AbstractID: 6909 Title: 4D in-vivo dosimetry in radiotherapy

4D in-vivo dosimetry in radiotherapy

Purpose: To present a novel concept of 4D *in-vivo* dosimetry in radiotherapy.

Method and Materials: A prototype of a new system capable of simultaneous measurement of dose and spatial position has been developed. The device, controlled by a computer, consists of a probe combining two technologies: MOSFET radiation detector coupled with a magnetic positioning device. Special software that allows sampling position and dose in user defined time intervals has been developed. The preliminary tests of the new device have been performed. The tests included measurements of spatial position accuracy as well as a dosimetric evaluation of the device in ^{60}Co beam from a Theratron teletherapy unit. In addition, some tests were performed in a 6 MV beam from a Siemens linear accelerator to assess if the electromagnetic field from the linac interferes with the performance of the 4D dosimeter system.

Results: Measurements of the angular response of the probe over 360^0 range in a ^{60}Co beam have been found isotropic within +/- 7%. Measurements of dose profiles in air in a ^{60}Co beam have been performed. They agree very well with the measurements performed using RFA300 dosimeter system and a high quality photon diode. Tests conducted in a 6 MV beam indicate that there is no interference from the linac electromagnetic field on the performance of this new 4D dosimeter system.

Conclusion: The results of the preliminary tests indicate that the device can be used for in-vivo dosimetry in a ^{60}Co and high energy beams from linear accelerators. Future work will involve technical improvements to the device, experiments in a 4D phantom and finally patient in-vivo dosimetry.

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