Protective function of humic substances of peloids in the acute intoxication model by polychlorinated biphenyls

Avvakumova N.P., Zhdanova A.V., Katunina E.E., Krivopalova M.A., Glubokova M.N.
Samara State Medical University, Samara, Russia

DOI:10.36291/HIT.2021.003

Despite constant increased attention to pollution problems, its severity does not decrease. The industry has often used substances that are naturally non-decomposing and so dangerous that its production and use are prohibited by the 2001 Stockholm Convention, but they are nevertheless present in the environment. The eco-toxicants of high priority include polychlorinated biphenyls (PCB), which tend to cumulate in humans.

The aim of this work was a research of humic substances of peloid of protective action in model of acute intoxication caused by PCB.

The experiment was made on white outbred rats. Acute intoxication was simulated by single introduction via the probe of PCB mix to the stomach in a dose of 0,1 LD₅₀. To control group of animals (n=6) 0.9% chloride sodium solution was entered. As group of comparison were animals (n=6) to which after PCB intoxication daily entered 0.9% chloride sodium solution. With the medical purpose to animals (n=24) daily subcutaneously entered solutions of peloid drugs on the basis of the humic acids (HA), the hymatomelanic acids (HMA), fulvic acids (FA) and also initial humic substances extract (HFA) emitted from the low-mineralized silt sulfide muds (pH=7.4) by the patented techniques. The experiment was carried out within 10 days.

The therapeutic effectiveness of humic peloid drugs was evaluated by activity of enzymes of aspartate aminotransferase (AST) and alanine aminotransferase (ALT), change of bilirubin content, cholesterol and albumin on the 3rd and 10th day of the experiment in blood serum.

On the 3rd day of the experiment in comparison group under the influence of PCB there was a significant increase in activity of AST and ALT for 27% and for 19.7% respectively in comparison with healthy animals, the content of bilirubin increased by 10 times, cholesterol - by 1.5 times, at the same time the content of albumin decreased by 17%.

The use of peloid drugs has been resulted in smoothing of toxic action of PCB in various degree of intensity: on the 3rd day under the influence of all drugs the AST and ALT level has been sharply decreased; bilirubin content under the influence of HA and HMA decreased in comparison with comparison group more than twice – from 50 mkmol/L to 25 and 21 μ mol/L respectively; action of FA and HFA decreased bilirubin slightly – till 31 and 44 μ mol/L. Level of cholesterol decreased to physiological norm under the influence of all drugs, and the content of albumin was normalized only under the influence of HMA. On the 10th day all biochemical indicators of animals were normalized under the influence of humic substances.

Protective effect of all studied peloid drugs is established, at the same time the most effective was HMA on extent of influence on activity of enzymes, protein and lipidic metabolism.