

20: Animal Function

Key Concepts

- **Action Potential:** A nerve signal, reflecting on the change of the potential.
- **Alveoli:** The final branchings of the respiratory tree and act as the primary gas exchange units of the lung.
- **Antibody:** A protein used by the immune system to identify and neutralize foreign objects like bacteria and viruses. Each antibody recognizes a specific antigen unique to its target. The major weapon in humoral immune defense response.
- **Brainstem:** The connection between the rest of the brain and the rest of the central nervous system. It is the most primitive in the evolutionary chain and the function is for life support and basic functions such as movement.
- **Cardiac Cycle:** Alternating relaxation and contraction of heart. It contains three phases: diastole where heart relaxes and blood fills in; atria systole where atria contract and blood is pushed into ventricles, ventricular systole where blood is pushed out of heart.
- **Cerebellum:** A region of the brain that plays an important role in the integration of sensory perception and motor output. Consisting of two hemispheres
- **Chemical Digestion:** Mainly occur in small intestine, macromolecules are broken down into small molecules that can be absorbed by the body.
- **Complement:** A defense protein circulating in blood in an inactivated form, once activated, coat the surface of the microbes to make them more susceptible to macrophages
- **Forebrain:** The largest part of the brain, most of which is made up of the cerebrum; controls perception, memory, and all higher cognitive functions, including the ability to concentrate, reason and think in abstract form.
- **Gastrulation:** A phase early in the development of animal embryos, during which the morphology of the embryo is dramatically restructured by cell migration, resulting in three layers: endoderm, ectoderm and mesoderm.
- **Hemoglobin:** (abbreviated as **Hb**) is the iron-containing oxygen-transport metalloprotein in the red cells of the blood in animals.
- **Interferon:** Proteins produced by infected tissues to help other cells to resist the virus
- **Neurotransmitter:** Chemicals that are used to relay, amplify and modulate electrical signals between a neuron and another cell.
- **Pulmonary circuit:** A circuit of blood circulation in the cardiovascular system, serving exclusively the lungs, where red blood cells pick up oxygen and release carbon dioxide during respiration
- **Resting potential:** The voltage across the plasma membrane of a resting neuron.
- **Sensory Receptor:** A structure that recognizes a stimulus in the internal or external environment of an organism. In response to stimuli the sensory receptor initiates sensory transduction by creating graded potentials or action potentials in the same cell or in an adjacent one.
- **Synapse:** Specialized junctions through which cells of the nervous system signal to one another and to non-neuronal cells such as muscles or glands.
- **Systemic circuit:** A circuit of circulation in the cardiovascular system. Blood circulates from the left ventricle to the organs and tissues to the systemic veins to the right atrium.
- **Threshold potential:** A change in the potential that is big enough to initiate a nerve signal
- **Villi an microvilli:** Repeatedly folded structure on the wall of small intestine that increases its surface area for nutrient absorption.

Animal Functions

- ❖ **Digestion:**
 - **Stomach:**
 - HCl, pepsin and mechanical forces
 - **Small intestine:**
 - Chemical digestion by enzymes
- ❖ **Respiration**
 - **CO₂ and O₂ exchange in the lung capillary**
 - Hb releases CO₂ and uptakes O₂ in alveoli
- ❖ **Circulation**
 - **Pulmonary circulation**
 - CO₂ is taken to lung to be released and O₂ is taken from the lung to make O₂-riched blood
 - **Systemic circulation**
 - CO₂ is taken from tissue to heart and O₂ is delivered to tissue
- ❖ **Defense**
 - **Nonspecific Defense**
 - White blood cells
 - Special proteins: interferon and complement
 - Inflammatory response
 - **Specific Defense – Immune response**
 - Humoral response: B cell and antibody
 - Cell-mediated response: T cells
- ❖ **Reproduction**
 - **Gastrulation and organ formation**
 - Endoderm: digestive tract, liver, pancreas, thyroid, parathyroid, thymus, lining of bladder
 - Ectoderm: skin and central nervous system
 - Mesoderm: internal organs, skeletal/muscular system
- ❖ **Sensory and signal transmission**
 - Sensory receptor transfer stimuli into a nerve signal
 - The nerve signal regenerate itself along the transmitting axon
 - The signal is passed to a receiving neuron via synapse
 - Sensory neuron --> interneuron --> motor neuron --> effector

