

AbstractID: 11796 Title: Dosimetry for Small Animal Irradiation Using Gamma Knife Perfexion

**Purpose:** To characterize the dosimetry of the Leksell Gamma Knife Perfexion for irradiation of small animals. **Methods:** The dosimetric properties of the Gamma Knife Perfexion were measured by irradiating EBT radiochromic film in a “cylindrical” phantom, length: 40mm, radius: 10mm, having rounded ends of similar radius. The phantom was composed of hard-rubber, tissue-like material, split along the cylinder’s long axis and was supported by two Styrofoam slabs, 120mm by 140mm by 8mm-thick, cantilevered in air within a plane parallel to the floor, perpendicular to the Leksell ring. EBT film was “sandwiched” between the phantom halves and Styrofoam in a plane. Film dosimetry was possible within the irradiated cylindrical phantom and in the surrounding “air” simultaneously. Irradiating one end of the phantom with the 16mm aperture (whole mouse brain) was planned with GammaPlan PFX, version 8.3.1, using a phantom model, manually entered as Skull-Scaler dimensions. This allowed comparing theoretical dose computations with measurements. Calibrated film dosimetry was performed using a PC running RIT113 software, v.4.x, and a Vidar scanner. **Results:** Dose profiles showed rapid fall-off at phantom edges. The “prescription” volume shape within the phantom was similar to GammaPlan calculations and could be manipulated by sector blocking. Absolute dose within the phantom was higher by 10-20% than that predicted by Gamma Plan. Dose in surrounding “air” was 4-8% of the maximum dose to the phantom, 2cm away when blocking sectors projecting parallel to the film plane. Rough dose estimates at the end opposite phantom end from that irradiated indicate that the surrounding “air” dose is from scattered low energy photons, having about 15keV average energy. **Conclusions:** For irradiation of small animals with Gamma Knife Perfexion, GammaPlan predicts irradiated volumes reasonably. Absolute dose should be determined with measurements. Non-irradiated regions of the animal should be easily shielded from surrounding “air” dose.