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The permeability of some blood-tissue barriers for PEGylated gold nanoparticles at use of parenteral injection

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In biomedicine gold nano-particles (GNPs) use widely for diagnostic, the directed transport of drugs, for optical visualization of cellular structures. The possibility of penetration of nanoparticles through animal's blood-tissue barriers remains poorly studied. The aim of this study was the morphological features of the permeability through some blood-tissue barriers by using the parenteral injection of GNPs. PEGylated 5-150-nm GNPs, suspended in saline solution was injected in tail venous of male and pregnant female rats at a volume about 0.7 ml, 100 mkg Au per kg body weight. GNPs were visualized by the auto metallography and the total Au content in tissues was evaluated by the atomic absorption spectroscopy (AAS). We studied permeability of the placental barrier, of blood-brain barrier (BBB), of blood–testis barrier (BTB) and of blood-retinal barrier (BRB) of animals. AAS showed that 5-, 10-, 30- and 50-nm GNPs penetrate through the rat placental barrier. GNPs were found in macrophages of fetal liver and spleen. In tissues of the organs of examined fetuses no significant morphological changes were observed.150-nm GNPs don't penetrate through the rat placental barrier, but 5-nm GNPs penetrate through the blood-brain barrier. BTB and BRB barriers are impermeable for GNPs of all these diameters. Also we demonstrated presence other morphological features for the size-dependence permeability of GNPs through animal blood-tissues barriers by use of parenteral injection. Authors suggest that these results can be used to develop new types of drugs (in high technological nano-pharmacology) with selective permeability through animal tissue barriers, especially in prenatal fetal therapy.

Biography

Radik Khayrullin has completed his DD. He is the Head of chair of Human Anatomy of Ulyanovsk State University. He has published more than 80 papers in reputed journals.

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