

Human Bioscience A

HBS1HBA

2019

Contents Page:

INTRODUCTION TO THE HUMAN BODY	3
CELL STRUCTURE AND FUNCTION	6
MOVEMENT OF MOLECULES	11
NERVOUS SYSTEM	13
HOMEOSTASIS AND THE ENDOCRINE SYSTEM	20
THE HEART	23
THE CARDIOVASCULAR SYSTEM	27
THE RESPIRATORY SYSTEM	31
THE DIGESTIVE SYSTEM	38
THE RENAL SYSTEM	43
THE REPRODUCTIVE SYSTEM	50
ACID BASE	53

INTRODUCTION TO THE HUMAN BODY

Anatomy vs Physiology

Anatomy: the body's structures and the relationship between them

Physiology: the study of the function of these parts

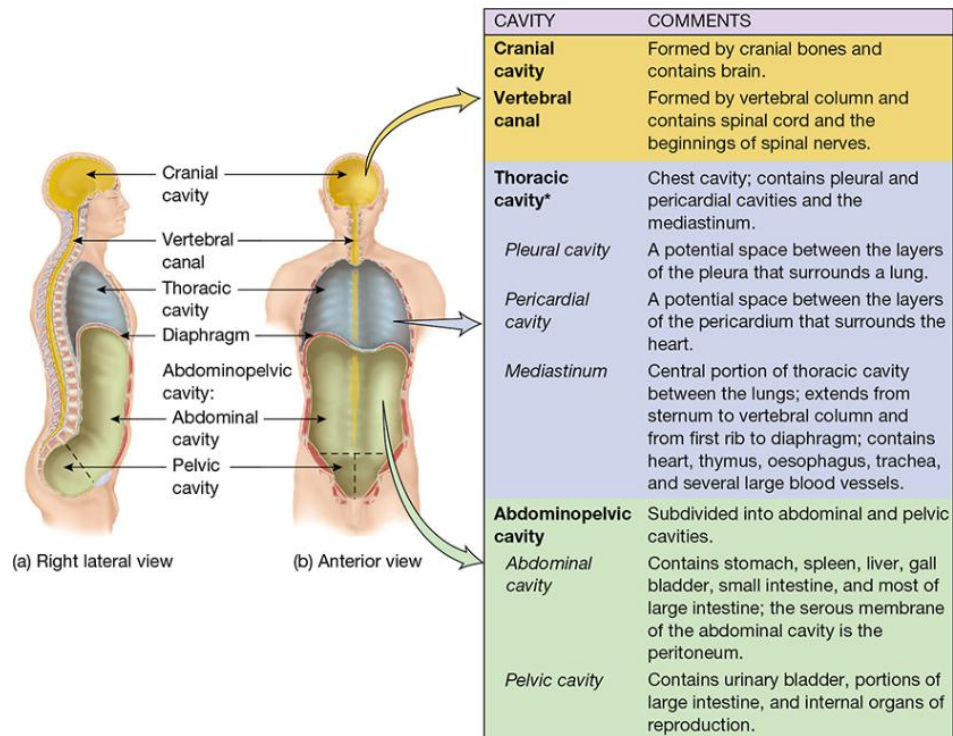
Levels of structural organisation

1. Chemical
2. Cells
3. Tissues
4. Organs
5. Systems
6. Organism

Functions of the major organ systems

SYSTEM	WHAT IT CONTAINS?	WHAT IT DOES?
Integumentary	Skin	Protects body; helps regulate body temperature; eliminates some wastes; helps make vitamin D; detects sensations such as touch, pain, warmth, and cold; stores fat and provides insulation.
Skeletal	Bones and joint	Supports and protects body; provides surface area for muscle attachments; aids body movements; houses cells that produce blood cells; stores minerals and lipids.
Muscular	Skeletal muscles	Body movements; maintains posture; produces heat
Nervous	Brain, spinal cord, nerves, sensory organs	Generates action potentials (nerve impulses) to regulate body activities; detects changes in body's internal and external environments, interprets changes, and responds by causing muscular contractions or glandular secretions
Endocrine	Hormones and glands	Regulates body activities by releasing hormones
Cardiovascular	Heart, blood and blood vessels	Pump blood through vessels to deliver oxygenated blood to working cells and eliminate waste, contents in blood defend against disease; regulate acid base
Lymphatic/immunity	Lymphatic fluid and vessels, lymphocytes	Contains sites of maturation and proliferation of B cells and T cells that protect against disease-causing microbes
Respiratory	Lungs and air passages	Transfers oxygen from inhaled air to blood and carbon dioxide from blood to exhaled air; helps regulate acid-base balance of body fluids; voice
Digestive	gastrointestinal tract and salivary glands	Achieves physical and chemical breakdown of food; absorbs nutrients; eliminates solid wastes.
Urinary	Kidneys, ureters, urinary bladder, urethra	Produces, stores, and eliminates urine; eliminates wastes
Reproductive	Gonads and associated organs	Gonads produce gametes (sperm or oocytes) that unite to form a new organism; regulate other body processes

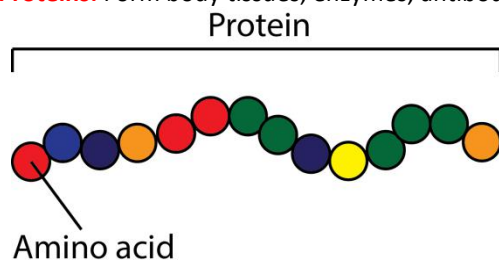
Major body cavities and their subdivisions



* See figure 1.10 for details of the thoracic cavity.

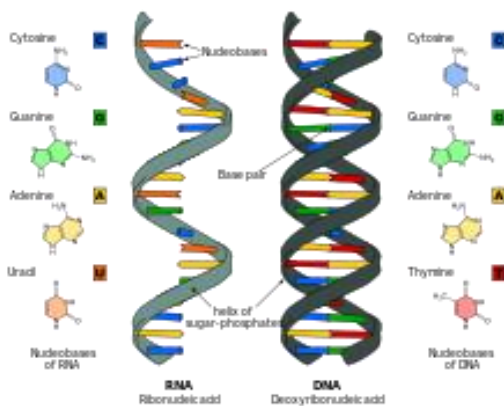
Organic molecule classes

Proteins: Form body tissues, enzymes, antibody and hormones



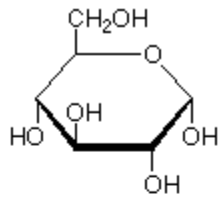
Nucleic acids: composed of nucleic acids, a phosphate group and sugar group. There is DNA and RNA.

- **DNA** - forms genes that contains genetic info for a cell to live, reproduce and develop
- **RNA** - guide cells in synthesis proteins from DNA

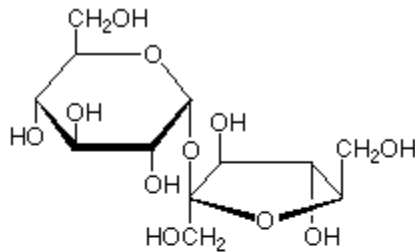


Carbohydrates: sugars that provide cells with energy (eg. Starch, glycogen and cellulose)

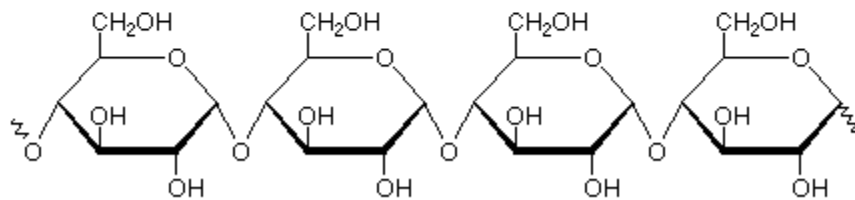
- **Monosaccharides** = 1
- **Disaccharide** = 2
- **Polysaccharides** = many



monosaccharide (glucose)

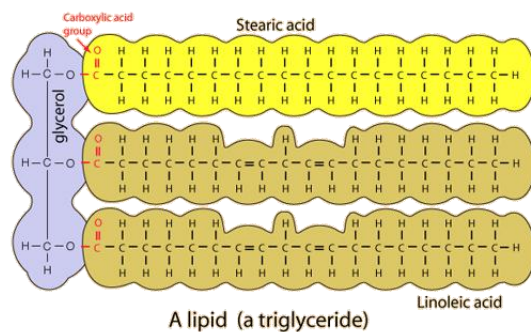


disaccharide (sucrose)



polysaccharide (amylose starch)

Lipids: fatty acids, tryglycerides, phospholipids, steroids



A lipid (a triglyceride)

Homeostasis and its importance

Homeostasis: equilibrium of the body's internal environment // regulatory processes that keep body systems within narrow limits

- Without homeostasis certain processes won't function properly
- Conditions of body must be kept constant

CELL STRUCTURE AND FUNCTION

Major organelles and their function

3 main parts of the cell: plasma membrane, cytoplasm and nucleus

Organelle	Function
Plasma Membrane	<ul style="list-style-type: none"> ● Protects cellular contents ● Makes contact with other cells ● Contains channels, transporters, receptors, enzymes, cell-identity markers, and linker proteins ● Semi-permeable membrane
CYTOPLASM	<ul style="list-style-type: none"> ● Combination of organelles and cytosol ● Does not include nucleus
Cytosol	<ul style="list-style-type: none"> ● Fluid portion in which many of the cells metabolic reactions occur
Cytoskeleton	<ul style="list-style-type: none"> ● Maintains shape and general organisation in the cell
Centrosome	<ul style="list-style-type: none"> ● The pericentriolar material that contains tubulins, which are used for growth of the mitotic spindle and microtubil formation
Cilia and flagella	<ul style="list-style-type: none"> ● Cilia: finger like structures that move fluids over the cell's surface ● Flagella: move entire cell
Ribosome	<ul style="list-style-type: none"> ● Protein synthesis
Endoplasmic reticulum (ER)	<p>Rough ER:</p> <ul style="list-style-type: none"> ● Synthesises glycoproteins and phospholipids that are transferred to cellular organelles, inserted into the plasma membrane, or secreted during exocytosis. <p>Smooth ER:</p> <ul style="list-style-type: none"> ● Produces fatty acids and steroids ● Inactivates or detoxifies drugs ● Removes phosphate group from glucose-6-phosphate ● Stores and releases calcium ions in muscle cells
Golgi Complex	<ul style="list-style-type: none"> ● Accepts, modifies, sorts and packages molecules for transportation ● Enter at cis face (accepts proteins from rough ER) ● Exit at trans face (modifies, sorts and packages)
Lysosome	<ul style="list-style-type: none"> ● Digests contents of endosomes, pinocytic vesicles and phagosomes ● Transports final products of digestion into cytosol ● Digests worn out organelles (autophagy), entire cells (autolysis), and extracellular materials
Peroxisome	<ul style="list-style-type: none"> ● Oxidises amino acids and fatty acids ● Detoxifies harmful substances such as hydrogen peroxide and associated free radicles
Proteasome	<ul style="list-style-type: none"> ● Degrades unneeded, damaged, or faulty proteins by cutting them into small peptides
Mitochondria	<ul style="list-style-type: none"> ● Powerhouse of the cell ● Produces ATP aerobically ● Site of aerobic respiration ● Important role in early apoptosis