PROGRAMME OF THE SUBJECT
„MEDICAL BIOCHEMISTRY“

STUDY BRANCH: „GENERAL MEDICINE“
2ND YEAR – MEDICAL FACULTY UK

LECTURES
Summer semester

1st week: 18.02 – 22.02. 2019
Synthesis and degradation of nucleotides


2nd week: 25.02. – 01.03. 2019
Synthesis of DNA, RNA, basis of gene expression


3rd week: 04.03. – 08.03. 2019
Basic mechanisms of proteosynthesis


4th week: 11.03. – 15.03. 2019
Mechanisms of regulation of biochemical processes

Regulation of metabolic pathways at the molecular level: changes of enzyme activities by substrates, products, energy or oxidation-reduction state of the cell. Integration of metabolism by neural and hormonal regulations. Mechanism of the action of regulatory systems.

5th week: 18.03. – 22.03. 2019
Hormonal regulation - endocrine system

Relationship between CNS and endocrine system. Hormones of hypothalamus, anterior pituitary, role of posterior pituitary, effects of individual pituitary hormones.
6th week: 25.03. – 29.03. 2019
Hormones of individual endocrine glands
Hormones of adrenal medulla and adrenal cortex - glucocorticoids, mineralocorticoids, catecholamines. Hormones of thyroid and parathyroid glands. Sex hormones - estrogens, gestagens, androgens. Basal defects of these regulatory systems.

7th week: 01.04. – 05.04. 2019
Nutrition and specific metabolic functions of the organs in integration of metabolism

8th week: 08.04. – 12.04. 2019
Biochemical aspects of gas transport, maintenance of homeostasis, role of kidneys
Regulation of acid-base balance in the organism, role of kidneys and respiratory system in regulation of homeostasis.

9th week: 15.04. – 19.04. 2019
Biochemical basis of nerve system and sensoric functions
Specific characteristics of metabolism in CNS tissue, relation to the structures and function of CNS. Excitation and transduction of nerve impulse along nerve fiber. Function of synapses, transfer of excitation through synapse. Cholinergic neurotransmission - cholinergic receptors. Catecholamines and serotonin in neurotransmission. Amino acids neurotransmitters - glutamate, aspartate and their receptors, glycine, gamma-aminobutyrate (GABA) and their receptors

10th week: 22.04. – 26.04. 2019
Biochemistry of the liver

11th week: 29.04. – 03.05. 2019
Biochemistry of muscle and connective tissue
Composition of skeletal muscles, muscle proteins, Mechanism of contraction in skeletal muscle, energy requirements for muscle contraction. Metabolism of muscle cells.
Types of connective tissue and their characteristics, basal components of connective tissue. Collagen, chemical composition and metabolism. Elastin, its components. Composition of bone tissue, metabolism of bones and teeth.

12th week: 06.05. – 10.05. 2019
Introduction into pathobiochemistry
Biochemical parameters and their evaluation. determination of enzyme activities in blood plasma and their meaning. Factors affecting enzyme activities in plasma, isoenzymes and their meaning for diagnosis. Example of isoenzyme determination in blood serum in myocardial damage.
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SEMINARS AND PRACTICAL EXERCISES
Summer semester

1\textsuperscript{st} week: 18.02 – 22.02. 2019
Role of vitamins as the essential components of the food in metabolic processes. Defects of metabolism and functions in vitamins deficiencies.
Practical part: Determination of methymalonic acid in urine

2\textsuperscript{nd} week: 25.02. – 01.03. 2019
Defects in purine nucleotides metabolism - hyperuricaemia (gout).
Practical part: Determination of uric acid in blood serum and in urine

3\textsuperscript{rd} week: 04.03. – 08.03. 2019
Regulation of gene expression in procaryots and in eucaryots. Lactose and tryptophane operone, transcription factors.

4\textsuperscript{th} week: 11.03. – 15.03. 2019
Gastrointestinal system and digestion. Basis of chemical mechanisms of digestion of individual foodstuffs, mechanism of secretion of HCL and its regulation in stomach.
Examination of basal and stimulated secretion of HCL, preparation of the patient and evaluation of the test.
Practical part: Examination of gastric secretion under basal conditions and after stimulation

5\textsuperscript{th} week: 18.03. – 22.03. 2019
Metabolism of iron. Absorption of iron, trasport of iron, regulation of iron metabolism.
Practical part: Determination of iron in blood, absorption curve of iron

6\textsuperscript{th} week: 26.03. – 30.03. 2018
Mechanisms of the transfer of chemical signals into the cells. Vegetative nervous system - neurotransmitters, receptors and mechanisms of the action.
Classification of receptors at the terminals of vegetative nervous system, Physiological actions of sympathetic and parasympathetic nervous systems at the molecular level.

7\textsuperscript{th} week: 01.04. – 05.04. 2019
Metabolism of water and minerals. Water - functions in the organism, regulation of water balance, Defects - dehydration, hyperhydration. Na⁺, K⁺, Cl⁻ - meaning in the organism, regulation, mineralocorticoids, defects.

8th week: 08.04. – 12.04. 2019
Meaning of calcium and phosphate in the organism. Regulation of calcium level – parathyroid hormone, vitamin D, calcitonine
Practical part: Determination of calcium and phosphate concentration in blood

9th week: 15.04. – 19.04. 2019

10th week: 22.04. – 26.05. 2019
Disorders of blood plasma proteins, changes in amounts and spectrum of blood plasma proteins in several diseases.
Practical part: Determination of total proteins and albumin in blood plasma

11th week: 29.04. – 03.05. 2019
Functional biochemistry of the liver. Synthesis and degradation of tetrapyrrols, metabolism of bilirubin
Practical part: Determination of bilirubin in serum

12th week: 06.05. – 10.05. 2019
Blood plasma enzymes and meaning in medicine. Factors affecting enzyme activities in blood plasma. Application of determination of enzyme activities in blood plasma in myocardial attack and in damage of organs.
Practical part: Determination of alkaline and acidic phosphatase