

AbstractID: 94 Title: Applying 0.6cc Farmer Chamber in dose measurement for small field and for high dose gradient region with Step-and-Shot IMRT

Purpose: To reduce the dose measurement uncertainty of the 0.6 cc Farmer type ion chamber in small fields for step-and-shot IMRT dose verification.

Materials and Methods: We used a 0.6 cc farmer type ion chamber with tip perpendicular to the radiation beam (chamber tip method) to cover the whole chamber volume for our measurements. We compared the field size factors and absolute doses from field size $1 \times 1 \text{ cm}^2$ to $10 \times 10 \text{ cm}^2$ with two-measurement methods (chamber tip and chamber horizontal), treatment planning system (TPS) and film dosimetry. We measured doses at several arbitrary points with both methods (chamber tip and chamber horizontal) on several randomly selected IMRT plans (step and shot), then compared the measurements with that calculated by TPS, especially in high dose gradient regions.

Results: In field size factors and absolute dose measurements, the smallest field size could be measured by the chamber tip method is $2 \times 2 \text{ cm}^2$. And the difference between measurement and TPS is less than $\pm 3\%$. In step-and-shot IMRT dose verifications, especially high dose gradient region, the chamber tip method also showed better results than that of chamber horizontal method.

Discussion: For Step-and-Shot IMRT dose verification, if we do not have a small volume ion chamber, we may use this method for a better dose measurement results. The chamber tip measurement method could provide better results especially in small fields and in high dose gradient regions too. However, we still need to choose suitable dose measurement points carefully for a finest measurement.