Subject: Medical Biochemistry 1

Study Programme: General Medicine

Study Period: 3. semester

Evaluation: graduated

Subject Type: compulsory

Content: 2 h. lectures and 3 h. practical exercises / week Total 70 hours

Pracovisko: Department of Medical and Clinical Biochemistry UPJŠ FM

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<tr>
<th>Week</th>
<th>Lectures</th>
<th>Practical Lessons</th>
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<td>1.</td>
<td>CELL BIOCHEMISTRY&lt;br&gt;- General features of cell metabolism&lt;br&gt;- The cell and subcellular localization of biochemical processes&lt;br&gt;- Redox processes and their energetics&lt;br&gt;- Biological membranes, transport in cells</td>
<td>Principles of biochemical laboratory techniques&lt;br&gt;1. Safety in biochemical laboratory&lt;br&gt;2. Introduction to clinical biochemistry&lt;br&gt;3. Calculation of the Vmax and Km of enzyme-catalyzed reactions&lt;br&gt;Seminar: 1. Cellular membranes (p.21)</td>
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<td>2.</td>
<td>ENZYMES&lt;br&gt;- The role of enzymes in metabolism&lt;br&gt;- Structural features of enzymes, active site, specificity, enzyme classification&lt;br&gt;- Mechanism of catalysis&lt;br&gt;- Kinetics of chemical and enzymatic reactions, Michaelis –Menten equation&lt;br&gt;- Enzyme activity, inhibition of enzymatic activity&lt;br&gt;- Factors affecting the rate of enzymatic reactions&lt;br&gt;- The principles of regulation of enzymatic activity, allosteric enzymes&lt;br&gt;- Diagnostically important enzymes</td>
<td>Enzymes I.&lt;br&gt;1. Effect of temperature on the activity of α-amylase&lt;br&gt;2. Activation and inhibition of α-amylase by inorganic ions&lt;br&gt;Seminar: 1. Classification and catalytic activity of enzymes (p.4)&lt;br&gt;2. Kinetics of enzymatic reactions (p.6)&lt;br&gt;3. Factors affecting then velocity of enzymatic reaction (p.9)</td>
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<td>3.</td>
<td>METABOLISM SACCHARIDES I.&lt;br&gt;- Introduction to metabolism of saccharides&lt;br&gt;- Digestion of saccharides&lt;br&gt;- Glucose transporters&lt;br&gt;- Glycolysis – importance and energy balance&lt;br&gt;- Regulation of glycolysis</td>
<td>Carbohydrates metabolism I.&lt;br&gt;1. Substrate specificity of glycosidases&lt;br&gt;2. Detection of glycolysis intermediates&lt;br&gt;3. Detection of lactic acid&lt;br&gt;Seminar: 1. Glycolysis and gluconeogenesis (p.54)&lt;br&gt;2. Clinically significant carbohydrates (p.64)</td>
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<td>METABOLISM SACCHARIDES II.&lt;br&gt;- Gluconeogenesis&lt;br&gt;- Regulation of gluconeogenesis&lt;br&gt;- The pentose phosphate pathway&lt;br&gt;- Metabolism of galactose, mannose and fructose</td>
<td>Carbohydrates metabolism II.&lt;br&gt;1. Enzymatic determination of glucose in blood&lt;br&gt;Seminar: 1. Sources of glucose (p.46)&lt;br&gt;2. Glucose in blood (p.56)</td>
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<td>5.</td>
<td>METABOLISM OF SACCHARIDES III.&lt;br&gt;- Glycogen synthesis&lt;br&gt;- Factors affecting synthesis of glycogen&lt;br&gt;- Glycogen degradation&lt;br&gt;- Regulation of glycogen metabolism&lt;br&gt;- Metabolism of uronic acids</td>
<td>Carbohydrates metabolism III.&lt;br&gt;1. Isolation and detection of glycogen from liver&lt;br&gt;Seminar: 1. Glycogen (p.58)</td>
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<td>METABOLISM OF SACCHARIDES IV.&lt;br&gt;- Metabolism of aminosaccharides&lt;br&gt;- Metabolism of glycosaminoglycans and glycoproteins&lt;br&gt;- Regulation of carbohydrates metabolism&lt;br&gt;- Disorders in carbohydrates metabolism</td>
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| 7. | 1st revision test | BIOLOGICAL OXIDATIONS  
- Introduction to biological oxidations  
- Macroergic bond, macroergic compound |
| 8. | Biological oxidations I. | Seminars:  
1. Qualitative determination of ATP in selected tissues  
2. Glycoproteins (p.58) |
| 9. | CITRIC ACID CYCLE | Seminars:  
1. Oxidative decarboxylation of pyruvate  
2. The citric acid cycle – reactions, enzymes, regulation and energetic balance  
3. Acetyl-CoA and its relationship to respiratory chain  
4. Anaplerotic reactions |
| 10. | Biological oxidations II. | Seminars:  
1. Isolation of erythrocytary membranes and detection of lipid phosphate  
2. Test of catalase activity  
3. Biological oxidations (p.27) |
| 11. | RESPIRATORY CHAIN | Seminars:  
1. Role of shuttles  
2. The respiratory chain - electron transport and oxidative phosphorylation  
3. Factors affecting the respiration  
4. Inhibitors, uncouplers  
5. The others redox systems (except respiratory chain) |
| 12. | Biological oxidations III. | Seminars:  
1. Detection of dehydrogenases in animal tissue  
2. Citric acid cycle (p.38)  
3. Respiratory chain (p.31) |
| 13. | LIPIDS METABOLISM I. | Lipids metabolism I.  
1. Hydrolytic cleavage of lipids by lipase  
2. Detection of the double bonds presence in fatty acids  
3. Lipids metabolism (p.71) |
| 14. | Metabolism of lipids II. | Lipids metabolism II.  
1. Fractionation of blood serum lipids  
2. Determination of total lipids in blood serum  
3. Eicosanoids (p.73) |
| 15. | Metabolism of lipids III. | Lipid metabolism III.  
1. Determination of cholesterol in blood serum  
2. Calculation of HDL and LDL cholesterol  
3. Determination of triacylglycerols in blood serum  
4. Determination of β-lipoproteins in blood serum  
5. Lipoproteins (p.75)  
6. Metabolism of steroids (p.82) |
| 16. | Metabolism of lipids IV. | COLLOQUIUM  
1. Theoretical test  
2. Practical exam |
| 17. | Oxidation stress | Credit  
1. Summary and evaluation of student work  
2. Reactive metabolites of oxygen  
3. Mechanism of oxidative damage of FA and proteins  
4. Defense systems against free radicals  
5. Natural antioxidants |