Public Abstract

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Graduation Term:FS 2012

Department:Nuclear Engineering

Degree:PhD

Title:QUANTIFICATION OF ABSORBED DOSES FROM RADIOACTIVE GOLD NANOPARTICLES AND CHROMIUM 51 SEED IMPLANTS

The purpose of this work is 2 fold, firstly to estimate that radioactive gold nanoparticles can be used in brachytherapy, and secondly the chromium isotope in the form of brachy seed in radiation therapy applications.

Radioactive nanoparticles use is new in radiation therapy. There is no established mechanism that quantifies the radiation doses due to nanoparticles. As a intiator, gelatin based dosimeters were used to estimate the radiation doses. Gelatin based dosimeters are very senstive to radiation interactions depending upon its constituents and can show quick response upon radiation interaction. The tiny radioactive gold nanoparticles that are about 20 nanometer average size were injected in gel dosimeters. Hypothetically radiation emitted from the nanoparticles interact with the monomers suspended in the gel dosimeters that may undergo polymerization. The magnitude of transformation of monomers into polymers quantifies the absorbed radiation doses. This quantification is presented with the use of MR (Magnetic Resonance) imaging of the dosimeters. Further the quantified results were analyzed with computer simulation using Monte Carlo code (MCNP5 from oak ridge national lab).

Chromium isotope is another potential candidate that may be used in conventional brachy seed form (typically sealed in denser material for e.g. titanium). The quantification of the radiation doses were attempted using MCNP5 code and results suggest that chromium isotope does bear many properties that make it suitable for brachytherapy applications. This has same efficacy as that of clinically accepted irridium isotope and also has less radiation safety issues. This isoptope may find specific use in low dose rate type of brachytherapy applications.