# Lectures in Physiology
# for Dental Medicine Students
## 2018/2019 Academic Year (summer semester)

| Date | Topic | Examination Synopsis | Lecturer |
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| 13.02.19<br><br>2 acad. Hours | Physical basis of gas exchange. Solubility, diffusion coefficient and diffusion capacity of the gases. Composition of the gases in air, lungs and blood. Diffusion of gases across the alveolocapillary membrane. Ventilation-perfusion ratio.<br>Transport of $O_2$ in the blood. Oxyhemoglobin dissociation curves. Oxygen exchange in lungs and tissues.<br>Transport of $CO_2$ in the blood. Carbon dioxide exchange in lungs and tissues. | 42, 43 | Prof. Julia Nikolova MD, PhD |
| 20.02.19<br><br>2 acad. hours | Transport of $O_2$ in the blood. Oxyhemoglobin dissociation curves. Oxygen exchange in lungs and tissues.<br>Transport of $CO_2$ in the blood. Carbon dioxide exchange in lungs and tissues.<br>Control of respiration. Respiratory center and rhythm of breathing. Chemical control of respiration. Reflex control of respiration. Effects of the cerebral cortex on the respiratory functions. | 43, 44 | Prof. Julia Nikolova MD, PhD |
| 27.02.19<br><br>2 acad. hours | Cardiovascular system. Systemic and pulmonary circulation. Heart as an organ – functional morphology of the pericardium, endocardium and myocardium. Nerve supply. Myocardial blood supply.<br>Functional morphology and physiological characteristics of the excitatory and conductive system of the heart. Automaticity. Cardiac rhythm. Abnormalities of conductivity.<br>Physiological characteristics of the working myocardium. Excitation and contraction. Refractory periods**.** Extrasystoles**,** flutter and fibrillation**.** Myocardial metabolism**.** | 27, 28 | Prof. Julia Nikolova MD, PhD |
| 06.03.19<br><br>2 acad. hours | Electrical events during cardiac performance. Origin, registration and evaluation of the electrocardiogram.<br>Dynamics of the cardiac contractions – cardiac cycle. States of the valvular apparatus during different phases of the cardiac cycle.<br><br>Functions of the heart valves of the heart. Heart sounds. Methods of examination. Stenosis and insufficiency of the valves. Correlation between a synchronous phonocardiographic and electrocardiographic record.<br>Heart rate. Stroke volume and cardiac output and their changes during different physiological conditions.<br>Control of the cardiac performance – intrinsic (self-control). Energetics of the heart pumping.<br>Extracardial neural regulation of the cardiac performance – characteristics of the sympathetic and parasympathetic effects. Humoral factors affecting cardiac performance. | 29, 30, 31 32 | Prof. Julia Nikolova MD, PhD |
| 13.03.19<br><br>2 acad. Hours | Functional characteristics of blood vessels. Hemodynamic principles – characteristics of the vessels and the blood. Hemodynamic indices. Volume and linear velocity of the blood flow through the various parts of vascular system and factors determining them.<br>Blood pressure in the various parts of the cardiovascular system. Arterial blood pressure – methods of measurements and normal values. Factors determining the blood pressure levels.<br>Arterial blood flow. Arterial pulse. Sphygmography. Characteristics of the arterial pulses. Venous blood flow. Venous pulse. Phlebography.<br>Physiology of the microcirculation. Functional organization of the microcirculation unit. Organ–related peculiarities of the capillaries. Control of the microcirculation. | 33, 34, 35, 36 | Prof. Julia Nikolova MD, PhD |
| 20.03.19<br><br>2 acad. hours | Vascular tone. Basal tone of blood vessels. Local, neural and humoral regulatory mechanisms of the vascular tone.<br>Control of the circulation. Characteristic and localization of the receptors. Vasomotor center. Supramedular control of the circulation.<br>Control of the arterial blood pressure. Mechanisms of the quick short-term, quick ongoing, and long-term regulation**.** | 33, 36, 37, 38 | Prof. Julia Nikolova MD, PhD |
| 27.03.19<br><br>2 acad. Hours | Gastrointestinal system – functions. Digestion in the Mouth: processes of mastication, secretion, enzyme destruction and absorption. Swallowing – phases and regulation. Motor functions of the Stomach – hunger contractions, storage function, mixing and propulsion of food. Emptying of the Stomach. Control of the Stomach motor activity. Vomiting.<br>Secretion, enzyme destruction and absorption in the Stomach. Gastric juice: composition, mechanism of secretion and functions. Gastric secretion and its control: cephalic, gastric and intestinal phases. Protective potentialities of the gastric barrier. | 45, 46, 47, 48 | Prof. Julia Nikolova MD, PhD |

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| 03.04.19<br><br>2 acad. hours | Small Intestine – motor activity: type of movements and regulation; secretion, digestion and absorption.<br>Colon – type of movements and their regulation; secretion, digestion and absorption. Defecation.<br>Pancreatic juice – composition and functions. Control of the pancreatic secretion.<br>Processes of formation and secretion of Bile. Composition and functions of the Bile. Regulation of the Bile secretion. Functions of the Liver. | 49, 50, 51 | Prof. Julia Nikolova MD, PhD |
| 10.04.19<br><br>2 acad. Hours | Digestion and absorption of Proteins, Fats and Carbohydrates in the Gastrointestinal Tract. Absorption of Salts, Water and Vitamins.<br>Metabolism of the Nutrients in the organism. Metabolism of Carbohydrates: the level and regulation of Glucose in the circulating blood. Metabolism of Proteins and its control. Metabolism of Lipids and its control.<br>Energy metabolism in the organism. Energy values of the Nutrients. The Energy Equivalent of Oxygen. The measurement of the Metabolic Rate: Direct and Indirect Calorimetry. The Basal Metabolic Rate and the Daily Energy Requirements for different physiologic states.<br>Nutrition – general principles in defining the physiologic standards– plastic and energy needs of the organism. Physiologic mechanisms of Starvation and Satiety. | 52, 53, 54, 55 | Prof. Julia Nikolova MD, PhD |
| 17.04.19<br><br>2 acad. hours | Excretion functions of the organism and systems, accomplishing them. The Kidneys – functional structure. Peculiarities of the kidneys blood supply and innervation. Mechanism and control of glomerular filtration. Methods of glomerular function assesment.<br>Functions of renal tubules. Transport processes within the different parts of the tubules. Mechanisms for excretion of a dilute urine and a concentrated urine. Renal excretion.<br>Renal clearance tests. Volume of the urine and its components.<br>Micturition. Endocrine and metabolic functions of the kidneys. Control of the renal functions. | 57, 58, 59 | Prof. Julia Nikolova MD, PhD |
| 24.04.19<br><br>2 acad. Hours | Water-electrolyte balance of the organism. Body fluids and electrolytes. Dynamics of body fluids volume and osmolality. Control of Water-Salts homeostasis. Thirst – physiologic mechanisms.<br>Acid-Base Balance of the organism. Buffer systems of the body fluids. Respiratory regulation of pH. Renal regulation of pH. Abnormalities in Acid-Base Balance. | 60, 61 | Prof. Julia Nikolova MD, PhD |
| 08.05.19<br><br>2 acad. hours | Temperature regulation. Body temperature and isothermia. Mechanisms of heat production and heat loss. Neurophysiologic bases of temperature regulation. Hyperthermia and hypothermia. Acclimatization. Regulation of body temperature within exsercise. | 56 | Prof. Julia Nikolova MD, PhD |
| 15.05.19<br><br>2 acad. Hours | States of brain activity and sleep. The role of the different neuronal structures in the maintenance of the brain activity. Physiologic changes within sleep. Electroencephalography. | 68 | Prof. Julia Nikolova MD, PhD |
| 22.05.19<br><br>2 acad. hours | Sensory systems. Functional morphology. General principles of sensory systems information coding and processing. Sensory systems adaptation. General sensation. Somatosensory system – organization and modalities. Mechanisms of thermo- and mechanoreception. | 62, 63, 69 | Prof. Julia Nikolova MD, PhD |

**11.02.2019**

**Professor Nikolay Boyadjiev, MD, PhD**
**Head of the Department**