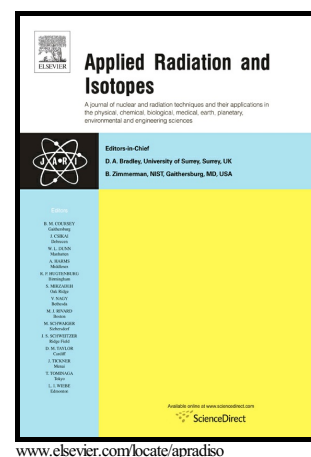


Nanoscale dose deposition in cell structures under X-ray irradiation treatment assisted with nanoparticles: an analytical approach to the relative biological effectiveness

W. Melo-Bernal, V. Chernov, G. Chernov, M. Barboza-Flores



PII: S0969-8043(16)31104-6
DOI: <http://dx.doi.org/10.1016/j.apradiso.2017.05.020>
Reference: ARI7899

To appear in: *Applied Radiation and Isotopes*

Received date: 18 January 2017

Accepted date: 24 May 2017

Cite this article as: W. Melo-Bernal, V. Chernov, G. Chernov and M. Barboza-Flores, Nanoscale dose deposition in cell structures under X-ray irradiation treatment assisted with nanoparticles: an analytical approach to the relative biological effectiveness, *Applied Radiation and Isotopes* <http://dx.doi.org/10.1016/j.apradiso.2017.05.020>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting galley proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Nanoscale dose deposition in cell structures under X-ray irradiation treatment assisted with nanoparticles: an analytical approach to the relative biological effectiveness

W. Melo-Bernal¹, V. Chernov², G. Chernov³, M. Barboza-Flores²

¹Departamento de Investigación en Física, Doctorado en Física Universidad de Sonora, 83000, Hermosillo, Sonora, México

²Departamento de Investigación en Física, Universidad de Sonora, 83000, Hermosillo, Sonora, México

³Departamento de Física, Doctorado en Nanotecnología, Universidad de Sonora, 83000, Hermosillo, Sonora, México

Abstract

In this study, an analytical model for the assessment of the modification of cell culture survival under ionizing radiation assisted with nanoparticles (NPs) is presented. The model starts from the radial dose deposition around a single NP, which is used to describe the dose deposition in a cell structure with embedded NPs and, in turn, to evaluate the number of lesions formed by ionizing radiation. The model is applied to the calculation of relative biological effectiveness values for cells exposed to 0.5 mg/g of uniformly dispersed NPs with a radius of 10 nm made of Fe, I, Gd, Hf, Pt and Au and irradiated with X-rays of energies 20 keV higher than the element K-shell binding energy.

1. Introduction

In recent years, the use of nanoparticles (NP) in medicine has been growing rapidly. In particular, recent advances in nanotechnology have provided new opportunities for the use of NPs to further increase radiation therapy efficacy (Ngwa et al., 2014). Given that radiation therapy is not a selective antitumor treatment; the main challenge for the use of this therapy is the damage to the healthy tissue surrounding the tumor. Hence, the goal of combining radiation therapy with NPs is to increase its therapeutic efficacy by increasing the differential effect between healthy and tumor tissue (Retif, et al., 2015).

Download English Version:

<https://daneshyari.com/en/article/8208464>

Download Persian Version:

<https://daneshyari.com/article/8208464>

[Daneshyari.com](https://daneshyari.com)