PolyGraphene - Perspective Enterosorbent for Medical Toxicology. Preclinical Tests and Safety Assessment.

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The main task. To investigate the interaction of carbon sorbent of new-generation PolyGraphene with the structure of the small intestine mucosa and to determine the possibility of using PolyGraphene for detoxification. During experiments it was studied a new form of an expanded graphite, which after repeated thermal activation and chemical modification with using ultrasound results in a material with stacks of carbon layers with higher multiplicity (10-100), but containing both single sheets of graphene. It is possible to include this material in classification of nanocomposite sorbents and the graphene-containing carbon forms. The authors of this work introduce a new classification of this type of material and see it as PolyGraphene (PG).
Enterosorption - the method based on linkng and removal from the digestive tract (DT) with the medical or preventive purpose of endogenous or exogenous substances, metabolites, various products of a microbic origin.
The last achievements in the field of physiology and pathology of digestion allow to consider enterosorption mechanisms from mass exchange positions between the internal and enteral medium. Though materials and manufacturing techniques of sorbents significantly differ, the main medical requirements to enterosorbents remain rather constant: 1) convenient pharmaceutical form; 2) not toxicity; 3) preparations shouldn't injure the mucous; 4) there has to be a good evacuation warning a sorbent congestion in an intestines gleam; 5) high sorption ability to the deleted components; and others.
Conditions of experiments. Histologic research of a small intestine. For 10 rats through a probe was entered PoliGraphen's suspension into initial department of a duodenum. After 2.5 hours for receiving samples of biomaterial to rats was done euthanasia according to the European bio-ethical standards of manipulations with laboratory animals. Further was opened an abdominal cavity of rats, was cuted sites of medial department of a duodenum, initial department of lean gut and distal department of ileum gut. Samples placed in the cooled fixating solution and processed according to the standard scheme for histologic research.
The results. PolyGraphene remains as a part of a himus and in the field of near wall of a mucous membrane of a gut. PG doesn't get directly to a surface of cages of an epithelium that treats as large poly-particles of PG (100-500 microns), and smaller poly-particles (10-50 microns). At one-time introduction of PG, it goes as transit goods through a small intestine, without being late and without getting directly to a surface of an intestinal epithelium which is closed by a continuous dense mucous bed, and also in space between intestinal fibers. PG works, mainly in a gleam of intestines and at a surface of a mucous layer, without having direct negative destructive effect on cells of an intestinal epithelium and PG has a large capacity.
Conclusions. The results of tests PG as acting basis for the enterosorbents of new generation indicate a good promising potential for wide medical applications of PolyGraphene.