

The Applications of Routine Dosimeters in IMRT Dose Verification

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Abstract

The basic principle for Intensity Modulated radiotherapy (IMRT) is using non-uniform beam intensity and "dose accumulation" concept to make the dose distributions "conform" the tumor volume. The dose distribution will show a great dose gradient. This high dose gradient makes dose measurement more difficult.

We applied two different types of phantom for our study; solid water phantom and rando phantom. Besides the phantom, we used various dosimeters for our dose measurements; two different sizes ion chambers for absolute dose measurements and TLD for inhomogeneous phantom measurement and for off-axis dose measurements.

The results of comparing calculation by treatment planning system with measurements show the followings: The differences in absolute dose at flat dose gradient area, either at the center or at the off-axis points, are all within 2 % with ion chamber measurements; The absolute dose nearby the center has a difference less than 3% with TLD dosimetry. From the results of our study, we conclude: The ion chamber is the best tool for absolute dose verification; TLD is also a good tool for dose measurements. But the higher dose response variation and the difficulty in position accuracy increase the source of error in TLD dosimetry.

Key Words: dose verification, intensity modulated radiotherapy, ion chamber, TLD.