support
    b. Movement (with joints and muscles)
    c. Storage of minerals
    d. Blood cell formation

C. Muscular system (Figure 4-4)
1. Structure
    a. Muscles
        (1) Voluntary or striated
        (2) Involuntary or smooth
        (3) Cardiac
2. Functions
    a. Movement

b. Maintenance of body posture
c. Production of heat

D. Nervous system (Figure 4-5)
1. Structure
a. Brain
b. Spinal cord
c. Nerves
d. Sense organs
2. Functions
a. Communication
b. Integration
c. Control
d. Recognition of sensory stimuli
3. System functions by production of nerve impulses caused by stimuli of various types
4. Control is fast-acting and of short duration

E. Endocrine system (Figure 4-6)
1. Structure
a. Pituitary gland
b. Pineal gland
c. Hypothalamus
d. Thyroid gland
e. Parathyroid glands
f. Thymus gland
g. Adrenal glands
h. Pancreas
i. Ovaries (female)
j. Testes (male)
2. Functions
a. Secretion of special substances called hormones directly into the blood
b. Same as nervous system—communication, integration, control
c. Control is slow and of long duration
d. Examples of hormone regulation:
(1) Growth
(2) Metabolism
(3) Reproduction
(4) Fluid and electrolyte balance

F. Cardiovascular (circulatory) system (Figure 4-7)
1. Structure
a. Heart

b. Blood vessels
2. Functions
a. Transportation
b. Regulation of body temperature
c. Immunity (body defense)

G. Lymphatic system (Figure 4-8)
1. Structure
a. Lymph nodes

b. Lymphatic vessels
c. Thymus
d. Spleen

2. Functions
a. Transportation
b. Immunity (body defense)

H. Respiratory system (Figure 4-9)
1. Structure
a. Nose
b. Pharynx
c. Larynx
d. Trachea
e. Bronchi
f. Lungs

2. Functions
a. Exchange of waste gas (carbon dioxide) for oxygen in the lungs
b. Area of gas exchange in the lungs called alveoli
c. Filtration of irritants from inspired air
d. Regulation of acid-base balance

I. Digestive system (Figure 4-10)
1. Structure
a. Primary organs
(1) Mouth
(2) Pharynx
(3) Esophagus
(4) Stomach
(5) Small intestine
(6) Large intestine
(7) Rectum
(8) Anal canal

b. Accessory organs
(1) Teeth
(2) Salivary glands
(3) Tongue
(4) Liver
(5) Gallbladder
(6) Pancreas
(7) Appendix

2. Functions
a. Mechanical and chemical breakdown (digestion) of food
b. Absorption of nutrients
c. Undigested waste product that is eliminated is called feces
d. Appendix is a structural but not a functional part of digestive system
e. Inflammation of appendix is called appendicitis

J. Urinary system (Figure 4-11)
1. Structure

a. Kidneys
b. Ureters

c. Urinary bladder
d. Urethra

2. Function
    a. “Clearing” or cleaning blood of waste products; waste product excreted from body is called urine
    b. Electrolyte balance
    c. Water balance
    d. Acid-base balance
    e. In males, urethra has urinary and reproductive functions

K. Reproductive system
1. Structure
    a. Male
        (1) Gonads—testes
        (2) Genital ducts—vas deferens, urethra
        (3) Accessory gland—prostate
        (4) Supporting structures—genitalia (penis and scrotum)
    b. Female
        (1) Gonads—ovaries
        (2) Accessory organs—uterus, uterine (fallopian) tubes, vagina
        (3) Supporting structures—genitalia (vulva), mammary glands (breasts)
2. Functions
    a. Survival of species
    b. Production of sex cells (male: sperm; female: ova)
    c. Transfer and fertilization of sex cells
    d. Development and birth of offspring
    e. Nourishment of offspring
    f. Production of sex hormones