**LESSON NOTE 1**

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| **REGULATION OF INTERNAL ENVIRONMENT : ENDOCRINE GLANDS**    Endocrine glands are specialized organs in the human body that produce and release hormones. Unlike exocrine glands, which release their products through ducts, endocrine glands release hormones directly into the bloodstream.  Key endocrine glands in the human body include:   1. Hypothalamus: Located in the brain, it produces hormones that stimulate or inhibit the release of hormones from the pituitary gland. 2. Pituitary Gland: Often referred to as the "master gland," it produces and releases a variety of hormones that control other endocrine glands. 3. Thyroid Gland: Found in the neck, it produces hormones (thyroid hormones) that regulate metabolism and growth. 4. Parathyroid Glands: Located near the thyroid, they produce parathyroid hormone, which regulates calcium and phosphorus levels in the blood. 5. Adrenal Glands: Situated on top of each kidney, they produce hormones such as cortisol and adrenaline that regulate stress response, metabolism, and electrolyte balance. 6. Pancreas: Functions as both an endocrine and exocrine gland. The endocrine part produces insulin and glucagon, which regulate blood sugar levels. 7. Ovaries (in females): Produce hormones such as estrogen and progesterone, which regulate the menstrual cycle and secondary sexual characteristics. 8. Testes (in males): Produce testosterone, which regulates the development of male reproductive tissues and secondary sexual characteristics.   FUNCTIONS OF ENDOCRINE GLANDS AND THEIR HORMONES   |  |  |  | | --- | --- | --- | | Endocrine glands | Functions | Hormones | | Hypothalamus | Coordinates with pituitary gland, regulates body temperature, hunger, thirst, fatigue etc. produces releasing and inhibiting hormones | Releasing and inhibiting hormones | | Pituitary gland(master gland) | Controls other endocrine glands. Regulates growth, thyroid function, adrenal function, and reproductive processes. | Growth hormone (GH), thyroid-stimulating hormone (TSH), luteinizing hormone (LH), etc. | | Thyroid gland | Regulates calcium and phosphorus levels in the blood. Produces parathyroid hormone (PTH). | Thyroid hormones (T3 and T4), calcitonin | | Adrenal glands | - Adrenal Cortex: Regulates metabolism, helps the body respond to stress, and controls salt and water balance. - Adrenal Medulla: Involved in the "fight or flight" response. | - Adrenal Cortex: Cortisol, Aldosterone  - Adrenal Medulla: Adrenaline, Noradrenaline | | Pancreas | Regulates blood sugar levels. Produces insulin and glucagon | Insulin Glucagon |   EFFECTS OF SECRETION OF ENDOCRINE GLANDS  HYPOSECRECTION (Under secretion)   1. Hypothyroidism (under active thyroid): slowed metabolism, weight gain, fatigue, col intolerance, potential impact on mood and cognitive function. It is caused by insufficient production of thyroid hormones by the thyroid gland. 2. Type 1 Diabetes (insulin deficiency): caused by autoimmune destruction of insulin-producing cells in the pancreas. Effects include; high blood sugar levels, excessive thirst, frequent urination, weight loss and fatigue. 3. Addison’s disease (Adrenal insufficiency): caused by insufficient production of adrenal hormones (cortisol and aldosterone). Effects include weakness, fatigue, weight loss, low blood pressure and electrolyte imbalances.   HYPERSECRETION (Over- secretion)     1. Hyperthyroidism (overactive thyroid): increased metabolism, weight loss, rapid heartbeat, heat intolerance etc. 2. Cushing’s syndrome: caused by prolonged exposure to high levels of cortisol, due adrenal tumors or prolonged use of corticosteroid medications. Effects are weight gain (face and abdomen) high blood pressure, muscles weakness and mood disturbances. 3. Acromegaly (excess growth hormone): over production of growth hormone due to tumor in the pituitary gland results in enlargement of bones and tissues particularly in the hands, feet and face. |

**LESSON NOTE 2**

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| **THE SKIN**    The **skin** is the **largest organ** of the human body. It covers and protects the body from harmful substances, helps regulate body temperature, and allows us to feel sensations such as touch, pain, and heat.  **Structure of the Skin**    The skin is made up of **three main layers**:   1. **Epidermis**    * The outermost layer of the skin.    * Made up of dead cells on the surface that are constantly shed and replaced.    * Contains melanin (gives skin its color and protects against UV rays). 2. **Dermis**    * The middle layer of the skin.    * Thicker than the epidermis.    * Contains: Blood vessels, Sweat glands, Sebaceous (oil) glands, Hair follicles, Nerve endings 3. **Subcutaneous Layer (Hypodermis)**    * The innermost layer.    * Made up of fat and connective tissues.    * Helps insulate the body and protects internal organs.   **FUNCTIONS OF THE SKIN**   1. **Protection**: Acts as a barrier against bacteria, viruses, and physical injuries. 2. **Sensation**: Contains nerve endings that detect touch, temperature, pressure, and pain. 3. **Temperature Regulation**: Sweat glands help cool the body; blood vessels widen or narrow to release or conserve heat. 4. **Excretion**: Removes waste products such as salts and urea through sweat. 5. **Vitamin D Synthesis**: Helps in the production of vitamin D when exposed to sunlight.   **CARE OF THE SKIN**     * Bathe regularly with clean water and mild soap. * Avoid sharing personal items like towels and razors. * Eat a balanced diet and drink plenty of water. * Protect the skin from excessive sunlight using sunscreen or clothing. * Seek medical attention for persistent skin problems.   HOME FUN  List 4 skin diseases |

**LESSON NOTE 3**

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| **NERVOUS COORDINATION**    Nervous coordination is the process by which the body detects and responds to changes (stimuli) in its internal and external environment using the **nervous system**. It enables quick and accurate responses, such as moving your hand away from a hot object.  **The Human Nervous System**    The nervous system is the control and communication network of the body. It is divided into two main parts:  **1. Central Nervous System (CNS)**   * Comprises the **brain** and **spinal cord**. * Responsible for processing and interpreting information. * Acts as the control center of the body.   **2. Peripheral Nervous System (PNS)**   * Made up of **nerves** that connect the CNS to the rest of the body. * Includes:   + **Sensory (afferent) nerves** – carry messages from sense organs to the CNS.   + **Motor (efferent) nerves** – carry instructions from the CNS to muscles and glands.   **The Neuron**    A **neuron** is the basic unit of the nervous system. It is a specialized cell that transmits electrical signals throughout the body.  **Parts of a Neuron:**   * **Cell Body (Soma):** Contains the nucleus and other organelles. * **Dendrites:** Short branches that receive messages from other neurons. * **Axon:** Long extension that carries impulses away from the cell body. * **Myelin Sheath:** Fatty layer that insulates the axon and speeds up nerve impulse transmission. * **Axon Terminal:** Sends signals to other neurons or effectors.   **Transmission of Nerve Impulses**  Nerve impulses are electrical messages that travel along neurons. The path of transmission is:  **Stimulus** → **Receptor** → **Sensory Neuron** → **CNS (Brain/Spinal Cord)** → **Motor Neuron** → **Effector (muscle or gland)** → **Response**   * **Synapse:** A tiny gap between neurons where impulses are transmitted chemically using neurotransmitters. * **Receptors:** Specialized cells that detect stimuli (e.g., skin, eyes, ears). * **Effectors:** Organs (muscles or glands) that carry out the response.   HOME FUN  Highlight 5 functions of the nervous system |