AbstractID: 9082 Title: Rind Radiosurgery: Investigation of a novel radiation therapy technique for the treatment of intracranial lesions

Purpose: Rind radiosurgery is a highly modulated technique that aims to treat the proliferative disease of ring-enhancing intracranial lesions, and to reduce the dose to normal brain tissue when compared with conventional radiosurgery. This study aims to quantify the potential dose reductions to normal tissue for rind treatments.

Methods and Materials: A set of IMRT treatment plans were created in the Eclipse planning system to quantify dose sparing for a range of lesions (diameter = 3, 5, 7, 9 cm) and rind thicknesses (0.5, 1.0, 1.5, 2.0 cm). Plans were created for both the conventional (solid tumor) and rind (ring-enhancing) scenarios. A variety of beam arrangements and IMRT constraint schemes of varying levels of complexity were evaluated. All doses were computed using the pencil beam convolution algorithm with a dose grid size of 1.25 mm. The dose reduction to normal brain was evaluated by comparing the integral dose to a 0.5 cm shell of normal tissue, encapsulating all PTV's.

Results: The reduction in normal tissue integral dose ranged from 0 to 5.5% with the greatest savings correlating with smaller lesion sizes. Maximum dose sparing of 5.5% was achieved using a 12 non-coplanar beam arrangement, and a constraint scheme which held no limits on dose deposited in the center of the tumor. A dramatic increase in the number of monitor units of up to 123% was observed in the delivery of rind distributions.

Conclusions: These results indicate that the integral dose to normal brain tissue can be reduced with rind radiosurgery IMRT treatments. The dose sparings were less however than previously reported with radiosurgery cone technique, and this is probably due to leakage associated with the extreme modulation of rind plans.