

BIOLOGICAL IMPACT OF HIGH-DOSE AND DOSE-RATE RADIATION EXPOSURE.

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Experimental anti-radiation vaccine is a power tool of immune – prophylaxis of the acute radiation disease. Existing principles of treatment of the acute radiation disease are based on a correction of developing patho-physiological and biochemical processes within the first days after irradiation. Protection from radiation is built on the general principles of immunology and has two main forms – active and passive immunization. Active immunization by the essential radiation toxins of SDR group allows significantly reduce the lethality and increase duration of life among animals that are irradiated by lethal and sub-lethal doses of gamma radiation. The radiation toxins of SDR group have antigenic properties that are specific for different forms of acute radiation disease.

Development of the specific and active immune reaction after intramuscular injection of radiation toxins allows optimize a manifestation of a clinical picture and stabilize laboratory parameters of the acute radiation syndromes. Passive immunization by the anti-radiation serum or preparations of immune-globulins gives a manifestation of the radioprotection effects immediately after this kind of preparation are injected into organisms of mammals. Providing passive immunization by preparations of anti-radiations immune-globulins is possible in different periods of time after radiation.

Providing active immunization by preparations of SDR group is possible only to achieve a prophylaxis goal and form the protection effects that start to work in 18 - 35 days after an injection of biological active SDR substance has been administrated.

However active and passive immunizations by essential anti-radiation toxins and preparations of gamma-globulins extracted from a hyper-immune serum of a horse have significantly different medical prescriptions for application and depend on many factors like a type of radiation, a power of radiation, absorption doses, a time of radiation, a time after radiation, individual and situational conditions of the irradiated object and the environment.

A group of essential radiation toxins with antigenic properties expressed significantly and specifically for different forms of the radiation disease represents the group of compounds: glycoproteids and lipoproteids that accumulate in the lymphatic system of mammals at once in the first hours after radiation.

The molecular weight of radiation toxins of SDR group constitutes 200-250 kDa.

The essential radiation toxins, preparations of SDR (Specific Radiation Determinant), were isolated from the lymphatic system of laboratorial and agricultural animals that were irradiated by doses capable to induce development of cerebral (SDR – 1), toxic (SDR-2), gastrointestinal (SDR-3) and typical (SDR-4) forms of the acute radiation disease .

Biological properties and reproduction effects of preparations of essential radiation toxins of SDR group depended on a magnitude of radiation doses that animal-donors absorbed being irradiated. The essential radiation toxins of SDR group isolated from the lymphatic system of irradiated animals and injected by the different doses to intact animals can provide the effects which induce development of different forms of the acute radiation disease. Different doses of active biological substance of SDR can provide different effects: 1. Optimal doses are necessary for an active immune response and radioprotection effects 2. Toxic doses can induce and stimulate the radiation disease.

Optimal doses of SDR preparations applied for active immunization are determined very individually and depend on species of laboratory animals, their weight and gender.

Toxic doses of SDR preparations can cause, stimulate and imitate the development of different forms of the acute radiation syndromes and any consequences of the acute radiation disorder.

Previously researchers allow making assumption what toxic doses of biological active substances of SDR will increase a possibility of development of oncology disorders.

Active immunization by anti-radiation vaccine reduces a possibility of development post-radiation leucosis and tumors. The anti-radiation vaccine can be used for prophylaxis of radiation defeats for service workers of atomic plants, pilots of civic and military planes, astronauts, sailors of vessels with atomic power engines and for protection of the civic population in a case of a nuclear terrorism act. The Anti-radiation vaccine is not a panacea but however could be a very useful part of a complex management and treatment-prophylaxis measures provided for strengthening of civic and military protection from radiation.