

#### 4mm Helmet Factor for Elekta Gamma Knife

Elekta Instruments, A.B. of Stockholm has recently recommended increasing the helmet factor for the 4mm helmet (relative to the 18mm helmet) from 0.80 to 0.87 for the 100 plus Leksell Gamma Knife users world-wide. This recommendation was based on recent work with liquid ionization chambers as well as revised Monte Carlo calculations. A corresponding reduction in prescribed dose of 9% was also recommended for single shot plans with the 4mm helmet, in order that the actual dose delivered remain constant. North American users were surveyed to discover how many had attempted to measure the 4mm helmet factor and what their results were. A total of 14 of the 45 North American centers reported measurement results. Only 3 centers chose to use their own results clinically, all other centers relying instead on the old helmet factor, which dates from the first Elekta Gamma Knife delivered in 1987. Nine radiochromic film measurements yielded an average helmet factor of  $0.830 \pm 0.024$ . Three measurements with X-ray film yielded an average factor of  $0.782 \pm 0.024$ . Eleven TLD measurements yielded an average helmet factor of  $0.829 \pm 0.021$ . Four ion chamber measurements yielded an average helmet factor of  $0.644 \pm 0.020$ . The sole MOSFET measurement gave 0.750. Low results for the ionization chamber are probably attributable to partial volume effect. North American results average about 4.5% lower than the new manufacturers factor. Measurement of small high energy photon fields used in stereotactic radiosurgery remains a challenging problem.