Content of lectures, practical exercises and seminars

Subject:	**Medical Biochemistry 2**	**Code:** *ULCHBKB/LB-ZL2/15*	
Study Programme:	*Dental Medicine*	**Study Period:**	*4. semester*
Evaluation:	*exam*	**Subject Type:**	*compulsory*
Content:	*2 h lectures and 3 h practical exercises / week*	*Total 70 hours*	

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.** - The role of amino acids and proteins in metabolism - Degradation of proteins and peptides in the gastrointestinal tract - General metabolism of amino acids - Transport and detoxication of ammonia, urea cycle - Metabolism of the carbon skeleton of amino acids	***Metabolism of lipids*** 1. The safety rules in the laboratory 2. Repetition of lipid metabolism, introduction to clinical diagnostics ***Seminar:*** 1. Lipoproteins (p. 92) 2. Significance of lipids in diagnostics (p. 104)
2.	**METABOLISM OF AMINO ACIDS II.** - Biosynthesis of individual amino acids - Biosynthesis of catecholamines and tetrapyrroles - Formation of biogenic amines - Transport and interorgan exchange of amino acids - Pathobiochemistry of amino acid metabolism	***Metabolism of proteins*** 1. Determination of total concentration of proteins (patient) ***Seminar:*** 1. Protein digestion (p. 109) 2. Protein metabolism (p. 111)
3.	**METABOLISM OF NUCLEOTIDES** - *De novo* synthesis of ribonucleotides and deoxyribonucleotides - Degradation of nucleotides - Regulation of nucleotide metabolism **INTERMEDIARY METABOLISM** - Importance of acetyl-CoA in metabolism - Mutual relationships in metabolism – regulations	***Degradation of amino acids*** 1. Determination of ammonia 2. Determination of urea (patient) ***Seminar:*** 1. Amino acid metabolism (p. 112) 2. Detoxification of ammonia (p. 128)
4.	**BIOCHEMISTRY OF BLOOD** - Erythrocyte metabolism - Tetrapyrrole pigments of human blood and tissues - Role of blood plasma proteins - Buffering systems of the blood - Blood clotting, inherited disorders of blood clotting	***Metabolism of nucleotides*** 1. Determination of uric acid (patient) 2. Intermediary metabolism – mutual relationships ***Seminar:*** 1. Metabolism of nucleotides (p. 131) 2. Disorders in the metabolism of N-containing compounds (p. 137)
5.	**CHEMICAL COMMUNICATIONS IN LIVING SYSTEMS** - Chemical compounds as signaling molecules - Hormones – chemical structure - Classification and mechanism of hormone action - Receptors – structure, classification, signal transduction pathways	***Biochemistry of blood*** 1. Determination of bilirubin in blood serum (patient) 2. Determination of creatinine (patient) ***Seminar:*** 1. Metabolism of tetrapyrroles (p. 133) 2. Blood (p. 163)
6.	**LIVER** - Biochemical function of the liver - Disorders of liver metabolism **METABOLISM OF FOREIGN COMPOUNDS – XENOBIOCHEMISTRY** - Classification and resorption of xenobiotics - Metabolism of xenobiotics - Biotransformation reactions	***Acid-base balance*** 1. Models of acid-base balance 2. Determination of HCO_3^- ***Seminar:*** 1. Biochemistry of the inner environment (p. 159) 2. Acid-Base balance (p. 165)

Content of lectures, practical exercises and seminars

7.	**1. REVISION TEST *** **BIOCHEMISTRY OF THE KIDNEY** - 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)	***Metabolism of the liver*** 1. Determination of ALT in blood serum (patient) 2. Determination of γ-glutamyl transferase activity (patient) ***Seminar:*** 1. Liver (p. 195) 2. Metabolism of xenobiotics (p. 200)
8.	**BIOCHEMISTRY OF MUSCLES** - Organization of muscle fibres, proteins of muscle tissue - Contraction and relaxation of skeletal, heart, and smooth muscle - Regulation of muscle activity - Energy sources for muscle work	***Metabolism of the kidney*** 1. Biochemical examination of urine (patient) 2. Clearance – calculation ***Seminar:*** 1. Kidney (p. 206) 2. Clinical-biochemical examination of urine (p. 239)
9.	**METABOLISM OF HARD TISSUE** - Composition of bones and teeth - Synthesis and degradation of collagen - Mineralization and demineralization - Proteins of connective tissue - Function and regulation of calcium and phosphorus	***Muscle tissue metabolism*** 1. Determination of AST in blood serum (patient) 2. POCT – determination of cardiovascular markers ***Seminar:*** 1. Muscle (p. 211) 2. Muscle diseases (p. 218)
10.	**BIOCHEMISTRY OF ORAL CAVITY** - Organic components of teeth - Mineralization – hydroxyapatite crystal formation - Conditions and theories of mineralization - Saliva – composition, functions, importance	***Biochemistry of mineral compounds*** 1. Determination of calcium (patient) 2. Determination of inorganic phosphorus (patient) ***Seminar:*** 1. Metabolism of mineral substances (p. 173) 2. Calcium in relation to bone metabolism (p. 223)
11.	**PATHOBIOCHEMISTRY OF THE ORAL CAVITY** - Dental plaque, tooth decay, and tartar - Biochemistry of tooth decay - Pathobiochemistry of inflammatory periodontal diseases - Effect on the oral cavity of the organism	***Biochemistry of the oral cavity*** 1. Argentometric determination of chlorides in saliva 2. Proof of thiocyanate's presence in saliva ***Seminar:*** 1. Digestive system, oral cavity (p. 188) 2. Biochemistry and metabolism of bones (p. 219)
12.	**2. REVISION TEST *** **REPLICATION AND TRANSCRIPTION** - Structure and organization of the genome - Replication and repair of DNA - Transcription and inhibitors of transcription – reverse transcription, HIV virus	***Specialized metabolic processes*** 1. POTC – determination of vitamin D ***Seminar:*** 1. Importance of HCl in the stomach (p. 189) 2. Patient evaluation – determination of diagnosis based on the student's results of biochemical examinations
13.	**PROTEOSYNTHESIS** - Translation of mRNA – co-translational modification of proteins - Posttranslational modifications and activity control of proteins **REGULATION OF GENE EXPRESSION** - Regulation of gene expression and inhibition of protein synthesis - Methods of studying nucleic acids (NA) – e.g., sequencing, amplification (PCR)	***Analysis of nucleic acids*** 1. Electrophoretic determination of DNA in agarose gel 2. Restriction enzymes **3. REVISION TEST* – practical exercises, seminars** ***Seminar:*** 1. Biochemistry of nucleic acids (p. 142) 2. Replication, transcription (p. 144)
14.	**BIOCHEMICAL BASIS OF NUTRITION** - Biological value of nutrients - Requirements for nutrient content (e.g., limiting amino acids, vitamins) - Impact of technology and modification of nutrients on digestion, resorption, and usability of nutrients	***Final assessment of practical exercises*** 1. Individual evaluation of student work

** Students can come to see how their test was graded within one week of the test*