

**AbstractID: 12607 Title: A retrospective single institution patient population study of I.G.R.T. shifts and their implications for non-IGRT treatment set-up margins, as both an internal and external Q.A. tool.**

**Purpose:** To establish a population based set of margins from I.G.R.T. patients to account for set-up uncertainties based on published formulas for use with non-I.G.R.T. patients locally and potentially for QA purposes outside of our institution; as well as potentially identify any systematic errors in the patient treatment chain.

**Method and Materials:** All kV and C.B.C.T. based I.G.R.T. patient's shifts were recorded over a 3+ year period and divided into general anatomy based categories. The set-up uncertainty margin formula proposed by Van Herk et al of  $2.5\Sigma + 0.7\sigma$  was applied to each category. In addition, all averages and block check sessions were analyzed for systematic problems.

**Results:** Thorax set-up margins: 0.84 cm vertical, 1.21 cm Longitudinal, 0.89 cm Lateral; Pelvis: 0.94 cm vert., 0.87 cm long., 0.69 cm lat.; Abdomen: 0.94 cm vert., 1.3 cm long., 0.82 cm lat.; Head/Neck: 0.34 cm vert., 0.49 cm long, 0.39 cm lat.; extremities: 0.62 cm vert, 0.69 cm long, 0.68 cm lat.; and Spine: 1.10 cm vert., 1.25 cm long, 0.87 cm lat.

**Conclusion:** Population based margins can be used as a portion of a total PTV margin formula when designing a treatment plan. If margins the size of those calculated would be clinically unacceptable, I.G.R.T. would be indicated and the patient set up uncertainty would be reduced to the uncertainty of the IGRT process only. Since this population of patients is large and represents a wide variety of diseases, it should also have Q.A. value to other institutions that either do not have I.G.R.T. or are just starting a program as a baseline with which to compare. Machine uncertainties, imaging uncertainties (mostly longitudinal), block edge/penumbra margins and other patient or case specific uncertainties should also be considered when designing margins.