

Chapter 4: Human Body – Endocrine, Circulatory, and Nervous System

The human body functions through the coordination of various systems, including the **endocrine system (hormonal control)**, **circulatory system (blood transport)**, and **nervous system (nerve control)**.

1. Endocrine System

The **endocrine system** consists of **endocrine glands** that secrete **hormones** directly into the bloodstream to regulate body functions.

a) Difference Between Exocrine & Endocrine Glands

Exocrine Glands	Endocrine Glands
Secrete substances through ducts	Secrete hormones directly into blood
Example: Sweat glands, Salivary glands	Example: Thyroid, Adrenal, Pancreas

b) Major Endocrine Glands & Their Functions

Gland	Location	Secretion (Hormone)	Function
Thyroid	Neck	Thyroxine	Controls metabolism
Adrenal	Above kidneys	Adrenaline	Prepares body for stress (fight or flight)
Pancreas	Near stomach	Insulin	Controls blood sugar levels
Pituitary	Brain	Growth hormone	Controls growth and other glands

c) Adolescence and Accompanying Changes

- ✓ Physical Changes: Growth spurts, development of reproductive organs
- ✓ Emotional Changes: Mood swings, independence, self-awareness
- ✓ Personal Hygiene: Importance of cleanliness, proper diet, exercise

d) Stress Management

- ✓ **Meaning:** Stress is the body's response to challenges or demands.
- ✓ **Ways to Manage Stress:**
 - **Yoga & Meditation** – Helps in relaxation
 - **Time Management** – Organizing tasks reduces pressure

- **Sports & Hobbies** – Engage in activities for mental well-being
 - **Rational Thinking** – Positive attitude towards problems
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2. Circulatory System

The **circulatory system** consists of the **heart, blood vessels, and blood**. It transports oxygen, nutrients, and removes waste.

a) Structure of the Heart

- ✓ **Four chambers:** Left atrium, right atrium, left ventricle, right ventricle
- ✓ **Valves:** Prevent backflow of blood
- ✓ **Septum:** Divides left and right sides of the heart
- ✓ **Pacemaker:** Regulates heartbeat

b) Blood Vessels

Blood Vessel	Function
Aorta	Carries oxygenated blood from the heart to the body
Pulmonary Trunk	Carries deoxygenated blood to the lungs
Coronary Artery & Vein	Supplies blood to the heart itself
Vena Cava	Returns deoxygenated blood to the heart

c) Circulation of Blood

- ✓ **Double Circulation:** Blood passes through the heart **twice** in one complete cycle.
 1. **Pulmonary Circulation:** Heart → Lungs → Heart
 2. **Systemic Circulation:** Heart → Body → Heart

d) Blood Groups & Universal Donors/Acceptors

- ✓ **Blood Groups:** A, B, AB, O
- ✓ **Universal Donor:** O (can donate to all)
- ✓ **Universal Acceptor:** AB (can receive from all)

e) Heart-Related Conditions

- **Palpitations** – Fast or irregular heartbeat
- **Cardiac Arrest** – Heart stops pumping blood suddenly

- **Hypertension** – High blood pressure, increases risk of heart disease

f) Lymphatic System (Parallel Circulatory System)

- ✓ Helps in immunity and fluid balance
- ✓ Transports white blood cells (WBCs)

3. Nervous System

The **nervous system** controls body functions through nerves and the brain.

a) Types of Nerves

- ✓ **Sensory Nerves:** Carry messages from **sense organs to the brain**
- ✓ **Motor Nerves:** Carry messages from **brain to muscles**
- ✓ **Mixed Nerves:** Carry **both sensory and motor signals**
- ✓ **Cranial Nerves (12 pairs)** – Arise from the brain
- ✓ **Spinal Nerves (31 pairs)** – Arise from the spinal cord

b) Structure of a Motor Neuron

- ✓ A motor neuron consists of: **Dendrites, Cell Body, Axon, Synapse**

c) Central Nervous System (CNS)

Part	Function
Brain	Controls thoughts, emotions, memory
Spinal Cord	Transmits signals between brain and body

d) Reflex Action

- ✓ **Definition:** Automatic response to a stimulus without conscious effort
- ✓ **Examples:** Blinking, knee-jerk, withdrawing hand from hot objects
- ✓ **Basic Terms:**
 - **Stimulus:** Change in environment (e.g., heat)
 - **Response:** Action taken (e.g., pulling hand away)
 - **Impulse:** Electrical signal traveling through nerves

- **Receptor:** Detects stimulus (e.g., skin)
 - **Effector:** Carries out response (e.g., muscle)
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Conclusion

The **endocrine, circulatory, and nervous systems** work together to regulate body functions, transport essential substances, and respond to stimuli. Proper care of these systems through **hygiene, stress management, and healthy habits** ensures a well-functioning body! ❤️

