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Photo of the press service of Moscow State University.

The new system allows you to effectively cleanse the blood of toxic substances that cause sepsis.

Illustration from the website pixabay.com.

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Sepsis, or the systemic inflammatory response that occurs in response to a local infection process, is a global global health problem. Approximately 200 cases of the disease are recorded per 100 thousand people. According to experts, this is one of the leading causes of death (30-60% of cases of the disease are fatal) with a tendency to annual growth.

As scientists explain, the main threat is the lipopolysaccharide - a fragment of the bacterial membrane. This is one of the most powerful and dangerous toxins for humans, causing a disproportionately strong response from the immune system.

It is the poisoning of the body with lipopolysaccharides that is the key stage in the development of the septic process. Lipopolysaccharides are strongly bound to blood cells and plasma proteins, so it is very difficult to reduce their concentration below dangerous values.

Lipopolysaccharide is one of the most powerful and dangerous toxins for humans, causing a disproportionately strong response from the immune system. Translation of "News. Science." Illustration of the press service of Moscow State University.
Unfortunately, there is still no specific drug for the treatment of sepsis. In recent years, doctors have been able to reduce the number of deaths using modern extracorporeal treatment methods. We are talking about hardware-based purification of blood outside the body using physicochemical methods (for example, artificial kidney or artificial liver devices are used).

To solve an important medical problem, graduates of the Faculty of Chemistry of Moscow State University have developed a unique tool. The invention is based on special polymer sorbents obtained for the first time.

Researchers used porous spherical microspheres of the hypercrosslinked styrene-divinylbenzene copolymer as a matrix. On the pore surface of these microgranules, a synthetic ligand is fixed to lipid A, the most conservative domain of bacterial lipopolysaccharide.

“The proposed materials were selected primarily for safety reasons, resistance to sterilizing treatment, and the absence of emission (emission - ed.) Of low molecular weight substances,” says Ivan Bessonov, creator of the sorbent and founder of Efferon.

According to the scientist, the resulting matrix is characterized by high hemocompatibility (the ability to contact with blood without exerting negative effects on it) and the optimal shape and number of pores. Moreover, the main advantage of the used synthetic ligand is its high binding strength to the lipopolysaccharide molecule.

The researchers also proposed an original method for producing porous polymers of an unusual structure, which directedly extract lipopolysaccharides from the blood, which are responsible for the development of the pathogenic process.

The discovery has already attracted investments aimed at creating the final product, which is based on the described development. The other day, a new medical product Efferon LPS is entering the market.

It is a plastic cylindrical body, internally filled with a sorbent and having standard ports for connecting blood-conducting lines ("adsorber", "sorption column").

Blood of a patient using a special pump under low pressure is passed through the sorbent, while the formed elements of blood and large plasma proteins pass through it without being sorbed, and

lipopolysaccharides bind to special sections of the surface of the sorbent.

Passing this “filtration”, the blood returns back to the circulatory system, and toxic substances firmly bound to the sorbent are removed from the body.

Experts have confirmed the non-toxicity and biocompatibility of the materials used.
Photo of the press service of Moscow State University.
To date, the production of polymer sorbent and other components for the manufacture of disposable medical devices - adsorbers, as well as the production of the products themselves have been organized.

It is important to note that independent, accredited laboratories conducted their own technical and toxicological tests in animal and cell models. Experts have confirmed the non-toxicity and biocompatibility of the materials used, as well as the efficiency

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