

## **Topic List Dentistry students**

**2024-25 1<sup>st</sup> semester**

- 1. Principles of control theory**
- 2. Passive transport mechanisms of the cell membrane**
- 3. Active transport mechanisms of the cell membrane.**
- 4. The resting membrane potential**
- 5. The electric properties of neuronal membranes. The axonal propagation of the action potential. Axon classification.**
- 6. Neurotransmission.**
- 7. Receptors, signal transduction mechanisms.**
- 8. The parasympathetic division of the autonomic nervous system.**
- 9. The sympathetic division of the autonomic nervous system. The adrenal medulla.**
- 10. Fluid compartments of the body. The blood plasma.**
- 11. The general features of red blood cells. Erythropoiesis. Hemoglobin degradation, bilirubin metabolism.**
- 12. White blood cell types. The differential leucocyte count. Cellular and humoral elements of the innate immunity.**
- 13. The humoral and cellular elements of the specific (adaptive) immunity.**
- 14. The AB0 and Rh blood groups.**
- 15. The characterization and functions of thrombocytes. Primary hemostasis.**
- 16. Secondary hemostasis: blood clotting (coagulation). Inhibition of clotting. Fibrinolysis.**
- 17. The peripheral nervous system: motor neurons, neuromuscular junction.**
- 18. Structural comparison of the skeletal and smooth muscle. Muscle subtypes, contraction types**
- 19. Comparison of the skeletal and smooth muscle based on their function.**
- 20. Cardiac muscle: structural and functional characterization, the excitation-contraction coupling. The metabolic properties of the cardiac muscle.**
- 21. Cardiac muscle: cellular electrophysiology. Electrocardiography (ECG)**
- 22. Cardiac cycle.**
- 23. Factors determining the cardiac output. Regulation of the contractile force of the cardiac muscle. The Frank-Starling law of the heart.**
- 24. The coronary circulation**
- 25. Blood viscosity and basic biophysical principles of circulation (Hagen–Poiseuille’s law, Laplace’s law, Bernoulli’s law)**
- 26. Hemodynamics: the function of the aorta and the arteries. The characteristics of the venous circulation.**
- 27. The microcirculation: capillary solute exchange, lymphatic circulation and edema formation**
- 28. The regulation of local blood flow. Autoregulation of blood flow, functional hyperemia, vasoactive mediators**
- 29. Short-term control mechanisms of arterial blood pressure.**

- 30. Long-term control of arterial blood pressure. Volume regulation: The regulation of Na<sup>+</sup>-metabolism and extracellular fluid volume.**
- 31. Respiratory mechanics: Static mechanics of the lung and the chest. Spirogram. The rhythmogenesis of breathing.**
- 32. Pulmonary gas exchange. Oxygen and carbon-dioxide transport in blood.**
- 33. Pulmonary circulation. The chemical control of ventilation. Ventilatory reflexes elicited from the lung.**
- 34. Glomerular filtration: the factors determining the volume and composition of filtrate**
- 35. Renal blood flow. The regulation of GFR and RBF.**
- 36. The general features of transport mechanisms in the renal tubuli (reabsorption and secretion). Renal clearance**
- 37. Renal tubular transport of NaCl and water, production of the medullary osmotic gradient.**
- 38. Regulation of water balance. Osmoregulation.**
- 39. The physiology of the urinary tract. Micturition reflex.**
- 40. Thermoregulation, cutaneous blood flow.**
- 41. Skeletal muscle blood flow. Sports physiology: the cardiovascular, respiratory and muscular effects of training. Factors determining performance in sports.**