# RADIOPROTECTIVE DRUGS IN RADIATION PROTECTION OF EXPOSED WORKERS AT NUCLEAR ACCIDENTS

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Radiation workers can be exposed to most significant radiation risks during the early stage of nuclear accident. There is the possibility that they may be exposed to lethal doses of γ,β-radiation within the next few hours after the start of a serious nuclear accident (*Ilyin*, 1996).

Radioprotector **indralin** (B-190), being a drug of emergency action, is designed to prevent the acute radiation damage upon exposures to a high dose rate of ionizing radiation (>1 Gy/hour) and particularly to reduce the risk of mortality at the doses that cause severe and extremely severe forms of acute radiation illness (*Vasin*, 1977, *Ilyin et al*, 1994). According to dose reduction factor, the expected radiation protective effect of indralin for humans is up to 1.5 (*Vasin et al*, 1999). Indralin causes no complications of dyspepsia that occur when using sulfur-containing radioprotectors (cystamine, amifostine). Indralin does not reduce the tolerance to thermal exposures in the range of up to 40° C when performing a moderate-level physical activity or affect the labour productivity of exposed radiation workers under hypoxia (*Ilyin et al*, 1994, *Vasin*, 2006). Radiation protective properties of indralin are also sustainable under the combined effects of radiation and extreme factors of the occupational activity.

The drug **betaleukin** (recombinant human IL-1β) proposed as agent of early urgent anti-radiation therapy applying once within two hours after irradiation (*Rozhdestvenskii et al*, 2008). The antiemetic drug **latran** (ondansetron) has included in first-aid kit of personnel for prevention and arrest of primary radiation syndrome.

The second most important factor for exposed workers in these situations is the intake of iodine radionuclides into the body via inhalation followed by thyroid gland damage. The iodine prophylaxis by usage of **potassium iodide** tablet (125 mg) must be taken no later first hour from the start of radiation accident once/day within only five days (*Ilyin et al*, 1972).

The experience of the Chernobyl accident has shown that the levels of the inhalation and alimentary intake into a body of other radionuclides (fission isotopes, neutron activation products, plutonium and transuranic elements (TUE)) were within emergency regulations. However, in order to prevent resorption (due to the retrograde intake from the respiratory system) cesium and strontium radionuclides by the gastrointestinal tract, **ferrocene** and **adsobar** or **algisorb** are administered. Sodium-calcium and zinc salts of pentetic acid (**pentacin** and **zinkacin**) are applied to fight against the incorporation of plutonium, TUE, alkaline-earth and rare-earth radionuclides. Detergent **"Zaschita"** is applied as a standard agent for an effective decontamination of the skin (*Ilyin et al*, 1972,1977).

**Emergency agents of radiation protection and treatment of radiation damages**

- Radioprotector of emergency action: Indralin
- Drugs of early treatment: Betaleukin (rhIL-1β)
- Iodine prophylaxis: Potassium iodide
- Prophylaxis of radiation vomiting: Latran
- Prophylaxis of radionuclides incorparation: Ferrocene, Adsorbar, Algisorb , Pentacin, Zincacin
- Antioxident prophylaxis: Riboxin, Aminotetravit, Bioflavonoids etc
- Decontamination of skin: Detergent “Zaschita”

The antioxidant agents (**riboxin**, **polyvitamins**, **bioflavonoids** etc) are applied to accelerate post-radiation repair in emergency workers during a prolonged exposure to low-intensity γ-irradiation if cumulative dose of external radiation is about 150-250 mSv (*Vladimirov et al*, 1997, *Vasin*, 2006).