IRON OXIDE NANOPARTICLES AND LIPID PEROXIDATION IN ACUTE BLOOD LOSS

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Introduction: In many countries around the world the researchers study the iron oxide nanoparticles because of their unique super magnetic properties and an opportunity for biodegradation in the organism as well as of wide spread and cheapness of this biometal.

There are more and more preparations based on the supermagnetic nanoparticles. They are used as contrast agents for a magnetic resonant tomography. They also are applied in oncology for the treatment of malignant tumors and in hematology for the therapy of ferrous-deficit anemia.

It is known that nanoparticles of iron oxides have an increased chemical reactance. The authors described that inhalation of iron oxide nanoparticles is accompanied by the induction of active forms of oxygen in the lung cells. However, the data on iron nanoparticles' influence on oxidative-reductive homeostasis are limited and have inconsistent character.

Aims and objectives: The research purpose is to study the influence of iron oxide nanoparticles on lipid peroxidation and superoxide dismutase (SOD) activity in red blood cells under the conditions of acute blood loss.

Methods and results: Experiments were carried out in 15 albino male Wistar rats with body weight of 180-200g. Blood loss was designed by the extraction of 25% of circulating blood from the heart under the general anesthesia inhalation.

Ultrasmall supermagnetic nanoparticles of iron oxide (II, III), so called magnetite, were obtained by the method of electronic-radiation technology in the Paton Electric Welding Institute of the National Academy of Sciences of Ukraine. They are in the form of powder containing magnetite nanoparticles with a size of 8-16 nm. Suspension of these nanoparticles was prepared ex tempore and administered to the animals intraperitoneally in a dose of 1.35 mg of iron/kg immediately after the blood loss. According to the results of laser spectroscopy in such liquid 99.9% of particles have the size of 50 nm. Mass of these nanoparticles is 46% from iron oxides mass. Other fraction is represented by the particles with a size of 830 nm.

Sl. 8. 3 hours after that the contents of the products reacting with thiobarbituric acid (TBA-reactants) and the activity of SOD by the inhibition of epinephrine auto-oxidation were determined. The data were processed statistically by the standard programs Microsoft Excel.

Sl. 9. It is shown, that acute blood loss is characterized by the increase of TBA-reactants' concentration in red blood cells up to 11.2 extinction units per milliliter in comparison with 3.2 extinction units per milliliter of blood in intact animals. The activity of SOD is 52.6% and essentially does not differ from the control.

After the administration of iron oxide nanoparticles the TBA-reactants' level is equal 7.2 extinction units per milliliter that is in 1.6 times less than in blood loss without pharmacological correction. SOD activity in this group is 46.4% that is authentically lower as compared to blood loss without nanoparticles administration.

The received results testify that acute blood loss in the early period of its compensation is accompanied by amplified formation of lipid peroxidation intermediates on a background of normal SOD's activity. The iron oxide nanoparticles reduce the expressiveness of oxidative stress that can be connected to fast improvement of hematological parameters and restoration of hemoglobin level which plays the important role in maintenance of oxidative balance in red blood cells.

Conclusion: Thus, ultrasmall super magnetic nanoparticles of iron oxide (II, III) as 1.35mg of iron/kg of body weight administered parenterally in acute blood loss can inhibit lipid peroxidation in erythrocytes. Probably, the reducing of oxidative stress in the given situation is connected with fast restoration of hemoglobin level, but the mechanism of this action demands further studying.

Int	bl l	Fe	M	Fe-M
54,3+7,5	52,6+10,0	56,4+12,3	62+8,9	49,1+8,8

	ТБКАП	едЕ/мл(г)	
	Эр	*печень*	
Инт	3,15+0,88	14,05+2,33	6
	3,01+0,49		11
кр 3ч	11,21+0,97	11,82+0,97	4
кр +НЧЖ	7,15+1,35	11,7+0,61	5
кр+М	2,13+0,73	13,58+1,52	4

NEAMON-HEPA CAPSULES – PHARMACEUTICAL PRECLINICAL AND CLINICAL STUDIES

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Introduction: Neamon-hepa combination drug preparation, capsules, developed at the Scientific Center of Drug Research of the State University of Medicine and Pharmacy "Nicolae Testemitanu" contains the following active ingredients: arginine aspartate, spironolactone and BioR (extract of Spirulina platensis biomass), firstly proposed as a combination drug.

Matherials amd methods: Preparation of dosage of Neamon-hepa capsules: weight and volume measurement of the components, lactose impregnation with BioR, and drying of lactose with BioR and pulverization of dry mixture, preparation of mixes: I (spironolactone: anhydrous lactose in 1:2 ratio), II (mix the mix I with lactose impregnated with BioR), III (mix the mix II with cornstarch, microcrystalline cellulose, magnesium stearate), IV-final (mix the mix III with dry L-arginine aspartate), conditioning in capsules.

Results: Efficacy and safety of the product was demonstrated by clinical experiments on a group of 56 mice by determining the acute and chronic toxicity in toxic hepatitis model induced by CCl4 (carbon tetrachloride). The results indicate that in laboratory animals with induced chronic liver damage, receiving Neamon-hepa preparation, declined significantly body mass, decreased hepatomegaly, improved functional status of liver expressed by reduced total bilirubin, ALT, AST alkaline phosphatase, and serum cholesterol lactatdehydrogenase.

Neamon-hepa, has undergone clinical trials, according to the protocol on 55 patients (men and women, aged 18-61 years) with liver cirrhosis B and D of viral etiology, stage Child-Pugh A. Patients were subjected to clinical, laboratory and instrument examination. Data from this study indicates the efficacy and safety of Neamon-Hepa in the treatment of liver cirrhosis and chronic hepatitis, characterized by its hepatoprotective property, evidenced through improved liver function capacity (cytolytic index improvement) and reduction of portal hypertension.