Aim of the course

The subject Oral Biochemistry 2 fulfill irreplaceable role in medical dental studies, which is to teach students to perceive life processes and pathological processes as mechanisms that proceed on the molecular level. Only from this point of view is the future dentist able to take an objective and exact opinion and formulate the decision on the progress of disease or its treatment. To distinguish pathological and normal processes is necessary to handle and understand to the massive amounts of chemical reactions in the cell, whose are generally called cellular metabolism. Study of the processes occurring in the oral cavity is the main objective of the biochemistry subject for students of dental medicine.

Education: lectures/practical
Assessment: WS – exam (see Requirements)

Syllabus

Metabolism of nitrogen compounds
Protein and amino acid metabolism: nitrogen balance (positive, negative), intracellular degradation of proteins, amino acids (essential, nonessential), transamination, oxidative deamination, decarboxylation, NH₃ formation - the urea cycle reactions, catabolism of carbon skeletons of amino acids, glycogenic and ketogenic amino acids, disorders in amino acid metabolism. Metabolic transformation of individual amino acids. Synthesis of nonessential amino acids.


Biochemistry of nucleic acids and proteosynthesis

Biochemistry of organs and tissues
Relationships in intermediary metabolism: thermodynamic characterization of living cell, major metabolic control mechanisms, connective points between metabolism of saccharides, lipids and proteins, feeding – starving cycle.
Biochemistry of blood: structure of the red blood cell. Specificity of metabolism of the RBC. Function of hemoglobin (transport O$_2$ and CO$_2$), biosynthesis and degradation of heme and molecular disorders (e.g. porphyria, hyperbilirubinemia). Plasma proteins and their physiological and biochemical functions. Salting-out and electrophoretic characterization of plasma proteins, blood clotting process, diseases associated with blood function. Acid-base balance, acidosis and alkalosis, blood buffering systems.

Chemical communication in living systems: hormones control of metabolism - principles of hormone regulation, classification of hormones, mechanisms of hormone action, messengers, and hierarchy of hormones.

Metabolism of liver: biochemical processes in the liver. Metabolic disorders of the liver. Markers of liver damage. Foreign substances (xenobiotics) in the environment and in the body. Biotransformation of xenobiotics, types of biotransformation reactions. The enzymes participating in biotransformation.

Metabolism of kidney: biochemical processes occurring in the kidney. Renal regulation of ions and water exchange. The role of the kidneys in maintaining the Acid-base balance.


Components of natural diets (energy, essential, “inert” and toxic components). Special nutritional problems (obesity, starvation, alcoholism, vegetarians, pregnancy). Enzymatic processes involved in digestion, components of gastric juice, bile, pancreatic juice, gastrointestinal hormones - gastric, secretin, cholecystokinin, somatostatine, vasoactive intestinal polypeptide.

**Oral biochemistry**


**Clinical biochemistry**

Biological material. Basic analytical reactions and determination of biologically active substances (eg. Use of enzymes in the diagnosis, inflammatory markers).