

Chapter 1

The Study of Body Function

- I. Homeostasis and Feedback Control
 - A. Negative Feedback Loops
 - B. Positive Feedback Loops
 - C. Neural and Endocrine Regulation
 - D. Feedback Control of Hormone Secretion
- II. The Primary Tissues
 - A. Muscle Tissue
 - B. Nervous Tissue
 - C. Epithelial Tissue
 - D. Connective Tissue
- III. Organs and Systems
 - A. Systems
 - B. Body-Fluid Compartments

Human Physiology

Study of how the human body functions

How organisms accomplish tasks essential for life

Pathophysiology:

How physiological processes are altered in disease or injury.

Homeostasis

- Maintaining constancy of internal environment.
 - Dynamic constancy. Within a certain normal range.
- Maintained by negative feedback loops.

Table 1.2

- Regulatory mechanisms:
 - **Intrinsic**
Within organ being regulated.
 - **Extrinsic**
Outside of organ, such as nervous or hormonal systems.
Negative feedback inhibition.

Feedback Loops

- Sensor:
 - Detects deviation from **set point**.
- Integrating center:
 - Determines the response.
- Effector:
 - Produces the response.

Fig 1.1

Negative Feedback

- Defends the **set point**.
- Reverses the deviation.
- Produces change in the opposite direction.
- Examples:
 - Insulin decreases plasma glucose.
 - Body temperature

Fig 1.3

Fig 1.4

Fig 1.5

Fig 1.6

Fig 1.7

Positive Feedback

- Action of effectors **amplifies** the changes.
- Is in **same** direction as change.
- Examples –
 - Oxytocin (parturition)
 - As parturition proceeds the levels of oxytocin concentration increase
 - Voltage gated Na^+ channels (depolarization).
 - As depolarization progresses more Na^+ channels (gates) open

Primary Tissues

- The body composed of 4 different primary tissues:
 - muscle
 - nervous
 - epithelial
 - connective

Muscle Tissues

- Specialized for contraction.
- 3 types of muscle tissue:
 - Skeletal
 - Cardiac
 - Smooth
- Skeletal and cardiac muscle have similar mechanisms of contraction.

Skeletal Muscles and Nervous Tissue

Read pages 10 – 11

Epithelial Tissue

- Cells that form membranes:
 - Provide barrier between external and internal environments.
 - Classified according to number of layers and shape of the cells in upper layer
- Simple
 - one cell layer thick
 - specialized for transport
- Stratified membranes:
 - composed of a number of layers
 - specialized for protection

- Shape
 - squamous, columnar, or cuboidal
- Glands:
 - exocrine or endocrine glands.

Epithelial Membranes

- Squamous cells:
 - Flattened in shape.
 - Function:
 - Diffusion and filtration.
 - Line all blood vessels, pulmonary alveoli.
- Cuboidal cells:
 - Cube-shaped cells.
 - Function:
 - Excretion, secretion and absorption.
 - Line kidney tubules, salivary and pancreatic ducts.
- Columnar cells:
 - Taller column shaped cells.
 - Function:
 - Excretion, secretion and absorption.
 - May contain cilia.
 - Line digestive tract, uterine tubes, and respiratory passageways.

Fig 1.12

Exocrine Glands

- Derived from cells of epithelial membranes.
- Secretions are released through ducts.
- Examples:
 - Tear glands.
 - Sweat glands.
 - Prostate glands.

Endocrine Glands

- Lack ducts.
- Secrete hormones into capillaries/lymphatic system within the body.
- May be discrete organs:
 - Primary functions are the production and secretion of hormones

Table 1.3

Connective Tissue

- 4 types of connective tissue:
 - Connective tissue proper.
 - Loose (areolar) connective tissue
 - Dense fibrous connective tissue
 - Adipose connective tissue
 - Cartilage connective tissue

- Bone connective tissue
- Blood (vascular) connective tissue

Read pages 16 – 18

Organs and Systems

- Organs:
 - Composed of at least two primary tissues.
 - Tissues serve different functions of the organ.
- Systems:
 - Organs that are located in different regions of the body and perform related functions.

Read pages 18 -20

Table 1.4

Body-Fluid Compartments

- 65 – 75% of total body weight is H₂O
- Intracellular compartment:
 - Fluid inside the cell
 - 2/3 of body's H₂O
- Extracellular compartment:
 - 2 Subdivisions:
 - Blood plasma.
 - Interstitial fluid.
 - 1/3 of body's H₂O.