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**MEDICINES BASED ON NANOSIZED SILICA – ACHIEVEMENTS AND PROSPECTS**

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Nanosized (highly dispersed, fumed) silica obtained by the vapor phase process has an extremely wide application in various areas of industrial activity. Its physicochemical

characteristics, including adsorption capacity, have been well examined [1]. In pharmaceuticals, fumed silica has long been used as an effective and safe excipient in the manufacture of tablets, ointments, liniments and other dosage forms. A real innovation was the use of fumed silica as an independent medicine with sorption action. The credit for this belongs to the Ukrainian team of chemists, pharmacists and doctors [2]. The effectiveness of fumed silica as an enterosorbent is based primarily on its extraordinary ability to bind proteins, such as microbial and food toxins. Fumed silica is also considered as an enveloping agent that interacts with the glycoproteins of the intestinal mucosa, forming a barrier for the absorption of toxic substances and preventing the adhesion of pathogenic microorganisms [3]. The peak of studying the medical and biological properties of nanosized fumed silica has already passed; today, enterosorbents based on it, for example Polysorb plus, Atoxil<sup>®</sup>, Carbowhite<sup>®</sup>, are in stable demand on the Ukrainian market. If the initial dosage form of fumed silica was powder, now there is a trend towards the production of gel-like dietary supplements (Atoxil Gel, Neosorb Activ Gel, Eliminal Gel<sup>TM</sup>), where polysaccharides, in particular inulin, are introduced as gelling agents.

The next direction is the development of sorption preparations based on nanosized silica for the local treatment of wounds – postoperative complications, trophic ulcers, diabetic foot, etc. Considering that the overly hydrophilic fumed silica powder, due to its strong drying effect, can be applied only in the first, exudative phase of the wound process, we have created a generation of hydrophilic-hydrophobic compositions Flotoxan, Metroxan, Pathelen<sup>®</sup>, Pathelen<sup>®</sup> Hybrid, which also contain antimicrobial substances. The industrially produced Pathelen<sup>®</sup> Hybrid has received good reviews from surgeons and, thanks to the efforts of Swiss investors, has been patented and is undergoing registration in Europe [4].

Another property of nanosized silica – a powerful hemostatic effect due to a specific adsorption mechanism – is used for the manufacture of powder hemostops, for example, by combination with sodium alginate. Kaolin and zeolites stop bleeding through a similar mechanism, however, the size of their surface and the concentration of hydroxyl groups on it, which act as adsorption centers, are smaller than those of silica, so the hemostatic effect of these minerals is weaker. The next step could be to create a bandage that is more convenient to use, in which an inert non-woven matrix will be impregnated with nanosized silica (analogous to American Quick Clot<sup>®</sup> Combat Gauze).

#### References:

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