

The Leksell Gamma Knife [Elekta Corp] uses helmets as collimators to produce four standard beam sizes. The nominal beam diameters are 18, 14, 8, & 4 mm. During treatment planning for Gamma Knife stereotactic radiosurgery, the size of the treated volume may differ from the available helmet sizes. To maintain conformality of the isodose curves to the treated volume, helmet sizes may be superimposed during computer treatment planning to produce beam diameters which are intermediate to the standard helmets. The computer weighting for each shot size is varied to attain the shot size diameter desired. A study of superimposed helmet shots was performed on the Elekta treatment planning computer, GammaPlan. The resulting shot sizes, and the weighting schemes are presented. The beams were defined at the 50% isodose line. The results show a linear relationship between shot size and beam weighting for the superimposed beams. The profiles of the superimposed shots were obtained and compared with the single helmet shots for beam uniformity.

The computer planning results were verified with film measurements of beam profiles for single helmet sizes and superimposed shots with various weightings. The film measurements confirm the computer calculations. Results will be presented.