Subject: **ORAL BIOCHEMISTRY**
Year of education: **2nd** **2012/2013** **Winter term**
Study branch: **Dent. Med.** **2/3**

| *Week* | *Lectures* | *Practical exercises* ***http://portal.lf.upjs.sk*** |
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| 1 | **METABOLISM OF AMINO ACIDS I.**<br><br>- Essential and nonessential amino acids<br>- Anabolism - biosynthesis of AA<br>- Catabolism - degradation of AA<br>- General catabolic processes of AA<br>- $NH_3$ - formation and urea synthesis<br><br>*prof. Mareková* | **Lipid metabolism**<br>1. The safety rules in laboratory<br>2. Determination of β-lipoproteins in blood serum - 4.3.5<br>3. Determination of the presence of double bonds in fatty acids<br>Seminar:<br>1. Repetition of metabolism of lipids<br>*RNDr. Mašlanková* |
| 2 | **METABOLISM OF AMINO ACIDS II.**<br><br>- Metabolic transformation of individual AA<br>- Biosynthesis of catecholamines<br>- Metabolism of serotonine, thyroxine and creatine<br>- Biosynthesis of tetrapyrroles<br>- Pathobiochemistry of amino acid metabolism<br><br>*prof. Mareková* | **Metabolism of proteins**<br>1. Determination of total concentration of proteins (*patient*) – 7.4.1<br>2. Isolation of albumin and globulin of blood serum<br>Seminar:<br>1. Digestive system<br>2. Digestion of proteins<br>*RNDr. Mašlanková* |
| 3 | **METABOLISM OF NUCLEOTIDES**<br><br>- Synthesis of purine and pyrimidine nucleot. de novo<br>- Synthesis of deoxyribonucleotides<br>- Inhibitors of purine and pyrimidine biosynthesis - relation to the chemotherapy of cancer<br><br>*Mgr. Urban* | **Metabolism of amino acids I.**<br>1. Chromatographic determination of disorders in amino acid metabolism-theoretically<br>2. Determination of urea in blood serum (*patient*) - 8.1<br>Seminar:<br>1. Nitrogen balance<br>2. Metabolism of proteins<br>3. Disorders of amino acid metabolism<br>*RNDr. Mašlanková* |
| 4 | **INTERMEDIARY METABOLISM RELATIONSHIPS**<br>- Metabolic interrelation of saccharides, lipids and proteins<br>- Metabolic pathways<br><br>***Repetition test from metabolism of nitrogen compounds***<br><br>*prof. Mareková* | **Metabolism of amino acids II.**<br>1. Determination of uric acid in blood serum (*patient*)<br>2. *Determination of ammonia in urine (patient)*<br>Seminar:<br>1. Metabolism of amino acids<br>2. Detoxication of ammonia - 2.4<br>*RNDr. Mašlanková* |
| 5 | **NUCLEIC ACIDS AND REPLICATION OF DNA**<br><br>- Organization of genetic material in DNA (genes)<br>- Molecular basis of mutations<br>- Methods in molecular biology (gene cloning)<br>**TRANSCRIPTION OF DNA AND PROTEOSYNTHESIS**<br>- Biosynthesis of tRNA, mRNA, rRNA<br>- Molecular mechanism of proteosynthesis<br>- Regulation and inhibition of proteosynthesis<br><br>*Mgr. Urban* | **Nucleic acids I**<br>1. Isolation of deoxyribonucleoproteins - 5.1<br>2. Quantitative determination of DNA - 5.2<br><br>Seminar:<br>1. Metabolism of nucleotide - 2.5<br>2. Methods of DNA isolation<br>3. Video: *Nucleic acids*<br>*RNDr. Mašlanková* |
| 6 | **REGULATION OF GENE EXPRESSION AND GENE ENGINEERING**<br><br>- The principles of gene expression and regulation<br>- Gene manipulation and therapy<br>- Inhibitors of NA synthesis functioning as drugs<br>- Reverse transcriptase and AIDS virus<br>- Diagnostic application of DNA analysis<br><br>*Mgr. Urban* | **Nucleic acids II**<br>1. Hydrolysis of nucleoprotein or DNA - 5.3<br>2. Proof of nucleic acid components in their hydrolysate - 5.4.2<br><br>Seminar:<br>1. Biochemistry of nucleic acids<br>2. Restriction endonucleases – 5.4.1<br>3. The principle of PCR reaction – 5.4.4<br>*RNDr. Mašlanková* |

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| 7 | **BIOCHEMISTRY OF BLOOD**<br><br>- Biochemical function of blood<br>- Specificity of erythrocyte metabolism<br>- Pathological hemoglobins<br>- Role of blood plasma proteins<br>- Blood clotting as a biochemical process<br>- Blood group substances<br>- Maintenance of acid-base balance (ABB)<br>- Disorders of ABB and their correction mechanism<br>*prof. Mareková* | **Biochemistry of blood**<br>1. Determination of bilirubin in blood serum - 7.2.1 (*patient*)<br>2. Hemoglobin and its derivates<br><br>Seminar:<br>1. Biochemistry of internal environment<br>2. Blood<br>3. Metabolism of tetrapyrolls<br>4. Video: *Hemoglobin I, II. III.*<br>*RNDr. Mašlanková* |
| 8 | **CHEMICAL COMMUNICATIONS IN LIVING SYSTEMS**<br>- Regulation of the metabolism on cellular level<br>- Chemical structure and classification of hormones<br>- Mechanisms of hormone action<br>- Receptors and second messengers<br>***Repetition test from 5-7 topics***<br>*prof. Mareková* | **Acid-base balance**<br>1. Models of acid-base balance - 7.3.1<br>2. Determination of $HCO_3^-$ - 7.3.2<br><br>Seminar:<br>1. Acid-Base balance<br>*RNDr. Mašlanková* |
| 9 | **LIVER AND METABOLISM OF FOREIGN COMPOUNDS**<br>- Biochemical function of the liver<br>- Pathobiochemistry of the liver<br>- Biotransformation reactions (redox, hydrolytic and conjugation)<br>- Review of metabolism of xenobiotics<br>*prof. Mareková* | **Metabolism of liver**<br>1. Determination of γ-glutamyl transferase activity - 7.5.22 (*patient*)<br>2. Determination of ALT in blood serum - 7.1.2 (*patient*)<br>Seminar:<br>1. Liver – 5.2<br>*RNDr. Mašlanková* |
| 10 | **SPECIALISED METABOLIC PATHWAY OF SELECTED TISSUES**<br>- Anorganic components of hard tissues<br>- Metabolism of calcium and phosphates in dental tissue<br>- *Metabolism of other elements of dental tissue*<br>- *Organic components of teeth*<br>*RNDr. Stupák* | **Metabolism of kidney**<br>1. Biochemical examination of urine *(patient)* – 8.2 - 8.4<br>2. Determination of creatinine - 7.1.1 *(patient)*<br>Seminar:<br>1. Kidney – 5.3<br>2. Clinical-biochem.anlysis of urine<br>*RNDr. Mašlanková* |
| 11 | **ORAL BIOCH. AND PATHOBIOCHEMISTRY I.**<br>- Mineralization – form of crystals<br>- Mineralization conditions<br>- Theory of mineralization<br>- Processes of mineralization<br>- Regulation of mineralization or demineralization<br>*RNDr. Stupák* | **Biochemistry of minerals**<br>1. Determination of calcium (instruction)<br>2. Determination of inorg. P – 7.3.3.<br>Seminar:<br>1. Metabolism of minerals<br>2. Calcium in relation to bone metabolism<br>*RNDr. Mašlanková* |
| 12 | **ORAL BIOCH. AND PATHOBIOCHEMISTRY II.**<br>- Composition of saliva<br>- Dental plaque, tooth decay and tartar<br>- Biochemistry of tooth decay<br>- Patobiochemistry of inflammatory periodontal diseases<br>- Condition of the body and its effect on the oral cavity<br>*RNDr. Stupák* | **Special metabolic processes**<br>1. Determination of HCl output by the gastric mucosa - 6.1.<br>Seminar:<br>1. Importance of HCl in the stomach<br>*RNDr. Mašlanková* |
| 13 | **BIOCHEMISTRY AND PATHOBIOCHEMISTRY OF DIGESTION AND NUTRITION**<br>- Digestion of saccharides, lipids, proteins and nucleoproteins and their role in nutrition<br>- Basic requirements of nutrition<br>- Special nutritional problems (obesity, fasting)<br>- Nitrition effect of tooth development<br>***Repetition test from 8-12 topics***<br>*RNDr. Mašlanková* | **Biochemistry of muscles and bones**<br>1. Determination of AST activity (patient)<br>2. Determination of ALP activity (patient)<br>Seminar:<br>1. Metabolism of muscle<br>2. Metabolism of bones<br>*RNDr. Mašlanková* |
| 14 | **CLINICAL BIOCHEMISTRY**<br><br>- Diagnostic and therapeutic applications in medicine<br>*RNDr. Mašlanková* | **Final exercise**<br>1. Diagnosis and its relationship to the biochemical examination – student seminar work<br>2. Summary and evaluation of student work |