Evaluation of the accuracy and efficiency of the in-vivo dosimetry systems for routine cancer patient dose verification

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Abstract

In external beam radiotherapy quality assurance is carried out on the individual components of the treatment chain. The patient simulating device, planning system and linear accelerators are tested regularly according to set protocols developed by national and international organizations. Even though these individual systems are tested errors that can be made in the transfer between systems. The best quality assurance for the system is at the end of the treatment planning chain. In-vivo dosimetry measures the dose to the target volume through indirect measures at the end of the treatment planning chain and is therefore the most likely method for picking up errors which might occur earlier in the chain.

In vivo dosimetry, using diodes or thermoluminescent dosimeters (TLDs) is performed in many radiotherapy departments to verify the dose delivered during treatment. The limitation of this technique is that dose can only be in system readout difficulty and type of readout (TLD system and diode) as the patient dose is directly measured. Several authors have investigated the measurements was 1.3%, with a standard deviation of 2.6%. Results were normally distributed around a mean as -0.39 and 0.34 respectively. After the evaluation of in vivo dosimetry brain case as an example, the mean doses for both eyes were 1.8%, with a standard deviation of 2.7%. These results are similar to studies conducted with diodes and TLD's. From these results we can conclude that the diode is superior to TLD, since the diode measurements can be obtained on line and allows an immediate check. Other advantages of diodes include high sensitivity, good spatial resolution, and small size, simplicity of used.