

SibFU scientists find a way to reduce the number of postsurgical complications in cardiology

Scientists of Siberian Federal University have tested the compatibility of four biopolymers with human and animal blood cells. The authors of the study claim that these compounds have huge potential for application in medicine. For example, in the future, it is possible to significantly reduce the number of postoperative complications in cardiovascular surgery due to the use of biopolymers as a coating for vascular endoprostheses (stents). The results of the study have been published in the International Journal of Biological Macromolecules.



According to Anna Shumilova, Assistant Professor of the Department of Biotechnology, Siberian Federal University, the number of cases of atherosclerosis is growing all over the world. The group of the highest risk of the disease is 40–60-year old men. One treatment option is stenting of the coronary heart vessels. Into the affected vessels, a special supporting tube is inserted, which, when expanded, broadens the lumen of the vessel and improves blood circulation. Unfortunately, sometimes postoperative complications occur due to an allergic reaction of blood cells to the material which the stent is made of. Such stent will be rejected by the body and overgrown with a cellular mass, which will endanger the patient's life. In addition, when a foreign body is introduced into the organism, platelets rush into the penetration zone and, sticking together, form blood clots, which can trigger a stroke or heart attack.

Postoperative complications can be avoided by using stents with a low allergenic coating. For example, a polymers film of polyhydroxyalkanoates (PHA). Previously, scholars of SB RAS Krasnoyarsk Institute of Biophysics together with specialists from Shumakov Center for Transplantology of Artificial Organs already investigated the properties and behaviour of PHA in relation to blood cells. However, recently SibFU scientists first conducted a “compatibility test” for four types of biopolymers, different in their chemical composition: two were rigid highly crystalline and two were with elastomeric (rubber-like) properties.

As **Anna Shumilova** told, the polymers for experiments were obtained in the laboratory of biotechnology of new biomaterials of Siberian Federal University.



“The polymer films were placed in special sterile trays with blood cells. In the experiment, red blood cells did not pop and did not deform; platelets and monocytes behaved as if they were in the bloodstream of a healthy organism, macrophages showed normal behaviour on the surface of the films,” — she added.

According to Ms Shumilova, the study showed that the biopolymer “shell”, which makes the metal coronary stent “invisible” for the human immune system, will help significantly reduce the number of postoperative complications in cardiovascular surgery.

Journalists from the scientific editorial office of international news agency “Russia Today” wrote about the study of SibFU scientists.

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