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EPR PROTOCOL FOR DOSE DELIVERY IN RADIOTHERAPY/RADIOSURGERY

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There are four million new cases of cancer per year, and the number of treatments is also increasing due to diagnostic improvements and an ageing population. The goal of radiotherapy/radiosurgery is to kill the tumour cells and simultaneously achieve a high survival rate of the surrounding healthy tissue. A 5% change in the dose can result in normal tissue complication probability of 20%-30%. However, the uncertainty requirement for the dose to the tumour (2.5% ICRU) is not achieved due the gap between the calibration conditions and the conditions used for new treatment modalities based on small and complex radiation fields. Electron paramagnetic resonance (EPR)/electron spin resonance (ESR) spectroscopy is a suitable method for radiation dosimetry due to its accuracy, sensitivity and non-destructive measuring procedure. Materials in which stable paramagnetic species are produced by irradiation can be used as EPR dosimeters for radiation research. When the relationship between EPR signal intensity of stable paramagnetic centre and the dose is of linear character over a wide dose range, the material can be used as a good dosimeter. The amino acid alanine (CH_3 (NH_2)-CH-COOH) is one of the most standardized organic materials for fabrication of dosimeters. The alanine dosimeters are used in biomedical applications due to the similarity with human tissues. Alanine dosimeters are small, compact and quite easy to handle. They are characterized by low influence of dose rate as well as a wide measuring dose range, which makes them applicable for radiation therapy in the ~5-100 Gy dose range where the measured signal is proportional to the absorbed dose. In this paper, an optimisation of the operational parameters of the EPR spectrometer was performed in order to determine the range of doses used in radiotherapy/radiosurgery using alanine dosimeters system and as a result, a new improved protocol was developed.

Biography

Catalin Stelian Tuta has completed his PhD from Faculty of Chemistry, University of Bucharest. Currently, he is working as a Scientific Officer at National Institute of Physics and Nuclear Engineering (IFIN-HH). He has published more than 10 papers in various scientific journals.

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