

May 25th -29th, 2020
Class 34 “BIOCHEMISTRY OF THE KIDNEY”

Tasks:

- I. Prepare at least 6-pages outline of the class, containing answers to the questions listed in the training guidelines.**

THEORETICAL PART

1. The kidney, biochemical functions, metabolism of the kidney.
2. Role of the kidney in regulation of pH balance.
3. Synthesis of biologically active compounds in kidney. Role of renin, erythropoietin, calcitriol.
4. Electrolytes composition of body fluids.
5. Regulation of sodium, water balance and pH in body fluids.
6. Water and electrolyte imbalance, acid-base imbalance. Dehydration, oedema, acidosis, alkalosis.
7. Mineral components of tissues: classification, representatives, biological role.
8. Sodium, potassium; their biological role, metabolism, regulation of balance.
9. Calcium, phosphorus; their biological role, metabolism, regulation of balance.
10. Trace elements, biological role (Fe, Cu, Co, I, Mg, Zn, Mn, Se).

LITERATURE FOR TRAINING:

1. Harper's Illustrated Biochemistry / Robert K. Murray [et. al.]. – 28th ed. – New York [etc]: McGraw-Hill, Medical, 2009. – P. 480.
2. Harper's Illustrated Biochemistry / Robert K. Murray [et. al.]. – 29th ed. – New York [etc]: McGraw-Hill, Medical, 2012. – P.541.
3. Biochemistry: manual for the medical faculty for international students (in English) / Н.Э. Петушок, А.А. Масловская, М.Н. Курбат. – Гродно: ГрГМУ, 2014. – P.244-261.
4. Harper's Illustrated Biochemistry / Robert K. Murray [et. al.]. – 31st ed. – New York [etc]: McGraw-Hill, Medical, 2018. – P. 540.
5. Harper's Illustrated Biochemistry / Robert K. Murray [et. al.]. – 30th ed. – New York [etc]: McGraw-Hill, Medical, 2015. – P. 562.
6. Lectures “Biochemistry of the kidney and urine” and “Metabolism of water and minerals”.

- II. In the laboratory work “BIOCHEMICAL ANALYSIS OF THE URINE” write down following results and make conclusions according to diagnostic importance of pathological components of the urine.**

1. QUALITATIVE REACTION ON PROTEIN

RESULT: white precipitate is observed

CONCLUSION:

DIAGNOSTIC IMPORTANCE.

Urine protein is a mixture of plasma proteins, renal tubular proteins and those from the lower urinary tract. Very little plasma protein crosses the glomerular capillary membranes in healthy individuals. Traces of albumin and beta globulins may be filtered, but are largely reabsorbed by the proximal tubule cells.

Proteinuria is frequently seen in chronic diseases, such as **diabetes** and **hypertension**, with increasing amounts of protein in the urine reflecting increasing kidney damage. A urinary protein extraction provides evidence of **glomerular disease** and defines the **nephrotic syndrome**. Another possible injury is **glomerulonephritis** (albuminuria caused by damages of glomerular membranes). **Nephrotic proteinuria** causes by **diabetic nephropathy**, **cardiac decompensation**, **inflammation of the urinary tract**, **increased blood pressure**, **pregnancy**, **nephrosis**.

3. QUANTITATIVE DETERMINATION OF GLUCOSE IN THE URINE

RESULT: red-colored sediment appeared

CONCLUSION:

DIAGNOSTIC IMPORTANCE.

The glucose test is used to monitor persons with diabetes. When blood glucose levels rise above 6.4 mmol/l (160 mg/dL), glucose will be detected in urine. Consequently, **glycosuria** may be the first indicator that **diabetes** or another hyperglycemic condition is present. Another possible pathologies are **kidney injury**, **intoxication with carbon monooxyde**.

4. QUALITATIVE REACTION ON BLOOD PIGMENTS

RESULT: green coloration observed

CONCLUSION:

DIAGNOSTIC IMPORTANCE.

Hematuria is presence of red cells or hemoglobin which may enter the urine from the kidney or lower urinary tract. This test detects abnormal levels of either, which may be caused by excessive **red cell destruction**, **glomerular disease**, **kidney or urinary tract infection**, **malignancy**, or **urinary tract injury**.

The notes and laboratory protocols will be revised by your teacher.

Please, report whether you have received this letter.