Thesis Title The Performances of 0.028 cc Ionization Chamber and Radiographic Film for Dosimetry in Stereotactic Radiosurgery

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Date of Graduation 14 May B.E. 2540 (1997)

ABSTRACT

Small circular x-ray beams are commonly used for stereotactic radiosurgery. Due to the high dose gradient and the lack of complete lateral electronic equilibrium for these small fields, the accuracy of dosimetric measurement by a small dosimeters is significant.

The performances of 0.028 cc ionization chamber and radiographic film for dosimetry in this technique were presented. Specified parameters measured for 6 MV x-ray beam included percentage depth dose, beam profile and total scatter factor. Field sizes were 0.8, 1.2, 1.8, 2.4, 3.0 and 3.8 centimeters in diameter and were defiled by the tertiary collimator with the secondary collimator fixed at a 6x6 square centimeter. All measured data were compared with those of TLDs.

In build up region, the percentage depth dose were found to be markedly different while below the depth of maximum dose, the percentage depth dose agreed well within ±4.2%. For some field sizes, the measurement from the radiographic film differed more than ±5% from those of TLDs. There were slightly difference, 0.0-1.7 millimeter, in both 20%-80% and 10%-90% penumbral width for all profiles. Finally, total scatter factors for all field sizes, the maximum difference were -1.71% and +3.17% for 0.028 cc ionization chamber and radiographic film, respectively, except for ionizing data of 0.8 centimeter in which diameter was -6.46% difference.