CHEMICAL COMPONENTS OF THE BODY

Exercise 1. Which of these words do you know? Check new words in a dictionary. Write the translation of the words in the table.

amino acid	[əˈmiːnəʊ 'æsɪd]	
adipose tissue	['ædɪpəus 'tɪʃuː]	
calcium	['kælsɪəm]	
carbon	['kɑːb(ə)n]	
catalyst	['kæt(ə)lɪst]	
double helix	['dʌbl 'hiːlɪks]	
fatty acid	['fætɪ 'æsɪd]	
glycerol	[ˈglɪs(ə)rɒl]	
hydrogen	['haɪdrədʒən]	
iron	['aɪən]	
lecithin	['lesɪθɪn]	
nitrogen	[ˈnʌɪtrədʒ(ə)n]	
nucleic acid	[njuːˈkliːɪk, 'æsɪd]	
nucleotide	[ˈnjuːklɪətaɪd]	
phosphate	['fɔsfeɪt]	
saccharide	[ˈsakərʌɪd]	
sodium	['səudɪəm]	
strand	[strænd]	

Exercise 2. Choose words from ex. 1 to fill in the gaps in sentences.

1. A _____ is a chemical compound that contains phosphorus.
2. A _____ is a substance that causes a chemical reaction to take place more quickly.
3. _____ is an element which usually takes the form of a hard, dark grey metal.
4. _____ is another term for sugar in Biochemistry.

5. A _____ is a compound which consists of a nucleoside linked to a phosphate group and forms the basic structural unit of nucleic acids.
6. A _____ is a single thin length of something such as fibre especially as twisted together with others.
7. The term _____ refers to the structure formed by double-stranded molecules of nucleic acids such as DNA.
8. _____ is a layer of fat just beneath the skin and around various internal organs.

Exercise 3. Read the text. Find the true sentences and correct the false ones.

1. There are no inorganic substances comprising carbon.
2. The principal role of carbohydrates is to provide energy.
3. Carbohydrates may be classified depending on whether they have one, two, several, or many saccharide units.
4. The body turns excess energy into fats, phospholipids and steroids.
5. Phospholipids and steroids are necessary to build cell membranes.
6. True fats are converted into substances used in the digestion.
7. Enzymes are essential for life because most chemical reactions in living cells would occur too quickly without them.
8. Protein synthesis in the cytoplasm is performed by DNA.

The human body contains chemicals that are constantly reacting with one another. There are two kinds of chemicals that make up the human body: inorganic and organic chemicals. Inorganic chemicals are primarily molecules that consist of one or two elements that are not carbon. Water (H2O) and oxygen (O2) are examples that are important for the human body to function, as are iron (Fe), calcium (Ca), and sodium (Na). One exception is carbon dioxide (CO2) - even though this contains carbon, it is inorganic. The other category of chemicals important to the body is organic chemicals, which contain the two elements hydrogen and carbon. These chemicals include fats, proteins, carbohydrates, and nucleic acids.

Carbohydrates are made up of carbon, hydrogen, and oxygen, and its main function is to be the body's energy source. There are four types of carbohydrates, all of which are forms of saccharide. They are monosaccharides, disaccharides, oligosaccharides, and polysaccharides. Monosaccharides are the simplest sugar compounds, because they only contain one sugar. Disaccharides comprise two monosaccharide compounds, while oligosaccharides contain anywhere between 3 and 20 monosaccharides. Finally, polysaccharides include thousands of monosaccharide compounds.

Like carbohydrates, lipids are also composed of carbon, hydrogen, and oxygen. Some lipids also contain phosphorus. Three types of lipids include true fats, phospholipids and steroids. True fats are made up of a molecule called glycerol, and between one and three fatty acid molecules. These fats are where the body stores excess energy produced by food in the form of calories. If a body does not use all of the calories, it is converted to fat and stored in the body's adipose tissues.

Another type of lipids is phospholipids, which are diglycerides that are bonded to a phosphate molecule. Unlike fats, phospholipids do not store energy. They are a part of a cell's structure; they form part of the cell membrane known as lecithin. They also are an integral part of the body's nervous system, in that they help to form the cell's myelin sheath that protects neurons. Like phospholipids, steroids form part of the cell membranes. But they also have other functions. One of their primary functions is that the liver processes them into bile salts, which are necessary for the digestion to process fats. In addition, steroids are also involved in hormones related to male and female reproductive organs.

Comprised of building blocks known as amino acids, proteins contain carbon, hydrogen, oxygen, nitrogen, and sometimes sulfur. One of the most important functions of proteins is their role as enzymes or catalysts. Enzymes accelerate chemical reactions in the body without additional energy, such as heat. There are specific enzymes for specific reactions. Because there are many thousands of different chemical reactions going on in the body at one time, there are many thousands of different enzymes.

There are two types of nucleic acid – DNA and RNA. Nucleic acids are large molecules that are made up of nucleotides. Each nucleotide has four components: sugar, phosphate group, and a nitrogenous base. DNA is a double strand of nucleotides that is in the shape of a twisted ladder, also called the double helix. DNA contains information on hereditary characteristics, and therefore is the body's genetic code. RNA is just a single strand. RNA's primary function is to carry out protein synthesis, and it performs this duty in the cytoplasm.

Exercise 4. Focus on grammar: Present Simple – positive and negative.

Present Simple is used to say that something happens all the time or repeatedly, or that something is true in general.

Look at these sentences and complete the rules.

Enzymes accelerate chemical reactions in the body without additional energy.

DNA contains information on hereditary characteristics.

Phospholipids do not store energy.

A body does not use all of the calories.

- In positive sentences with *I, we, you, they or plural nouns we use* _____
- In positive sentences with *he, she it or singular nouns we add* ____ *or* ____ *to the infinitive.*
- In negative sentences with *I, we, you, they or plural nouns we use* _____ *+ infinitive.*
- In negative sentences with *he, she it or singular nouns we use* _____ + *infinitive.*

Exercise 5. Fill in the gaps with the correct form of the verb in brackets.

Water 1_____ (comprise) approximately 60 to 75 percent of the human body. It 2_____ (act) as a solvent and as a lubricant. Besides it is vital in regulating the body's temperature. Many substances 3_____ (dissolve) in it, which 4_____ (allow) nutrients and other vital components to be transported throughout the body. Another important function is the elimination of waste. Water

5_____ (dissolve) materials that the body 6_____ (not need) and 7_____ (remove) them through the urinary system. Water is a lubricant, which 8_____ (mean) it 9_____ (prevent) friction between the various surfaces inside the body, such as bones and blood vessels. The temperature of water 10_____ (not change) quickly - it has to absorb a lot of heat or lose a lot of heat before the temperature 11_____ (increase) or 12_____ (decrease). This property 13_____ (enable) the body to stay at a constant temperature. In addition, water 14 _____ (do) an important cooling job for the body in the form of perspiration. When the body 15_____ (absorb) an excess amount of heat, sweat 16 _____ (form) on the skin, which 17_____ (allow) the heat to escape the body without damaging any cells.

Exercise 6. Find in the article in ex. 5 words to fill in the table. Check the meaning of new words in a dictionary.

verb	noun	adjective
	absorption	absorbed, absorbing
		damaged, undamaged
		decreased, decreasing
	solution	dissolving, dissolved, undissolved soluble, insoluble
eliminate		eliminated
disable	ability disability	able disabled
		increased, increasing
lubricate		lubricated, lubricating
	prevention	preventable, unpreventable
	removal	removed
heat		hot

Exercise 7. Use the word given in capitals at the end of each line to form a word that fits in the gap in the same line.

1. The typical feature of carbon atoms is the _____ to bond to each other or to atoms of other elements. ABLE

2. Water is the fundamental _____ for all biochemical processes in our bodies. DISSOLVE

3. Among its vital functions, water acts as a _____ for the respiratory tract, digestive tract, and all tissues that are moistened via mucus. LUBRICATE

4. Without sufficient phosphorus, body protein manufacture is _____, which eventually affects overall health. DECREASE

5. The process of iron _____ is tightly regulated because the body does not posses any biochemical mechanisms for removing iron. ABSORB

6. Sodium is _____ in the blood and plays a key role in maintaining blood pressure. DISSOLVE

7. Omega 3 fatty acid can be used for the _____ of cognitive decline in older people. PREVENT

8. When _____ of carbon dioxide is disrupted, this can lead to imbalances in body gases and acidity. ELIMINATE

Exercise 8. Focus on grammar: Present Simple – questions.

Look at these questions and complete the rule.

What functions do lipids perform in our bodies?

What functions does water perform in our bodies?

- We make Present Simple questions with:
  question word + _____ *or* _____ + *subject* + _____.

Exercise 9. Make questions with these words. Use Present Simple.

Ask and answer the questions in pairs.

1. What / inorganic chemicals / consist of?

2. What elements / organic chemicals / contain?
3. How many saccharide units / each type of carbohydrates / contain?
4. What / enzymes / increase?
5. What / phospholipids / form?
6. Where / RNA / perform its function?
7. What / DNA / contain?
8. How / water / regulate the body's temperature?

Exercise 10. Medical vocabulary: prefixes.

Study the meaning of prefixes:

Prefix	mono-	di-	oligo-	poly-
Meaning	one	two	little, deficient	many

Match medical terms 1-10 to their definitions a-j.

1 monocellular, 2 dicyclic, 3 oligodontia, 4 polycystic, 5 oligosymptomatic, 6 oligodynamic, 7 diphase, 8 mononuclear, 9 monosymptomatic, 10 diplopia

a having or involving a single kind of cell - *1 monocellular*

b the perception of two images of a single object; called double vision – _____

c active in very small quantities or at low concentrations - _____

d manifested by only one marked symptom – _____

e having two phases - _____

f containing two usually fused rings in the structure of the molecule – _____

g containing many cysts – _____

h congenital absence of some of the teeth – _____

i having only one nucleus – _____

j having few or minor symptoms - _____

Keys

Ex. 1.

amino acid	[əˈmiːnəʊ 'æsɪd]	амінокислота
adipose tissue	['ædɪpəus 'tɪʃuː]	жирова тканина
calcium	['kælsɪəm]	кальцій
carbon	['kɑːb(ə)n]	вуглець
catalyst	['kæt(ə)lɪst]	каталізатор
double helix	['dʌbl 'hiːlɪks]	подвійна спіраль (молекули ДНК)
fatty acid	['fætɪ 'æsɪd]	жирна кислота
glycerol	[ˈglɪs(ə)rɒl]	гліцерин
hydrogen	['haɪdrədʒən]	водень
iron	['aɪən]	залізо
lecithin	['lesɪθɪn]	лецитин
nitrogen	[ˈnʌɪtrədʒ(ə)n]	азот
nucleic acid	[njuːˈkliːɪk, 'æsɪd]	нуклеїнова кислота
nucleotide	[ˈnjuːklɪətaɪd]	нуклеотид
phosphate	['fɔsfeɪt]	фосфат
saccharide	[ˈsakərʌɪd]	сахарид
sodium	['səudɪəm]	натрій
strand	[strænd]	нитка (ДНК, білка)

Ex. 2.

1. A phosphate is a chemical compound that contains phosphorus.
2. A catalyst is a substance that causes a chemical reaction to take place more quickly.
3. Iron is an element which usually takes the form of a hard, dark grey metal.
4. Saccharide is another term for sugar in Biochemistry.
5. A nucleotide is a compound which consists of a nucleoside linked to a phosphate group and forms the basic structural unit of nucleic acids.
6. A strand is a single thin length of something such as fibre especially as twisted together with others
7. The term double helix refers to the structure formed by double-stranded molecules of nucleic acids such as DNA.
8. Adipose tissue is a layer of fat just beneath the skin and around various internal organs.

Ex. 3.

1 F Carbon dioxide contains carbon, but it is inorganic.
2 T.
3 T.
4 F The body turns excess energy into fats.
5 T.
6 F Steroids are processed by the liver into bile salts, which are used during the digestion to process fats.
7 F Enzymes are essential for life because most chemical reactions in living cells would occur too slowly without them.
8 F Protein synthesis in the cytoplasm is performed by RNA.

Ex. 5.

1 comprises, 2 acts, 3 dissolve, 4 allows, 5 dissolves, 6 does not need, 7 removes, 8 means, 9 prevents, 10 does not change, 11 increases, 12 decreases, 13 enables, 14 does, 15 absorbs, 16 forms, 17 allows.

Ex. 6

verb	noun	adjective
absorb	absorption	absorbed, absorbing
damage	damage	damaged, undamaged
decrease	decrease	decreased, decreasing
dissolve	solvent solution	dissolved, undissolved soluble, insoluble
eliminate	elimination	eliminated
enable disable	ability disability	able disabled
increase	increase	increased
lubricate	lubricant	lubricated, lubricating
prevent	prevention	preventable, unpreventable
remove	removal	removed
heat	heat	hot

Ex. 7.

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Ex. 9.

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2. What elements do organic chemicals contain?
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4. What do enzymes increase?
5. What do phospholipids form?
6. Where does RNA perform its function?
7. What does DNA contain?
8. How does water regulate the body's temperature?

Ex. 10.

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