Introduction to the Human Body

A concise, student-friendly overview

What This Guide Covers

- Big-picture organization of the human body—from cells to systems.
- Core anatomical terms to describe location and orientation.
- A brisk overview of each major organ system and how they work together.
- Homeostasis: how the body maintains internal balance.

Levels of Organization

- Chemical: atoms and molecules (e.g., water, proteins, DNA).
- Cellular: the cell is the basic unit of life (e.g., neurons, muscle cells).
- Tissue: groups of similar cells performing shared functions (epithelial, connective, muscle, nervous).
- Organ: two or more tissues working together (e.g., heart, lungs, stomach).
- Organ System: groups of organs with a common purpose (e.g., cardiovascular system).
- Organism: the complete living human.

Cells & Tissues (Essentials)

- Cell anatomy: plasma membrane (selective barrier), cytoplasm (metabolic reactions), nucleus (DNA storage & transcription).
- Tissues:
- Epithelial—covers surfaces, lines cavities, forms glands.
- Connective—supports, binds, transports; includes bone, cartilage, blood, fat.
- Muscle—movement; skeletal (voluntary), cardiac (heart), smooth (viscera).
- Nervous—communication; neurons (signals) and glia (support).

Core Anatomical Terms

- Anatomical position: standing upright, facing forward, arms at sides, palms forward, feet flat.
- Directional terms:
- Superior/Inferior (toward head/toward feet)
- Anterior/Posterior (front/back)
- Medial/Lateral (toward midline/away from midline)
- Proximal/Distal (closer to trunk/farther; for limbs)
- Superficial/Deep (near surface/far from surface)
- Planes: sagittal (left-right), frontal/coronal (front-back), transverse (top-bottom).

Body Cavities & Membranes

- Dorsal cavity: cranial (brain) and vertebral (spinal cord).
- Ventral cavity: thoracic (heart, lungs) and abdominopelvic (digestive, urinary, reproductive).

- Serous membranes (e.g., pleura, pericardium, peritoneum) reduce friction between organs and body walls.

Organ Systems Overview

- Integumentary: skin, hair, nails—protects, regulates temperature, sensory input.
- Skeletal: bones, joints—support, protection, mineral storage, blood formation.
- Muscular: skeletal muscles—movement, posture, heat production.
- Nervous: brain, spinal cord, nerves—fast control via electrical signals.
- Endocrine: glands (e.g., thyroid, pancreas, adrenals)—slower, longer-lasting hormonal control.
- Cardiovascular: heart & blood vessels—transport of gases, nutrients, wastes, heat.
- Respiratory: lungs & airways—gas exchange (O■ in, CO■ out).
- Digestive: GI tract & accessory organs—breakdown & absorption of nutrients, water balance.
- Urinary: kidneys, ureters, bladder—filter blood, excrete wastes, regulate pH & fluids.
- Immune/Lymphatic: lymph nodes, spleen, thymus, lymph vessels—defense, fluid return.
- Reproductive: ovaries/testes & associated organs—gamete production, hormones, reproduction.

Homeostasis & Feedback

- Homeostasis: maintaining stable internal conditions (e.g., body temperature, blood glucose, pH).
- Negative feedback: opposes change to restore set point (e.g., insulin lowers high blood glucose).
- Positive feedback: amplifies a process until a goal is reached (e.g., uterine contractions during childbirth).

Quick Physiology Snapshots

- Energy: cells convert nutrients into ATP via cellular respiration (glycolysis → Krebs cycle → ETC).
- Gas exchange: O■ diffuses into blood at lungs; CO■ diffuses out; hemoglobin carries O■.
- Circulation: heart pumps blood through systemic and pulmonary circuits.
- Excretion: kidneys regulate water, salts, acids/bases; form urine to remove wastes (urea, creatinine).
- Signaling: neurons transmit rapid impulses; hormones coordinate long-term processes (growth, metabolism).

Growth, Development & Aging

- From zygote to adult: cell division, differentiation, organ formation (organogenesis).
- Adulthood: maintenance and repair dominate; capacity varies by tissue.
- Aging: gradual decline in system efficiency; lifestyle and genetics influence the rate.

Health & Wellness Basics

- Nutrition: balanced macronutrients; micronutrients (vitamins/minerals) support metabolism and immunity.
- Hydration: water is essential for blood volume, temperature regulation, and reactions.
- Activity: regular exercise supports cardiovascular, muscular, and metabolic health.
- Sleep & stress: adequate sleep and stress management support hormonal and immune balance.

- Prevention: vaccines, hygiene, screenings, safe behaviors.

Mini Glossary

- Homeostasis: tendency to maintain internal stability.
- Metabolism: all chemical reactions in the body.
- Tissue: group of similar cells with a shared function.
- Organ: structure made of multiple tissues with a specific job.
- System: group of organs working together for a major function.