

Content of lectures and exercises

Subject:	Medical Biochemistry 2		
Study Programme:	<i>Dental Medicine</i>	Study Period:	<i>3. semester</i>
Evaluation:	<i>exam</i>	Subject Type:	<i>compulsory</i>
Content:	<i>2 h lectures and 3 h practical exercises / week</i>		<i>Total 70 hours</i>

Department: **Department of Medical and Clinical Biochemistry UPJŠ FM**

Week	Lectures http://portal.lf.upjs.sk	Practical exercises http://portal.lf.upjs.sk Medical Biochemistry - Seminars
1.	METABOLISM OF AMINO ACIDS I. - Catabolism - degradation of amino acids (AAs) - Common degradation processes of AAs - NH ₃ - formation and urea synthesis - Metabolism of carbon skeleton of AAs - Anabolism - biosynthesis of AAs - Intermediates of glycolysis and Krebs cycle and their roles in AAs metabolism	Metabolism of proteins 1. The safety rules in laboratory 2. Determination of total proteins of blood serum (patient) Seminar: 1. Repetition of lipids metabolism (p. 83) 2. Protein digestion (p. 109)
2.	METABOLISM OF AMINO ACIDS II. - Formation of biogenic amines - Biosynthesis of catecholamines - Metabolism of serotonin, thyroxine and creatine - Biosynthesis of tetrapyrroles - Pathobiochemistry of amino acid metabolism	Metabolism of amino acids I. 1. Isolation of albumin and globulin of blood serum 2. Determination of ammonia in urine (patient) Seminar: 1. Protein metabolism (p. 111) 2. Amino acid metabolism (p. 112)
3.	METABOLISM OF NUCLEOTIDES - <i>De novo</i> synthesis of purine and pyrimidine nucleotides - Synthesis of deoxyribonucleotides - Degradation of nucleotides - Inhibitors of purine and pyrimidine biosynthesis – relation to the chemotherapy of cancer	Metabolism of amino acids II. 1. Determination of urea in blood serum (patient) 2. Proof of phenyl pyruvate presence in blood serum Seminar: 1. Degradation of carbon skeleton of AAs (p. 114) 2. Detoxification of ammonia (p. 128)
4.	1. REVISION TEST INTERMEDIARY METABOLISM RELATIONSHIPS - Mutual relations in metabolism of saccharides, lipids and proteins - Metabolic regulations - Metabolic pathways	Metabolism of nucleotides 1. Determination of uric acid in blood serum (patient) 2. The solubility of uric acid and its salts Seminar: 1. Metabolism of nucleotides (p. 131) 2. Disorders in metabolism of nitrogen compounds (p. 137)
5.	BIOCHEMISTRY OF BLOOD - Biochemical composition, functions of blood - Specificities of erythrocyte metabolism - Metabolism of haemoglobin, biochemical importance - Disturbances in metabolism of porphyrins, pathological haemoglobins - Blood plasma proteins, biochemistry of blood clotting - Buffering systems. Acid-base balance	Diagnostic usage of the enzymes of cell metabolism 1. Determination of AST activity (patient) 2. Determination of ALP activity (patient) Seminar: 1. Enzymes in blood (p. 24) 2. Distribution of diagnostically important enzymes in tissues (p. 28)
6.	LIVER AND METABOLISM OF FOREIGN COMPOUNDS - XENOBIOCHEMISTRY - Biochemistry of the liver – metabolism, disturbances of metabolism - Importance of determination of selected biomarkers - Xenobiotics – definition, importance - Metabolism of xenobiotics, biotransformation reactions, conjugation	Biochemistry of blood 1. Determination of bilirubin in blood serum (patient) 2. Hemoglobin and its derivatives Seminar: 1. Blood (p. 163) 2. Metabolism of tetrapyrroles (p. 133)

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7.	<p>BIOCHEMISTRY OF KIDNEY</p> <ul style="list-style-type: none"> - Kidney metabolism - The role of the kidneys in homeostasis - ABR and its disorders - Significance of determination of selected metabolites in urine (e.g. creatinine, urea) - Specialized metabolic processes - neurotransmitters, receptors 	<p><i>Metabolism of liver</i></p> <ol style="list-style-type: none"> 1. Determination of ALT in blood serum (patient) 2. Determination of γ-glutamyl transferase activity (patient) <p><i>Seminar:</i></p> <ol style="list-style-type: none"> 1. Liver (p. 195) 2. Responses of the liver to toxic damage (p. 204)
8.	<p>BIOCHEMISTRY OF MUSCLES</p> <ul style="list-style-type: none"> - Organization of muscle fibres, proteins of muscle tissue - Contraction and relaxation of muscles - Regulation of muscles activity - Energy sources for muscle work 	<p><i>Metabolism of kidney I.</i></p> <ol style="list-style-type: none"> 1. Biochemical examination of urine (patient) <p><i>Seminar:</i></p> <ol style="list-style-type: none"> 1. Kidney (p. 206) 2. Clinical-biochemical examination of urine (p. 239)
9.	<p>CHEMICAL COMMUNICATIONS IN LIVING SYSTEMS</p> <ul style="list-style-type: none"> - Chemical compounds as signal molecules - Hormones - chemical structure, classification, mechanism of hormone action - Receptors – structure, classification, mechanisms of signal transduction 	<p><i>Metabolism of kidney II.</i></p> <ol style="list-style-type: none"> 1. Determination of creatinine in blood serum (patient) <p><i>Seminar:</i></p> <ol style="list-style-type: none"> 1. Tests of kidney functions (p. 208) 2. Muscle (p. 211)
10.	<p>METABOLISM OF HARD TISSUE</p> <ul style="list-style-type: none"> - Inorganic components of hard tissues - Connective tissue (collagen, elastin) - Metabolism of calcium and phosphates in dental tissue - Metabolism of other elements of dental tissue 	<p><i>Acid-base balance</i></p> <ol style="list-style-type: none"> 1. Models of acid-base balance 2. Determination of HCO_3^- <p><i>Seminar:</i></p> <ol style="list-style-type: none"> 1. Biochemistry of the inner environment (p. 159) 2. Acid-Base balance (p. 165)
11.	<p>2. REVISION TEST</p> <p>ORAL BIOCH. AND PATHOBIOCHEMISTRY I</p> <ul style="list-style-type: none"> - Organic components of teeth - Mineralization – crystals formation - Conditions and theories of mineralization - Saliva – composition, functions, importance 	<p><i>Biochemistry of mineral compounds</i></p> <ol style="list-style-type: none"> 1. Determination of calcium 2. Determination of inorg. Phosphorus <p><i>Seminar:</i></p> <ol style="list-style-type: none"> 1. Metabolism of mineral substances (p. 173) 2. Calcium in relation to bone metabolism (p. 223)
12.	<p>ORAL BIOCH. AND PATHOBIOCHEMISTRY II</p> <ul style="list-style-type: none"> - Dental plaque, tooth decay and tartar - Biochemistry of tooth decay - Pathobiochemistry of inflammatory periodontal diseases - Effect on the oral cavity on the condition of organism 	<p><i>Biochemistry of the oral cavity</i></p> <ol style="list-style-type: none"> 1. Argentometric determination of chlorides in saliva 2. Proof of thiocyanates presence in saliva <p><i>Seminar:</i></p> <ol style="list-style-type: none"> 1. Digestive system, oral cavity (p. 188) 2. Biochemistry and metabolism of bones (p. 219)
13.	<p>BIOCHEMICAL BASIS OF NUTRITION</p> <ul style="list-style-type: none"> - Biological value of nutrients - Requirements for nutrients content (e.g. limiting amino acids, vitamins) - Impact of technology and modification of nutrients on digestion, resorption and usability of nutrients 	<p><i>Specialized metabolic processes</i></p> <ol style="list-style-type: none"> 1. Determination of HCl output by the gastric mucosa <p><i>Seminar:</i></p> <ol style="list-style-type: none"> 1. Importance of HCl in the stomach (p. 189) 2. Patient evaluation - determination of diagnosis based on results of biochemical examinations <p>3. REVISION TEST</p>
14.	<p>CLINICAL BIOCHEMISTRY</p> <ul style="list-style-type: none"> - Biological material - Factors affecting the results and interpretation of biochemical examination - Clinical-biochemical examination - diagnostic and therapeutic application in medicine 	<p><i>Evaluation of practical exercises</i></p> <ol style="list-style-type: none"> 1. Individual assessment of students' work