Zahra Hajikarimi et al., J Nucl Med Radiat Ther 2015, 6:4
http://dx.doi.org/10.4172/2155-9619.S1.002

OMICS International
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International Conference on
Medical Physics
August 03-05, 2015 Birmingham, UK

Cytotoxic effect of Iron Oxide Nanoparticle with polymer coating as a carrier of 5- Fluorouracil and mega voltage X-ray on prostate cancer

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Nanotechnology has developed for both cancer diagnosis and therapy. The purpose of this study was to investigate the uptake and cytotoxic effect of magnetic nanoparticles as a carrier of 5-fluorouracil and x-ray on the level of proliferation capacity of DU145 prostate carcinoma cell line in monolayer model.

Therefore, DU145 cells were cultured as monolayer and treated with different concentrations of 5-FU / or nanoparticles as 5-FU carriers for 24 hours and 2Gy x-ray (6MV). After treatment with nanoparticles, the iron uptake of DU145 cells was confirmed through atomic adsorption spectrometry (AAS). The cytotoxic effect of these nanoparticles on the cells was evaluated using the Colony formation assay. Briefly after treatment, the cells seeded at different concentration in 60 mm Petri dish and left for 11 days to form colonies. Finally, the number of colonies counted for different groups by microscope.

Our results indicated that Iron content and therefore the cellular uptake of 5-FU loaded nanoparticles increased with the increase of nanoparticles concentrations. The viability of the cells is constant as along with the increase of the concentration of free 5-FU and 5-FU encapsulated in nanoparticles. Our finding showed that proliferation capacity of the cells decreased as along with the increase of the concentration of free 5-FU and PLGA coated iron oxide nanoparticles as a carrier of 5-fluorouracil in combination with x-ray. Our results point to the possibility that iron oxide nanoparticles as 5-fu carrier can affect more efficient that 5-Fu as enhanced radiation.

According to this study, drug loaded nanoparticles could deliver 5-Fu more efficient into the cells. So, magnetic nanoparticles are effective drug delivery vehicles for 5-FU. PLGA coated iron oxide nanoparticles are biocompatible and this coating is an appropriate surface that can penetrate into the cells.

Keywords: 5-Fluorouracil, PLGA coated iron oxide nanoparticles, prostate cancer, DU145, atomic absorption spectroscopy, Colony formation assay

Biography

I am completed my MSc at the age of 25 years from Tehran University of Medical Science. I am a medical physicist at Ramezanzade Oncology Center now. I published one book and three papers. I work on two books and one paper now. They are in Ultrasound and Radiation Safety topics.

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