

A new dosimetry protocol for external beam radiotherapy in Japan

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Introductory Remarks Before the Poster Session

My name is Akifumi Fukumura. I'm from (the) National Institute of Radiological Sciences in Japan. My poster briefly describes a new Japanese dosimetry protocol for external beam radiotherapy that was published last year. The protocol mostly follows IAEA Technical Report Series number 398. However the primary standard dosimetry laboratory of Japan does not supply the calibration factor in terms of absorbed dose to water, so our protocol provides a data table for conversion factors from calibration in terms of exposure to that in terms of absorbed dose to water. In addition our poster shows the proton dosimetry intercomparison using the new protocol. The result of the intercomparison will estimate the significance of the publication. Because before the publication, we did not have a unified protocol for proton dosimetry. We expect that use of the new Japanese protocol will strengthen institutional uniformity in dosimetry for external beam radiotherapy including proton and carbon beam therapy.

Synopsis

Japan Society of Medical Physics (JSMP) published a new code of practice for dosimetry, titled "Standard Dosimetry of Absorbed Dose in External Beam Radiotherapy" [1] in 2002. The principal purposes of the publication were to adopt the absorbed-dose-to-water based formalism, to update physical data, to recommend to use water phantom, to harmonize with international protocols, to note narrow beam dosimetry and to deal with proton and carbon beams.

The new Japanese dosimetry protocol mostly follows IAEA Technical reports series No. 398 [2], which is based on N_{D,w,Q_0} , i.e., the calibration factor in terms of absorbed dose to water for a dosimeter at a reference beam quality Q_0 . According to the protocols, absorbed dose is given by

$$D_{w,Q} = M_Q N_{D,w,Q_0} k_{Q,Q_0} \quad (1)$$

where $D_{w,Q}$ is the absorbed dose to water at the reference depth in a water phantom irradiated by a beam of quality Q , M_Q is the reading of a dosimeter at quality Q , corrected for influence quantities other than beam quality, and k_{Q,Q_0} is the factor to correct for the difference between the response of an ionization chamber in the reference beam quality Q_0 used for calibrating the chamber and in the actual user beam quality Q .

The Japanese primary standard dosimetry laboratory, however, has supplied the calibration factors in terms of exposure, N_{X,Q_0} , instead of in terms of absorbed dose to water. The peculiar feature of the new Japanese protocol is to provide the data table of the calculated ratio of N_{D,w,Q_0} to N_{X,Q_0} for many types of ionization chambers used in radiation therapy. Using the data table, the Japanese secondary standard dosimetry laboratory for radiation therapy facilities has supplied the calculated N_{D,w,Q_0} to end-users since 2002, in addition to the measured N_{X,Q_0} .

It seems to take a couple of years to implement the new protocol with N_{D,w,Q_0} calibration factor over the whole country. It is expected that the use of the new Japanese dosimetry protocol strengthen inter-institutional uniformity in dosimetry for external beam radiotherapy including proton and carbon beam therapy.

References

- [1] **Japan Society of Medical Physics**, *Standard Dosimetry of Absorbed Dose in External Beam Radiotherapy* (in Japanese), Tsuushou Sangyou Kenkyuusha, Tokyo (2002).
- [2] **International Atomic Energy Agency**, *Absorbed Dose Determination in External Beam Radiotherapy*, Technical Reports Series No. 398, IAEA, Vienna (2000).