

# **CLINICAL EVALUATION OF LABORATORY STUDIES**

## **Elective for 4<sup>th</sup> year student of the Faculty of foreign students Plan of practical classes**

### **1. Introduction to clinical laboratory diagnostics. Organization of laboratory research. Clinical and laboratory assessment of the results of general clinical examinations of urine, feces, sputum, fluids of serous cavities, cerebrospinal fluid (2 hours)**

Objectives, subject, objects of research in clinical laboratory diagnostics. Organization of clinical laboratory research. Stages of laboratory research (preanalytical, analytical, postanalytical). General rules for preparing for laboratory tests. Rules for obtaining, transporting and storing biological material. Analytical characteristics of laboratory methods of analysis (diagnostic and analytical specificity and sensitivity). Presentation of laboratory test results (units of measurement of laboratory test parameters, SI system). The concepts of "norm" and reference interval. "cut off" values. Critical quantities. Errors at different stages of laboratory research. Quality control.

### **2. Clinical and laboratory assessment of the results of general clinical examinations of urine and feces**

Clinical and laboratory assessment of the results of general clinical urine examination. Features of the preanalytical stage (rules of preparation for research, transportation, storage). General urine analysis. Indications. Clinical and diagnostic significance of changes in the physical properties of urine (transparency, reaction, relative density), the chemical composition of urine (albuminuria, proteinuria, glycosuria, ketonuria, bilirubinuria, hematuria, myoglobinuria); microscopic examination of urine (organized urine sediment - epithelium, leukocytes, erythrocytes, casts; unorganized urine sediment - oxalates, urates, phosphates and their derivatives). Clinical significance of urine analysis according to Nechiporenko, urine analysis according to Zimnitsky. Assessment of the degree of bacteriuria, clinical and diagnostic significance.

Clinical and laboratory assessment of the results of general clinical examination of stool. Changes in general properties, parameters of chemical and microscopic examination of feces. Scatological syndromes. Examination of feces for occult blood. Fecal calprotectin.

### **3. Clinical and laboratory assessment of the results of general clinical examinations of sputum, fluids of serous cavities, cerebrospinal fluid**

Clinical and laboratory assessment of the results of general clinical sputum analysis. Changes in physical properties, parameters of microscopic and bacterioscopic examination of sputum in various diseases (bronchitis, COPD, bronchial asthma, pneumonia, bronchiectasis, abscess, tuberculosis, lung cancer).

Clinical and laboratory assessment of the results of studying fluids of serous cavities. Changes in physicochemical properties, parameters of microscopic examination of transudate and exudate, differential diagnosis.

Clinical and laboratory assessment of the results of general clinical analysis of cerebrospinal fluid. Changes in cerebrospinal fluid parameters in various diseases (purulent and serous meningitis, encephalitis, acute cerebrovascular accidents).

#### **4. Clinical and laboratory assessment of the results of a general clinical blood test**

Rules for preparing a patient for general analysis, biochemical and coagulological and immunological blood tests. Obtaining biological material. Features of the preanalytical stage (sequence of tubes when drawing blood, patient identification, transportation and storage of biological material).

Clinical and laboratory assessment of the parameters of the general blood test (CBC). Abbreviations for UAC parameters in automated research. Clinical and diagnostic significance of changes in hemoglobin concentration, erythrocyte count, erythrocyte indices, leukocyte count, leukocyte formula, platelet count, reticulocyte count, erythrocyte sedimentation rate.

#### **5. Клинико-диагностическое значение изменений результатов общеклинического исследования крови и исследования костного мозга**

Изменения ОАК при воспалительных заболеваниях различной этиологии (неинфекционные и инфекционные заболевания бактериальной, вирусной этиологии, гельминтозах), анемиях и гемобластозах. Лейкемоидные реакции.

Клиническое значение исследований миелограммы, иммунофенотипирования, цитохимического и цитогенетического исследований при заболеваниях системы крови.

#### **6. Laboratory monitoring of the hemostatic system**

Laboratory assessment of the hemostatic system. The significance of changes in the parameters of vascular platelet hemostasis (bleeding time according to Ivey and Duque, coagulation time according to Sukhorev, platelet count, platelet aggregation) and coagulogram (APTT, TV, PT, INR, fibrinogen). Thrombemia markers (PDF, RFMC, D-dimers). Clinical and diagnostic significance of changes in thromboelastasiogram parameters. Algorithms for diagnosing pathology of hemostasis. Changes in hemostasiogram parameters in hemorrhagic diathesis, thrombophilia, DIC syndrome. Laboratory monitoring of anticoagulant therapy.

#### **7. Clinical evaluation of biochemical blood tests in the study of protein and nitrogen metabolism. Markers and syndromes of kidney disease**

Laboratory parameters for assessing protein metabolism (Total protein, albumin, protein fractions), indications for research, clinical and diagnostic significance. Specific proteins (C-reactive protein, procalcitonin, presepsin, ceruloplasmin, haptoglobin, antistreptolysin-O, rheumatoid factor, amyloid A)

Indicators of nitrogen metabolism. Urea, creatinine, uric acid. Cystatin C, NGAL in the diagnosis of kidney diseases. Assessment of glomerular filtration rate (direct and calculated methods) and tubular reabsorption. Clinical significance of the Reberg-Tareev test.

#### **8. Clinical assessment of biochemical studies of the activity of enzymes of the liver, bile ducts, pancreas, indicators of pigment metabolism. Biochemical syndromes in diseases of the liver and pancreas**

Clinical and diagnostic value of studying enzyme activity (AlAT, AST, de Ritis coefficient, GGTP, alkaline phosphatase, acid phosphatase, LDH, CPK, amylase, lipase).

Laboratory indicators of pigment metabolism. Changes in the concentration of total bilirubin and its fractions.

Biochemical syndromes in liver diseases. Biochemical diagnosis of pancreatic diseases.

## **9. Clinical assessment of changes in parameters of water-electrolyte and mineral metabolism. Laboratory diagnosis of carbohydrate metabolism disorders**

Clinical and diagnostic significance of changes in parameters of water-electrolyte and mineral metabolism (potassium, sodium, chlorine, calcium, inorganic phosphorus, magnesium, vitamin D). Laboratory assessment of iron metabolism (serum iron, TBSS, transferrin, ferritin, soluble transferrin receptors).

Laboratory diagnosis of carbohydrate metabolism disorders. Clinical and diagnostic significance of changes in glucose concentration in blood and urine. Glucose tolerance test, indications for the study, evaluation of results. Glycated hemoglobin, fructosamine, clinical and diagnostic significance. Insulin resistance. C-peptide.

## **10. Clinical evaluation of biochemical blood tests in the study of protein and nitrogen metabolism. Cardiovascular risk markers**

Laboratory diagnosis of lipid metabolism disorders (Total cholesterol, LDL, VLDL, LDLP, HDL, atherogenic coefficient, apo-A, apo-B, lipoprotein-alpha, triglycerides).

Cardiovascular disease risk markers (homocysteine, high-sensitivity CRP, lipid profile, lipoprotein-a, fatty acid binding protein (FABP), high-sensitivity troponin, glucose). Markers for the differential diagnosis of acute coronary syndrome (troponin, high-sensitivity troponin, CPK MB). Dynamics of laboratory parameters during myocardial infarction (leukocytes, ESR, cardiac markers). Modern markers of chronic heart failure (natriuretic peptide).