

CHEMICAL COMPONENTS OF THE BODY

1. Read the text and fill in the table.

Mineral Deficiencies

The term mineral deficiency means a condition where the concentration of any one of the minerals essential to human health is abnormally low in the body. Inorganic nutrients have a great variety of functions in the body.

Water, sodium, and potassium deficiencies are most closely associated with abnormal nerve action and cardiac arrhythmias. Sodium deficiency and water deficiency are the most serious and widespread deficiencies in the world. These deficiencies tend to arise from excessive losses from the body, as during prolonged and severe diarrhea or vomiting. Sodium deficiency and potassium deficiency also frequently result during treatment with drugs called diuretics.

When sodium levels in the body are low, water tends to enter cells, causing them to swell. When this occurs in the brain, it is referred to as cerebral edema. Cerebral edema is particularly dangerous because the brain is confined in the skull without room for expansion, and the swelling can lead to brain damage as the pressure increases within the skull. When the blood sodium levels drop gradually over time, symptoms can be very nonspecific and can include: headache, confusion or altered mental state, seizures, and decreased consciousness which can proceed to coma and death. Other possible symptoms include: restlessness, muscle spasms or cramps, weakness, and tiredness. Nausea and vomiting may accompany any of the symptoms.

Potassium is critical for the normal functioning of the muscles, heart, and nerves. It plays an important role in controlling activity of smooth muscle and skeletal muscle, as well as the muscles of the heart. It is also important for normal transmission of electrical signals throughout the nervous system within the body. Normal blood levels of potassium are critical for maintaining normal heart electrical rhythm. The effects of low potassium include may cause the following symptoms: muscle weakness, muscle aches, muscle cramps, and heart palpitations (irregular heartbeats).

Iodine deficiency is a global public health problem. It occurs in parts of the world with iodine-deficient soils, and results in goiter, which involves a relatively harmless swelling of the neck, and cretinism, a severe birth defect. The only use of iodine in the body is for making thyroid hormone. However, since thyroid hormone has a variety of roles in development of the embryo, iodine deficiency during pregnancy results in cretinism in the newborn. Cretinism involves mental retardation, a large tongue, and sometimes deafness, muteness, and lameness.

Iron deficiency occurs due to periods of dietary deficiency, rapid growth, and excessive loss of the body's iron. The symptoms of iron deficiency are generally limited to anemia, and the resulting tiredness, weakness, and a reduced ability to perform physical work.

Calcium deficiency due to lack of dietary calcium occurs only rarely. However, calcium deficiency due to vitamin D deficiency can be found among certain populations. Vitamin D is required for the efficient absorption of calcium from the diet, and hence vitamin D deficiency in growing infants and children can result in calcium deficiency. A low blood level of calcium can make the nervous system highly irritable causing spasms of the hands and feet, muscle cramps, abdominal cramps, overly active reflexes, and so on. Chronic calcium deficiency contributes to poor mineralization of bones, soft bones (osteomalacia) and osteoporosis, and, in children, rickets and impaired growth.

Dietary deficiencies in the remaining inorganic nutrients tend to be rare.

Dietary phosphate deficiency is rare because phosphate is plentiful in plant and animal foods, but also because phosphate is efficiently absorbed from the diet into the body. Magnesium deficiency is uncommon, but when it occurs it tends to occur in chronic alcoholics, in persons taking diuretic drugs, and in those suffering from severe and prolonged diarrhea.

Zinc deficiency is rare, but it has been found in impoverished populations in the Middle East, who rely on unleavened whole wheat bread as a major food source. The symptoms of zinc deficiency include lack of sexual maturation, lack of pubic hair, and small stature. It may occur in adults with alcoholism or intestinal malabsorption

problems. Low plasma zinc has been found in patients with alcoholic cirrhosis, Crohn's disease, and celiac disease. Experimental studies with humans have shown that the signs of zinc deficiency are detectable after two to five weeks of consumption of the zinc-free diet. The signs include a rash and diarrhea. The rash occurs on the face, groin, hands, and feet.

Mineral	Cause of deficiency	Symptoms of deficiency
Calcium		
Iodine		
Iron		
Potassium		
Sodium		
Zinc		

2. Read the text below and decide which answer A, B, C of D best fits each space.

Oxygen and Carbon Dioxide

We are continuously 1 _____ the gas known as oxygen - without it, we would die. Oxygen plays a vital role in 2 _____ down nutrients such as glucose that need to be transported to various locations to 3 _____ the body with energy.

This process is known as cell 4 _____. The energy produced through this process is contained in a molecule that is called ATP, which stands for adenosine triphosphate. ATP can be thought of as the fuel 5 _____ for various cellular processes to occur throughout the body. In addition to producing ATP, this process also produces carbon dioxide. It is considered a waste product and like other waste products it must leave the body. So carbon dioxide is 6 _____. If carbon dioxide builds up in the body, it can 7 _____ the chemical balance in the body. This can cause acidosis, when fluid becomes too acidic, which can result in calcium 8 _____ in the body's soft tissue. Carbon dioxide buildup in the body is toxic to the heart.

- | | | | | |
|---|----------------|---------------|--------------|--------------|
| 1 | A exhaling | B ingesting | C inhaling | D absorbing |
| 2 | A cutting | B breaking | C putting | D bringing |
| 3 | A give | B produce | C convey | D provide |
| 4 | A perspiration | B respiration | C digestion | D separation |
| 5 | A required | B caused | C contained | D deficient |
| 6 | A inhaled | B assimilated | C discharged | D exhaled |
| 7 | A prevent | B interrupt | C disrupt | D construct |
| 8 | A deficiency | B toxicity | C disability | D deposits |

3. Translate into Ukrainian.

A 46-year-old female patient consulted a doctor about pain in the small joints of the upper and lower limbs. The joints are enlarged and shaped like thickened nodes. Serum test revealed an increase in urate concentration. This might be caused by a disorder in metabolism of:

- A. Purines.
- B. Carbohydrates.
- C. Lipids.
- D. Pyrimidines.
- E. Amino acids.

4. Translate into English.

При обстеженні чоловіка 45-ти років, що тривалий час перебував на рослинній дієті, виявлено негативний азотистий баланс. Яка особливість раціону стала причиною цього явища?

- A. Недостатня кількість білків.
- B. Надмірна кількість води.
- C. Надмірна кількість вуглеводів.
- D. Недостатня кількість жирів.
- E. Недостатня кількість жирів і білків.

5. Study the abbreviations and write their meaning in the table.

Abbreviation	Meaning
c/o	
DOB	
Dx	
FH	
H&P	
M/F	
NYD	
O/E	
PH	
SH	

Keys.

Ex. 2.

1 C, 2 B, 3 D, 4 B, 5 A, 6 D, 7 C, 8 D.

Ex. 3.

Пацієнтка 46-ти років звернулася до лікаря зі скаргами на болі в дрібних суглобах ніг та рук. Суглоби збільшені, мають вигляд потовщених вузлів. У сироватці встановлено підвищений вміст уратів. Це може бути спричинене порушенням обміну:

A. Пуринів.

B. Вуглеводів.

C. Ліпідів.

D. Піримідинів.

E. Амінокислот.

Ex. 4.

Examination of a 45-year-old male patient, who has been on a vegetarian diet for a long time, revealed a negative nitrogen balance. What peculiarity of his diet caused this effect?

A. Proteins deficiency.

B. Excess of water.

C. Excess of carbohydrates.

D. Lipids deficiency.

E. Lipids and proteins deficiency.

Ex. 5.

Abbreviation	Meaning
c/o	complains of
DOB	date of birth
Dx	diagnosis
FH	family history
H&P	history and physical examination
M/F	male/female
NYD	not yet diagnosed
O/E	on examination
PH	past history
SH	social history