

Collegium Medicum im. L. Rydygiera w Bydgoszczy

MEDICAL BIOCHEMISTRY DEPARTMENT

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BIOCHEMISTRY

FOR THE MEDICAL STUDENTS FOR THE ACADEMIC YEAR 2019/20 (SEMESTER II)

Test 1 scope:

1. Glucose as an ATP source - glycolysis pathway reactions, substrate phosphorylation, glycolysis regulation. Anaerobic glycolysis (Corich cycle), glycolysis in red blood cells (bisphosphoglycerate pathway). Fructose and galactose entry in glycolytic transformations. Disorders of fructose and galactose metabolism. The course of pyruvate oxidative decarboxylation and regulation of this process.
2. The course of the pentose phosphate pathway, its special role in the body, disorders resulting from the lack of NADPH synthesis. Main metabolic pathways of red blood cells. Gluconeogenesis and regulation.
3. Glycogen synthesis and degradation, including diseases resulting from metabolism disorders glycogen. Hormonal regulation of constant blood glucose - the role of insulin, glucagon, adrenaline.

Test 2 scope:

1. The course of the tricarboxylic acid cycle - cycle energy gain. Mitochondrial transmembrane transport systems and NADH transport bridges. Respiratory chain, inhibitors and uncoupling compounds oxidative phosphorylation. Cell bioenergetics - rich energy compounds, total balance of glucose molecule oxidation. Generating reactive forms oxygen. Cell damage caused by reactive oxygen species. Antioxidant defense.
2. The role of carnitine in the transport of fatty acids. β -oxidation of saturated and unsaturated fatty acids. Energy balance of β -oxidation. β -oxidation of fatty acids with an odd number of carbon atoms in the chain. Metabolism of ketone bodies.
3. Synthesis and elongation of fatty acids, formation of unsaturated bonds. Role of arachidonic acid - synthesis of eicosanoids (prostaglandins, prostacyclins, thromboxanes and leukotrienes). Synthesis of glycerolphospholipids and sphingolipids.
4. Lipoproteins. Blood cholesterol transport by lipoproteins. Dyslipoproteinaemia. Cholesterol synthesis and regulation of this process in the human body.

Test 3 scope:

1. Biosynthesis of endogenous amino acids in the human body. The most important enzymes involved in amino acid transformation and removal of amino nitrogen. Urea cycle. Synthesis and role of biogenic amines.
2. Amino acid catabolism. Glucogenic and ketogenic amino acids. Selected metabolic disorders in amino acid catabolism. Amino acid transformations into biologically important specialized products. Single-carbon residue metabolism. The role of single-carbon residues in biosynthesis of biologically compounds

important.

3. Nomenclature and structure of the main and unusual purine and pyrimidine bases. Synthesis of purines and pyrimidines and regulation of these processes. Catabolism of purine and pyrimidine bases. Selected diseases related to disorders with purine catabolism.

Test 4 scope:

1. The liver as the metabolic center of the body. The role of the liver in processes detoxification. The role of the liver in maintaining normal blood glucose levels.
2. Hem synthesis and catabolism, regulation of these processes. Plasma bilirubin transport, role of liver in bilirubin conjugation. Enterohepatic circulation of bile dyes. Hyperbilirubinaemia. Diagnostic significance of total bilirubin, differentiation of bilirubin into indirect (free) and direct (bound). Importance diagnostic of direct and indirect bilirubin.
2. Biochemical kidney function. Diagnostic significance of metabolites excreted with urine.
3. Classification of hormones. The most important hormones that affect carbohydrates, fats and proteins metabolism in muscle cells, liver and tissue fat. Thyroid hormone synthesis.
4. Metabolic profile of basic organs and tissues. Summary of metabolism of carbohydrates, lipids and amino acids in liver cells, brain, skeletal muscle, heart muscle and kidneys. Metabolic links between carbohydrate, lipid and amino acid metabolism. Relationships and ATP source transformations for skeletal muscle cells at rest and during effort - sprint run and marathon. Metabolic changes occurring during fasting and nutrition. Metabolic changes associated with diabetes type I and II.