International Journal of
Biological Engineering and Agriculture

ISSN: 2833-5376
Volume 2 | No 11 | Nov -2023

# Some Aspects of the Application of Polymers in Pharmacology

**Urinova Zebo Khudayorovna[1], Namozov Orif Mardanovich[2], Karimov Makhmud Muratovich[3], Farmonov Nizom Ochilovich[4], Babaev TuigunMizaakhmedovich[5]**

[1] the main doctoral student of the Samarkand State University named after Sharaf Rashidov

[2] Ph.D., Associate Professor Tashkent State Technical University named after Islam Karimov

[3] Doctor of Chemical Sciences, Associate Professor National University of Uzbekistan named after Mirzo Ulugbek

[4] Candidate of Veterinary Sciences of the Samarkand State University of Veterinary Medicine, Livestock and Biotechnology

[5] Doctor of Chemical Sciences, Professor, National University of Uzbekistan named after Mirzo Ulugbek

**Annotation:** The article discusses the use of polymers in various fields of medicine, in particular in pharmacology. Polymers play an important role in modern medicine due to their unique properties such as biocompatibility, biodegradability, flexibility and versatility. The use of polymers in the creation and use of new drugs with a complex of properties, in wound healing, and in drug delivery is shown.

**Keywords:** pharmacology, biocompatibility, polymer, polyelectrolyte, drug delivery, hydrogel, biosensors.

Scientists increasingly have to think not only about the search for new drugs, but also about the creation of more advanced forms of known active drugs and the task of delivering these drugs directly to the target organ while simultaneously regulating the speed of their action and the time they remain in the body, reducing toxicity and changing the forms of administration, giving them a set of new properties. As world experience shows, solving these problems is possible using scientific achievements in the field of chemistry of macromolecular compounds. These include the production of new polymers with physiological activity and the modification of polymers using physiologically active substances [1]. Physiologically active polymers represent a unique opportunity to “improve” medicinal substances already used in practice. However, these effects, achieved when obtaining dosage forms using polymers, significantly depend on the nature of the polymer carrier and on the nature of the polymer-drug bond, as well as on the conformational features of macromolecules [2].

One of the most significant applications of polymers in medicine is drug delivery. Polymers can be used to encapsulate drugs and deliver them to specific areas of the body. Such targeted drug delivery can improve treatment efficacy and reduce side effects associated with traditional drug delivery methods [3]. Polymers used for drug delivery can be synthetic or natural, and their properties can be modified to suit specific needs. For example, some polymers may release drugs slowly over time, while others may be designed to release drugs quickly.

In the development of the field of chemistry of high-molecular compounds for medical purposes, especially polymer complexes, a great merit belongs to the scientific schools of N.A. Plate, V.A.

Kabanova, G.V. Samsonova, A.B. Zezina, E.F. Panarina, B.N. Laskorina, H.U. Usmanova, U.N. Musaeva, M. Fukuda, Y. Chen, A. Yoshida, B.A. Zhubanova, E.A. Bekturova, E. Orban, J. Matthäus, S. Gruner, S. Moulei, T. Yoshioka, M. Ogata, T. Suzuki and many others. Including V.A. Kabanov [4], by studying the interaction of polyacrylic and polymethacrylic acids with aminazine, showed that, along with electrostatic bonding, rather strong hydrophobic interactions are also realized in the system. ON THE. Plate and his colleagues [5] created biocompatible and biodegradable medications. Kazakh scientists [6] have created a new original drug - richlocaine, which is a highly effective local anesthetic, which is approved for use in practical medicine as an isotonic solution for injection. In the literature [7] there is information about the effect of the drug "Doxan" (a polyelectrolyte complex of a cationic polyelectrolyte and an anionic surfactant) on the processes of animal growth and increasing their productivity.

This scientific direction in our country was founded by academician H.U. Usmanov and developed in the scientific schools of academicians M.A. Askarova, S.Sh. Rashidova, Professor U.N. Musaev and significant progress has been made in the synthesis and study of natural and synthetic polymers and new polymeric drugs with special properties have been created. At the Institute of Chemistry and Physics of Polymers of the Academy of Sciences of Uzbekistan under the leadership of Academician S.Sh. Rashidova, based on natural biopolymers - pectin, cellulose and chitosan, created and studied the physicochemical properties of various polycomplexes [8]. For example, a plasma substitute is the drug "Covilon" based on PVP and Co+2 ions, and a laboratory scheme for the synthesis of chitosanbilized poly complexes of copper, cobalt and silver has been developed, which have shown positive effects as antimicrobial drugs and fungicides for suppressing diseases of agricultural crops [9 ].

Scientists under the leadership of U.N. Musaev, in order to obtain polymer complexes of dications of antiprotozoal drugs (azidine, diamidine), studied the processes of their interaction with carboxyl-containing polymers [10]. A study of the desorption of antiprotozoal compounds from complexes of carboxyl-containing polymers showed that there is an inverse relationship between the duration of pharmacological action and the rate of diffusion.

Next, we will present modern achievements in the use of polymers in pharmacology. For example, the use of polymers in medicine, the development of hydrogels for wound healing. Hydrogels are water-swollen polymer networks that can mimic the natural extracellular matrix of tissues. They can be engineered to have properties such as mechanical strength, biocompatibility and biodegradability, making them suitable for use in wound healing. Hydrogels can be used to create wound dressings that promote healing by creating a moist environment and delivering drugs or growth factors directly to the wound site [11]. They can also be used as injectable gels to fill irregularly shaped wounds or to deliver drugs to disease sites [12].

Polyelectrolytes (PE) are increasingly used as carrier polymers, which is explained both by the successes achieved in controlling the reactions of PE synthesis and by the unusual patterns of their preparation. The physicochemical and technological characteristics of polyelectrolytes allow them to be used to create a wide range of drugs, and to produce prolonged-release tablets, coated tablets, and medicinal films based on them [13]. To a large extent, this is due to such specific properties as the ability to react with charged particles and surfaces, selectively enter into chemical, physicochemical interactions, and also form true solutions and colloidal systems in aqueous, aqueous-organic and organic media [14].

Polymers are used in the process of creating new tissues or organs in the laboratory. Polymers can be used as scaffolds to support the growth of new tissues or organs. For example, a polymer scaffold can be used to support the growth of new bone tissue in patients with bone defects or injuries. In addition, polymers can be used to create artificial skin, which can be used to treat burns or other skin injuries [15].

Polymers can be used to create diagnostic tools such as biosensors that can detect specific molecules in the body [16]. Biosensors can be used to diagnose diseases or monitor the effectiveness of

treatments. Polymers used in diagnostic tools must be able to interact with target molecules in a specific and sensitive manner.

**Conclusion.**

The properties of polymers used in medicine must be carefully controlled to ensure their biocompatibility and biodegradability. In general, the use of polymers in pharmacology has revolutionized this field and opened up new opportunities for diagnosis, treatment and prevention of diseases. With continued research and development, polymers will continue to play a critical role in the advancement of medicine and healthcare.

**Bibliography:**

1. Panarin, E.F. Polymers in medicine and pharmacy. - St. Petersburg: Publishing House of the Polytechnic University, 2008. - 192 P.
2. Alhnan M.A., Basit A.W. Engineering polymer blend microparticles: An investigation into the influence of polymer blend distribution and attraction // Eur.J Pharm. Sci. -2010. -R. 798-805.
3. Shtilman M.I. Polymers for medical and biological purposes. M.: KKTs "Akademkniga" 2006. 247 p.
4. Bystrova N.I., Kemenova V.A., Zezin A.B., Kabanov V.A. Interaction of chlorpromazine with polymethacrylic and polyacrylic acids in acidic media // Pharm. Chem. magazine, -1984. No. 4. - P.464-467.
5. Plate N.A., Litmanovich A.D., Kudryavtsev Ya.V. Macromolecular reactions in polymer melts and mixtures. M.: Nauka, 2008, -S. 30-144.
6. Tatykhanova G.S., Yashkarova M.G., Kudaibergenov S.E.//Immobilization of richlocaine into a matrix of pH and thermosensitive hydrogels based on copolymers of N-isopropylacrylamide//Vestnik Nat. Academician of Sciences Rep. Kazakhstan. 2007. No. 5. - WITH. 8-12.
7. Shabanov P.D. New generation antiseptics. Pharmacology of kata-pol and related compounds // Clinic, pharmacology and drug therapy. 2002. T.1. No. 2. –P.64-72.
8. Rashidova S.Sh., Milusheva R.Yu. Chitin and chitosan Bombux mori: Synthesis, properties and applications. Tashkent: Fan, 2009. -S. 23-291.
9. Rashidova S.Sh., Kudyshkin V.O. Introduction to the chemistry of high-molecular compounds. Tashkent, Navruz. 2014. -P.19-22.
10. Karimov M.M., Mukhamediev M.G., Musaev U.N. Modification of 4,4'-diamidinodiazoaminobenzene with carboxyl-containing ionites // Sorption and chromatographic processes. 2012. T12. Issue 1. -S. 124-132.
11. Rauch B.M., Friberg T.R., Meudez C.A.M. Biocompatible reverse thermal gel systems the release of intervitreal bevacizumab in vivo//JOVS. 2014. No. 55. –R.469-476.
12. Bikbov M.M., Khusnitdinov I.I., Sichaeva N.N., Vildanova R.R. Polymer gels and their use in ophthalmology//Practical medicine. 2017. T.2. -WITH. 38-42.
13. Gavrilin M.V. “The use of polymers and copolymers of acrylic acid and ethylene oxide derivatives in pharmacy” Chem. Pharm. Journal, vol. 35, no. 1, 2001, pp. 33-36.
14. Bekturov E.A. Application of polymer Complex//Evrasian chemico technological journal. 2009. V.11, No. 3, -P. 187-192.
15. Kochetkova, E.M. Polymers in medicine. Moscow: Limited Liability Company "Internauka", 2020. - pp. 213-215.
16. Kakorin, I.A. Possibility of using nanostructures in dentistry // International Journal of Humanities and Natural Sciences. - 2022. -
17. No. 42 (67). - pp. 129-131. - DOI 10.24412/2500-1000-2022-4-2-129-131.