AbstractID: 8824 Title: Measurements of Gamma-Knife helmet output factors using a radiophotoluminescent glass rod dosimeter and a diode detector

A radiophotoluminescent (RPL) glass rod dosimeter (GRD) and a small active volume *p*-type silicon diode detector (SFD) were used for the measurement of Gamma-Knife output factors. All measurements were done using a 16 cm diameter spherical polystyrene phantom with the detector at the focal spot of Gamma-Knife. The GRD system consists of small rod-shaped glass chip detectors and an automatic readout device. The output factors measured with GRD of the 14, 8 and 4 mm helmets relative to the 18 mm helmet are 0.983, 0.937 and 0.870, respectively. Similarly, the corresponding output factors measured with the *p*-type silicon diode detector are 0.979, 0.941 and 0.863, respectively. These output factors are comparable with the values given in a recent publication and the values recommended by Elekta, the manufacture. The angular dependence of these detectors is also measured using a linear accelerator-based stereotactic radiosurgery system. For the Gamma-Knife angle ranging from 6 to 36 degrees from the vertical axis, the measured angular dependence of the GRD is approximately 1.0% at a 4 MV x-ray beam. The response of the silicon diode detector indicates approximately 3-4% directional dependence for the same angle range for a 6 MV x-ray beam. The Gamma-Knife helmet output factors measured with the silicon diode detector are corrected for angular dependence. In summary, GRD can be a good candidate in measuring small field output factor. Due to an angular dependence the small *p*-type diode detector needs care when calculating the Gamma-Knife dose.