

AbstractID: 7015 Title: An Independent Verification of Dosimetry for the Leksell Gamma Knife® Treatment Planning System

Purpose: To develop an independent and reproducible verification of the dosimetry for the Leksell Gamma Knife® treatment planning system (Gamma Plan).

Method and Materials: We have developed a simple method to independently compute point doses for a Gamma Knife® treatment. This was motivated by AAPM Report 46 (Task Group 40), which recommends independent calculation of the dose at one point in a treatment plan. Several authors have suggested methods to independently compute doses for Gamma Knife® treatments. Our method takes a different approach by utilizing measurements of the dose-rate for an array of points within a polystyrene anthropomorphic phantom while keeping each of the points at the center of the Gamma Knife® focus, and normalizing the measurements to the total source activity. Multiple measurements of the dose-rates were taken along the Z and Y axes throughout the phantom. We have created a program using the computer code MATLAB which calculates the dose delivered to any point within the patient's skull. The program uses patient and treatment specific information from the treatment plan, as well as measured dose rates in the anthropomorphic phantom, to calculate delivered dose at selected points.

Results: Validation of the program was initially performed using a CT of our anthropomorphic phantom that was used to create treatment plans. A maximum error of 2% was observed between point doses computed with our program to those by Gamma Plan. Patient treatment plans were also evaluated with the program, with an error no more than 4%.

Conclusion: Our independent dose calculation method for the Gamma Knife® can be easily implemented into a PC based application and used to quickly verify treatment plans before treating patients.

Conflict of Interest (only if applicable):