Western European Journal of Modern Experiments and Scientific Methods
Volume 1, Issue 3, November, 2023
https://westerneuropeanstudies.com/index.php/1
ISSN (E): 2942-1896 Open Access| Peer Reviewed
This article/work is licensed under CC Attribution-Non-Commercial 4.0

DEVELOPMENT OF IDEAS ABOUT COLLOIDAL DISPERSE SYSTEMS AND THEIR BASIC PROPERTIES

Yusufova Sabina Georgievna,
Assistant teacher of the Department of Medical Sciences, Branch of Kazan Federal University, Jizzakh, Uzbekistan

Abstract. The global role of colloids lies in the fact that they are the main components of such biological formations as living organisms. All substances in the human body are colloidal systems. Colloids enter the body in the form of nutrients and, during the digestion process, are converted into specific colloids characteristic of a given organism. This article learns about colloid-chemical human physiology which is a branch of science that studies the functioning of the human body systems that form colloidal compounds.
Keywords: colloidal formations, membranes, hyaloplasm, nucleus, ribosomes, lysosomes, Golgi complex, collagen, calcium, phosphorus.

Of the 10 body functions divided into separate systems, such as the digestive, cardiovascular, respiratory, nervous, immune, endocrine, genitourinary, blood, liver, kidney systems, we will highlight those that are colloidal systems. We can safely say that the whole person is a walking colloid, and all organs and systems of the body are a dispersed system in their connection with surface phenomena [2].

Bones are collagen, saturated with calcium and phosphorus, which migrate in the presence of vitamin D. Blood is a dispersed system in which the enzyme elements erythrocytes, platelets, and leukocytes are the phase, and plasma is the dispersed medium.

Colloids rich in connective tissue proteins (amino acids proline and glycine) make up the skin, muscles, nails, hair, blood vessels, lungs, the entire gastrointestinal tract and much more, without which life itself is unthinkable.

The entire human body is a world of particles that are in constant motion strictly according to certain rules that obey human physiology. Colloidal systems of organisms have a number of biological properties that characterize a particular colloidal state:

From the point of view of colloid-chemical physiology of a person, his body is a complex of colloidal systems in their constant dynamic interaction [1]. The smallest structural and functional unit of the body is the cell. The cell itself is a complex of colloidal formations, the main of which are cell membranes, hyaloplasm, nucleus, ER, ribosomes, lysosomes, Golgi complex, etc.

Western European Journal of Modern Experiments and Scientific Methods
Volume 1, Issue 3, November, 2023
https://westerneuropeanstudies.com/index.php/1
ISSN (E): 2942-1896 Open Access| Peer Reviewed
This article/work is licensed under CC Attribution-Non-Commercial 4.0

Colloidal processes such as dyeing and gluing have been used since ancient Egypt. The word "colloid" (from the Greek word meaning "glue") was coined by T. Graham in 1862. He distinguished between crystalloids (e.g., salt, sugar), which, when dissolved in water, readily diffuse through a parchment membrane, and colloids, which such as gelatin, which do not have such properties. In 1857, M. Faraday prepared a colloidal solution of gold sol and showed that a strong beam (ray) of light is significantly scattered when passing through this dispersion, so that its path becomes visible - just as happens to a ray of light in a dusty room or beam from car headlights on a foggy evening. This phenomenon is called the Tyndall effect (after J. Tyndall, who studied it in 1869). Light scattering experiments are one of the most effective means for studying colloidal particles and macromolecules; computer software has made it possible to achieve significant success in these studies [3].

Each particle moves along a zigzag path. This phenomenon was first observed in 1827 by R. Brown in water in which pollen particles were suspended; it was called Brownian motion. In the period 1902-1912, R. Zsigmondy created an ultramicroscope, which made it possible to identify colloidal particles by the light they reflected. An ultramicroscope made it possible to count the number of colloidal particles and study their movement.

Electrophoresis (the movement of charged particles in an electric field) was first observed by F. Royce in 1809, who showed that negatively charged particles of a clay suspension migrate towards the positive electrode. In 1937, A. Tiselius used electrophoresis to analyze biopolymers; in particular, he separated blood serum into five protein fractions using electrophoresis. Colloids play a special role in the life of living organisms, including the human body [4].

Blood is a typical example of body tissue, where some colloids are found inside others. V.A. Isaev defines blood as a dispersed system in which the formed elements - erythrocytes, platelets, leukocytes are the phase, and plasma is the dispersed medium. However, according to the definition of the maximum size that colloidal particles can reach, it is 10-7 m, while the size of platelets is 0.5-0.75 x 10-6 m, erythrocytes: 7x10-6 m, and the size of leukocytes exceeds the size erythrocytes several times. Thus, the formed elements cannot be considered a dispersed phase of a colloidal system and themselves represent a colloid within a colloid. Nevertheless, they are responsible for the viscosity of blood, which is 5 times higher than the viscosity of water.

To date, the most studied are colloidal systems of blood plasma. Almost all organic components of plasma are in a colloidal state.

Like blood, lymph consists of a liquid part and formed elements. Moreover, there is a very small amount of red blood cells in it [5].

The qualitative composition of the liquid part of the lymph is exactly the same as the composition of the blood plasma, but quantitatively it differs sharply. Lymph flowing from the intestines contains large quantities of digestive products, which it receives during absorption. It is called chyle and is an emulsion containing large chylomicrons of emulsified fat. The exact

Western European Journal of Modern Experiments and Scientific Methods
Volume 1, Issue 3, November, 2023
https://westerneuropeanstudies.com/index.php/1
ISSN (E): 2942-1896 Open Access| Peer Reviewed
This article/work is licensed under CC Attribution-Non-Commercial 4.0

composition of lymph is not known. It is very subject to individual fluctuations. It is influenced by factors such as the state of the immune system, the activity of various organs and systems, blood pressure, etc.

Connective tissue is a universal tissue of the body. Connective tissue performs the main supporting function in the body and is the basis for the construction of the bone skeleton, joints, ligaments, and internal organs. To date, many questions related to the study of biochemical, colloidal and other properties of connective tissue remain unanswered. Solving them would help to achieve significant progress in the study of the pathogenesis and treatment of diseases of the musculoskeletal system, collagenosis and connective tissue tumors.

Almost any liquid or tissue of the human body is a colloidal dispersed medium. These are, for example, the contents of the gastrointestinal tract, bile, cerebrospinal fluid, and urine. During pathological changes in the body, proteins in edematous fluid (transudates) or proteins in inflammatory exudates are in a colloidal state. Violation of the colloidal properties of the above body media leads to the formation of blood clots in the blood, and as a consequence the development of strokes and heart attacks. In this case, stones form in bile and urine, and in joint tissue - loss of uric acid salts (gout).

Large molecules of proteins, polysaccharides and nucleic acids in our body are nothing more than colloids [4].

In polymer chemistry, new synthesis methods have become possible, with the help of which a chemical system can be cut into particles measuring in the nanometer range. In this way, scientists can make colloidal polystyrene beads onto which they attach thousands of tentacle-like acceptors. Such traps made of a block polymer consisting of styrene and vinylpyridine make it possible, for example, to “fish out” mercury from the blood in case of mercury poisoning.

Currently, so-called liposomes are already used in medicine. Liposomes look like tiny capsules. They consist of an enveloping membrane and an internal cavity filled with an active substance that is soluble in water or oil. Since the structure of the liposome shell is perceived by cell membranes as its own, small transport capsules have less problems in overcoming the natural barriers of the skin than “unpackaged” active substances. In the deep layers of the upper skin, liposomes must give up their load of active substance to the cells, and strengthen the intercellular space with their empty shell [5].

Liposomes are closed bubbles of water surrounded by one or more layers of lipids. They were first noticed by English researcher Alec Bangham and his colleagues in 1965. They noticed that liposomes closely resembled cell membranes. In those years, it was already known that cell membranes perform many functions, and liposomes immediately became an important tool for studying them. Liposomes are used to study the effect of vitamins, hormones, antibiotics and other drugs on membranes. This aspect of the matter has attracted the most attention from researchers, since it turned out that liposomes do a good job as drug carriers.

Western European Journal of Modern Experiments and Scientific Methods
Volume 1, Issue 3, November, 2023
https://westerneuropeanstudies.com/index.php/1
ISSN (E): 2942-1896 Open Access| Peer Reviewed
This article/work is licensed under CC Attribution-Non-Commercial 4.0

What qualities of liposomes give them advantages over other drug carriers? First of all, this is the affinity with natural cell membranes in chemical composition. It is known that the lipids that make up membranes occupy from 20 to 80 percent of their mass. Therefore, with the correct selection of liposome components, their introduction into the body does not cause negative reactions.

The second important property of liposomes is their versatility. Due to their semi-synthetic nature, their sizes, characteristics, and surface composition can be widely varied. This allows liposomes to be assigned to carry a wide range of pharmacologically active substances: antitumor and antimicrobial drugs, hormones, enzymes, vaccines, as well as additional sources of energy for the cell, genetic material [3].

Thirdly, liposomes are relatively easily destroyed in the body, releasing the delivered substances, but along the way the liposomes, themselves devoid of antigen properties, reliably shelter their cargo from contact with the immune system and, therefore, do not cause protective and allergic reactions of the body.

Liposomes can also be used to combat infectious diseases. Common leishmaniasis is treated with antimony drugs, which are highly toxic. But when they were administered to experimental animals using liposomes, they began to suppress the proliferation of pathogens in liver cells hundreds of times more effectively than usual, and the toxic effect on the heart and kidneys decreased markedly, which made it possible to increase the dose of the drug. Similar results were obtained in the treatment of fungal diseases similar to leishmaniasis - cryptococcosis and histoplasmosis.

Other researchers, using the antibiotic gentamicin enclosed in liposomes, obtained the same results against the causative agents of brucellosis, and experiments were carried out both on cell culture and on animals - guinea pigs.

Thus, liposomes help maintain high concentrations of drugs in the blood and cells longer, and also help them penetrate into areas where they cannot reach without liposomes.

The forms of interaction of liposomes with cells largely explain their ability to overcome some anatomical barriers of the body, in particular, the walls of the gastrointestinal tract. This circumstance was used to treat diabetes mellitus by administering insulin orally in liposomes. Experiments were carried out on rats in which diabetes mellitus had previously been artificially induced. And it turned out that the administration of insulin in liposomes caused a decrease in blood sugar in the animals, because liposomes protect this hormone from destruction in the gastrointestinal tract. Currently, research in this direction continues

References:

1. Yusufova S.G. The development of cognitive activity among students in medical chemistry lessons in the conditions of individualization of education. Scientific conference “Innovative research in modern education”. Canada, 2023. -p.116.

Western European Journal of Modern Experiments and Scientific Methods
Volume 1, Issue 3, November, 2023
https://westerneuropeanstudies.com/index.php/1
ISSN (E): 2942-1896 Open Access| Peer Reviewed
This article/work is licensed under CC Attribution-Non-Commercial 4.0

2. Yusufova S.G. Redox processes. American Journal of Interdisciplinary Research and Development, Volume 21, 2023. -p.134. www.ajird.journalspark.org
3. Eliseeva T.N. Rare Earth Elements (REE), Which Are of Great Importance for Modern Technology Due to the Presence of Unique Optical and Magnetic Properties in Their Compounds. Eurasian Research Bulletin. Volume 19, 2023. -p.220. www.geniusjournals.org
4. Vasiliev V.P. Analytical chemistry: In 2 books: Book 1: Titrimetric and gravimetric methods of analysis: Textbook. for students universities studying chemical engineering. special - 4th ed., stereotype. - M.: Bustard, 2004. – p.36.
5. Kolthof I.M., Sendel E.B., Quantitative analysis, trans. from English, 3rd ed., M.-L., 1948, -p.496.