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Can nanoparticles from hyaluronic acid protect against ionizing radiation?

In recent years, hyaluronic acid (HA) has emerged as a promising candidate for biomedical applications mainly in areas of tissue engineering and drug delivery systems. Hyaluronic acid is a ubiquitous linear polysaccharide endowed with some exceptional physicochemical properties, such as high biocompatibility and biodegradability, strong hydration and viscoelasticity that depend on the size of the molecule. It plays a variety of important physiological roles in tissue hydration and mechanical protection and is also involved in inflammation, leukocyte migration and extracellular matrix remodeling. HA-based nanoparticles or nanoconjugates (HA NPs) have shown promising potential as the drug carrier for cancer therapy, due to specifically bind to CD44 which is over-expressed on various cancer cells. Already, a number of drug delivery systems such as drug-conjugates, nanocomplexes and nanoparticles, using HA as the primary constituent have been widely investigated. For these reasons, HA appear to be a very interesting option that could contribute to the mitigation or even complete elimination of radiation damage. Our goal is to determine the radioprotective effect of hyaluronic acid nanoparticles. We have been investigating in vitro effect of HA NPs with focus on relative nanoscale toxicity as well as effect on irradiated cell lines and specific surface receptors in response to ionizing radiation. Also, HA NPs have been applied to in vivo model (C57Bl/6J mice) before total body or partial thorax irradiation. This part of our research is targeting on effect of exogenous HA on the development and / or mitigating acute radiation syndrome and radiation induced lung injuries.

Key words: ionizing radiation, radioprotection, nanoparticles, hyaluronic acid

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