Comparison of Measured versus GammaPlan computer generated GK Beam Profiles and Isodose Distributions

Morris Bank Ph.D.
Indiana University Medical Center
Radiation Oncology
Indianapolis, Indiana

The Elekta Model B Gamma Knife uses 201 Co-60 beams to produce the clinically useful treatment beam. Primary ports direct the beams from the sources to a focus at the isocenter. The 201 beams are further shaped by patient helmets containing 201 individual collimators to form the final treatment beam. Four helmets with different size collimators are available to form nominal beam sizes of 4, 8, 14, & 18 mm. The Elekta GammaPlan planning computer simulates the beams for treatment planning using beam profiles based on previous measurements.[1] Gamma Knife treatments often use multiple "shots" for the patient treatment and the computer uses the single beam profiles to simulate the multibeam treatment. In this report the beam profiles and dose distributions produced by the GammaPlan are compared to measured results. Transverse Gamma Knife beam profiles recently measured with a microchamber and film[2] are compared to the GammaPlan profiles. Dose distributions of multiple "shots" were also obtained with films and compared to the GammaPlan generated distributions and profiles.

[1] "Physics of Gamma Knife Approach on Convergent Beams in Stereotactic Radiosurgery", A. Wu, et.al., I.J.Radiation Onclogy, Biology, & Physics, 18,941, 1990

[2] "Gamma Knife Beam Profiles Measured with Film and PTW Pinpoint Microchamber", M. Bank, Poster presented at 1998 AAPM Annual Meeting, San Antonio, Texas.