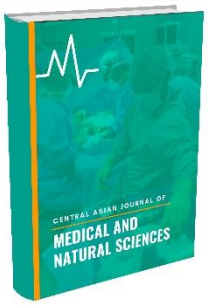
CENTRAL ASIAN JOURNAL OF MEDICAL AND NATURAL SCIENCES



Volume: 01 Issue: 03 | Sep-Oct 2020 ISSN: 2660-4159

www. cajmns.centralasianstudies.org/index.php

APPLICATION OF POLYMERIC MATERIALS IN MEDICINE

Sarimsokov A.A.[1], Mirvohidova A.J.[2]

EMAIL: sarimsokov_a@umail.uz

Received 26th July 2020,
Accepted 17th August 2020,
Online 4th October 2020

[1]Professor, Tashkent Institute of chemical technology, Uzbekistan
[2]Master, Tashkent Institute of chemical technology, Uzbekistan

ABSTRACT: This article discusses the polymer material and its significance in surgery.

KEYWORDS: Chemistry, material, polymer, medicine, surgery, vessel, heart.

INTRODUCTION

The widespread use of polymer materials in medicine is determined by their high consumer properties, especially their lower cost compared to medical products made of metals and their derivatives, and their ability to be easily processed if they are used as single-use products.

The use of polymers for the manufacture of medical devices allows the serial production of materials, patient care items, special dishes and various types of packaging for medicines, which have a number of advantages over similar products made of metals and glass: cost — effectiveness, in some cases-increased resistance to various environments, the ability to produce single-use products, and others.

Polymers intended for use in reconstructive surgery should have the following consumer properties:

- physiological harmlessness,
- no toxicity or carcinogenic properties,
- minimal irritating effect on the tissues in contact with the polymer and others.

In addition, specific applications of polymers in the testing of tissues and organs impose various and stringent requirements for a complex of physical, chemical and mechanical properties.

Such polymers are intended for permanent or temporary replacement of damaged or lost tissues and organs of a living organism.

Bioinert polymers are designed for long-term functioning of organs and tissues. Such polymers must be highly resistant to the effects of the body's environment, not change their original characteristics during repeated deformations, and allow thermal, radiation, and chemical sterilizing treatment.

Bioassimilable polymers are used to temporarily ensure the functioning of the organ for the period of tissue regeneration. Such polymers must have the ability to dissolve or degrade under the influence of liquid media to form non-toxic products assimilated by tissues, and then remove them from the body. The rate of transformation of solid bio-simulated polymers into liquid bio-soluble and biodegradable products under the influence of the biological environment should correspond to the rate of regeneration of body tissues and range from several weeks (for soft tissue prosthetics) to several months (for bone prosthetics).

We will analyze in more detail each area of application of polymers in surgery.

Polymers for cardiovascular surgery are primarily intended for prosthetics of heart valves and blood vessels. For this purpose, the following polymer materials are used in clinical practice

- for vascular prosthetics-fibers made of fluorinated polyolefins (fluorolon), polypropylene, polyester fibers (Dacron);
- for heart valve - silicone (silicone) rubbers, polypropylene, fiber ftorlon, polycarbonate. In some reconstructive operations on the heart apply felt of different density from ftorlon.

In addition to General technical requirements for materials used for prosthetics of the heart and blood vessels, specific requirements are also imposed on the use properties of such polymers: they should not cause hemolysis (destruction) of blood and the formation of blood clots, as well as have a high organotropy.

It should be borne in mind that a number of polymers, such as polyamides, polystyrene, contribute to thrombosis. Lavsan, polytetrafluoroethylene, polyethylene, and polyurethanes do not affect the process of thrombosis, and some of the polymers even delay the formation of blood clots.

Polymers for surgery of other internal organs and tissues. Operations on the lungs, esophagus, intestines, urinary tract, etc.performed using polymer materials are numerous, but the most widespread clinical use is found in adhesive compositions of acrylic polymers and, in particular, on the basis of cyanacrylic acid esters, hemostatic agents based on cellulose derivatives, surgical threads and sorbents based on modified silk.

Joining tissues in various surgical operations using glue is a significant step in improving medical technologies, since it provides tightness of the joint, the possibility of a sharp reduction in the number of stitches and even seamless connection, speeding up operations and reducing the healing time of wounds.

A large number of operations on the diaphragm, in the treatment of hernias, replacement of abdominal wall tissue defects, closure of esophageal defects, etc., are performed using mesh materials made of nylon fiber, polyester fibers, polypropylene fibers and fluorolone. There are reports of successful testing of the bile ducts and ureters using tubes made of polyethylene, plasticized polyvinyl chloride, and organosilicon rubbers.

However, a number of researchers note that the use of prostheses made of these materials gives only a temporary positive effect, since in most cases there is an "encrustation" of prostheses with salts, leading to their subsequent blockage.

A very urgent problem of lung surgery is reconstructive operations on the trachea, bronchi, as well as operations related to the need to fill postoperative cavities. In addition to adhesives, foamed and gel-like compositions based on bioinert and biocompatible polymers can be widely used in these operations. Polyorganosiloxanes (monolithic and foamed) are widely used for filling postoperative cavities, restoring the shape of the breast, etc.

Polymers used in traumatology and orthopedics are designed to create various products of external prosthetics (prosthetic limbs, orthopedic tabs, splints, etc.). polyethylene, polyvinyl chloride, fiberglass, rigid and elastic foams are Widely used, which make it possible to facilitate prostheses, improve their functional, hygienic properties and appearance.

Work on creating polymers for internal prosthetics of joints, bone sections, tendons and muscle ligaments has been widely developed.

To replace tendons and ligaments, Dacron tapes are used. Skull defects are closed using paste-like compositions based on acrylic polymers and copolymers that are approved without heating.

The actual problem of traumatology is the creation of various joint elements (pins, staples) from biocompatible polymers. This will allow you to avoid operations to extract these elements after the completion of bone regeneration. An important task is also the development of adhesive compositions that provide high strength of bone tissue bonding.

Based on the above, we can conclude that for the widespread use of polymer materials in practical medicine, it is necessary to conduct in-depth research in the direction of studying their structural, physico-chemical and biomedical properties..

REFERENCES:

[1]. V.P. Privalko Molecular structure and properties of polymers. -L .: Chemistry. - 1986
[2]. Vauchinsky Yu.P., Darovskikh G.T. Polymer adhesion. Textbook for the course "Chemistry and Physics of Polymers" .- L .: LTI im. Lensovet, 1974
[3]. Katsnelson M.Yu., Banaev G.A. Polymer materials: Handbook of L .: Chemistry. - 1982
[4]. Plate N.A., Vasiliev A.E. Physiologically active polymers. -M .: Chemistry, 1986