



Influence Of Nanoporous Carbon Hemosorbent On Blood Collection System

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ABSTRACT

For sorption medicine, carbon, carbon-mineral, specific and immunosorbents are widely used. Carbon sorbents that meet the requirements of medicine are of particular interest for the sorption of toxic substances of various molecular weights and nature. This study was based on the results of using a domestic granular carbon sorbent (UNPGS) with a predominant content of nano and mesopores under experimental conditions. The developer of this product was the team of authors of Uzkimyosanoat JSC with the Tashkent Research Institute of Chemical Technology. Experimental studies were carried out on 138 white laboratory rats of the "Wistar" breed in compliance with the rules adopted by the European Convention for the Protection of Vertebrate Animals used for Experiments or Other Scientific Purposes (ETS N 123), Strasbourg (1986).

KEYWORDS

Carbon sorbent, extracorporeal detoxification, partial thromboplastin time, prothrombin time.

INTRODUCTION

Materials and methods of research: All experiments on the use of UNPGS were carried out on the basis of the State Institution RSNPMCH named after acad. Vakhidov, Department of Experimental Surgery in 2020. Hemosorbent UNPGS is designed for plasma sorption for the purpose of extracorporeal detoxification of the body. The active ingredients of the UNPGS are a carbon sorbent with nano - and mesopores.

According to the international standard ISO10993-1 from 2016, to evaluate the components of systems for extracorporeal detoxification related to devices that are implanted from outside and in contact with indirect blood flow, it is necessary to carry out hemocompatibility tests, part of which is the assessment of coagulation parameters. Standard tests of the hemostasis system were performed: partial thromboplastin time (PTT);

prothrombin time (PT), fibrinogen. Tests to assess the degree of thrombosis development and platelet adhesion to sorbent granules have not been carried out, because the extracorporeal detoxification technique involves exclusively using the patient's plasma, i.e. direct contact with blood cells does not occur.

Partial thromboplastin time is the time of clot formation in recalcified citrate plasma with the addition of partial thromboplastin - a phospholipid suspension of the brain or lungs of mammals (a decrease in the PTT value that occurs upon contact with the material indicates hypercoagulation, is considered a hazard factor for thrombosis).

Results: PT - plasma clotting time with the addition of thromboplastin with known activity (in the presence of thromboplastin, the clotting time depends on the concentration of prothrombin, V, VII, X coagulation factors);

Bench experiments were carried out with UNPGS granules, which were incubated with 40-50 times the volume of confluent donor plasma from healthy volunteers for 10 minutes (short-term contact); 60 minutes (medium-term contact) and 120 minutes (long-term contact), simulating the plasmasorption procedure, which takes 2-4 hours on average. According to our results, in bench experiments in vitro using a large volume of plasma (1:40), after incubation of donor plasma with a sorbent, the hemostasiogram parameters: PT, PTT, fibrinogen do not statistically significantly differ from the control ($p < 0.05$)

The incubation time with UNGPS also does not affect the dynamics of PTT, PT and fibrinogen indices. The absence of significant deviations of the PV upon contact with the UNGPS indicates the absence of the effect of the sorbent on the studied blood coagulation factor. PTT - indicates an increase in prothrombinase activity associated with factors XII, XI, IX, VIII, as well as prothrombinase (Xa, Va, IIa). The level of antithrombotic activity of plasma also affects.

It should be noted that changes in PTT are observed when even one of the blood coagulation factors is shifted.

Conclusion: Thus, the UNGPS hemosorbent has no effect on hemocoagulation. Preclinical tests have shown that the morphology of blood corpuscles and hemocoagulation are not disturbed when using the UNPGS sorbent.

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