

AbstractID: 6449 Title: Simultaneous Integrated Boost for Canine Nasal Tumors using Helical Tomotherapy: A Radiobiological and Treatment Planning Study

Purpose: Canine nasal tumors exhibit a marginal 1-year local control rate of approximately 29%. To improve local control, we evaluated the feasibility of delivering a simultaneous integrated subvolume boost to the gross disease using helical tomotherapy to improve tumor control probability (TCP) via an increase in biological equivalent uniform dose (EUD).

Methods and Materials: Eight dogs with varying size nasal tumors (5.82-110.88cc) were planned to 42 Gy to 98% of the entire nasal cavity (PTV) and gross disease (GTV) boosts of 45.2, 48.3, and 51.3 Gy in 10 fractions. Simultaneous integrated boosts were selected such that tumor effect, NTD_{10} , received a relative dose boost of 10, 20, and 30%. Pitch of 0.215 and field width of 2.5cm were used for the planning. EUD values were calculated for tumors and mean normalized total doses (NTD_{mean}) for organs at risk (OAR). Normal Tissue Complication Probability (NTCP) values were obtained for OARs. Estimated TCP values were computed using the logistic expression and based on EUD boosts and previously published response rates.

Results: Significant increases in estimated TCP of 54, 74, and 86% were achieved with a 10, 23, and 37% mean EUD boost, respectively. NTCP values for blindness of either eye and for brain necrosis were < 0.01%, and for cataract formation were 31, 42, and 46% for studied boost schema. Average NTD_{mean} to eyes and brain for mean EUD boosts were 10.2, 11.3 and 12.1 Gy₃, and 7.5, 7.2 and 7.9 Gy₂, respectively.

Conclusions: Using helical tomotherapy, simultaneous integrated boosts to gross disease can be delivered to increase estimated 1-year tumor control probability without significantly increasing the NTD_{mean} to either eye or brain.

Conflict of Interest (only if applicable):

TRM has a financial interest in TomoTherapyInc.