

AbstractID:9549 Title :In vivo Surface Dosimetry With an Optically Stimulated Luminescence Dosimeter

Purpose

We investigated the use of a new optically stimulated luminescence dosimeter (OSLD) for surface dosimetry.

Methods and Materials

OSLDs are small plastic disks (5 mm diameter x 0.2 mm thick) infused with aluminum oxide doped with carbon ($\text{Al}_2\text{O}_3:\text{C}$). Their operation is similar to TLDs; their irradiated crystals yield a signal proportional to absorbed dose upon optical stimulation. The detectors are housed in a light-tight plastic casing measuring 24 x 10 x 1 mm. A dose-response curve for 6M^{V} photons from a Varian 21E x-ray was established. OSLDs were next used to measure surface/buildup doses in a plastic water phantom. Three field sizes were considered: 10 x 10 cm, 5 x 5 cm and 2 x 2 cm and results compared with a parallel plate ion chamber. Clinical performance of OSLD was next evaluated by measuring surface doses in head and neck patients undergoing 3DCRT/IMRT. All measurements were repeated with a MOSFET dosimeter currently used in our clinic.

Results:

The detectors are easy to use, require no preparation/annealing and can be read 10 minutes post-irradiation. The effective depth of measurement for OSLD was found to be 0.4 mm inside the plastic casing. Surface/buildup regression doses with OSLD were in excellent agreement with ion chamber data. When these detectors were used to measure patient surface dose, they compared favorably with MOSFET detectors. Due to smaller intrinsic buildup, OSLD measured surface doses were slightly lower with a mean dose ratio of 0.968 ± 0.011 .

Conclusions:

A new commercially available Al_2O_3 detector from Landauer is a convenient tool for measuring patient surface dosimetry. Detector performance compares well with existing dosimeters in radiotherapy. Unlike other dosimeters, however, the new detector shows no field size, energy or angular dependence.