AbstractID: 10666 Title: In-phantom calibration of high dose rate Ir-192 brachytherapy source – A feasibility study

Purpose: The purpose of this study is to develop the independent method of calibration of the brachytherapy source using the modified Radiotherapy Treatment Planning System (RTPS) Phantom and compare the results with the well chamber measurement or system activity.

Method and Materials: Nucletron (HDR) unit with Ir-192 source, modified solid cylindrical PMMA RTPS phantom with 12 inserts and 0.6cc Farmer chamber(FC) are used for this study. Out of these twelve inserts, any one insert can hold the source and rest eleven insert positions can be used as a measuring point with the 0.6cc FC. Phantom scatter factors are derived for various distances against the well chamber measurement activity and system activity values and made as a standard for reference. Measurements for activity calculation were taken at a distance varying from 4.4 to 15.69 cm between the source and the chamber and at a distance of 1m from the floor to minimize the room scattering. Maximum response position of the chamber was taken for each position.

Results: The variation between the measured activity and system activity by in-phantom method was -0.02% to 1.28%. and is mainly depends upon the phantom scatter factor for various distances. The percentage of variation (-0.02 to 1.28) is directly proportional to the distance (4.40-15.69cm) between source and the chamber because of phantom scatter contribution. So the percentage of variation increases with source to chamber distance but using RTPS the percentage of variation is within the tolerance limits.

Conclusion: The mechanical rigidity and reproducibility of a solid phantom is superior to in-air calibration jig however in chamber measurement chamber technique found to be reproducible and to agree within ±1.5%, as long as the appropriate corrections are applied. This method of calibration is being verified against well chamber & jig calibration.The results are within the tolerance limit.