Purpose: To investigate the effects of x-ray tube voltage and projection angle on the effective dose and thyroid gland dose from Interventional Neuroradiology (INR) procedures performed in the head and neck as a function of the Kerma Area Product.

Methods: X-ray tube voltage, image size, and projection angle data were collected on 68 adult INR procedures conducted during a one-month period. These procedures consisted of diagnostic, and treatments for aneurysm, AVM, and stroke. A commercial patient Dosimetry software package (PCXMC 2.0.1) was used to simulate typical radiation beam geometries established from the collected data at a series of projections in the Posteroanterior (PA) and Lateral (L) planes to estimate effective dose (E) and thyroid gland dose (DT). For a given projection and beam quality normalized E and DT were obtained by dividing by the Kerma Area Product (KAP) (ie. mSv, or mGy, per mGy-cm^2).

Results: The typical x-ray tube voltages ranged between 95 to 105 kV in the PA plane, and were more varied in the L plane with the two most common voltages at 72 and 102 kV. The PA plane showed greater variability in the image size than the L plane by a factor of 1.8, and ranged from 11 cm to 32 cm. Projections angles ranged up to 40 degrees from the centerline in both planes. Projection angle changes in the PA showed an increase in the DT/KAP by a factor of 2 when greater than 30 degrees.

Conclusions: Patient radiation doses are reduced in the PA compared with the L projections, and lower when the majority of the imaging is centered in the head versus the neck region. E is ~30% greater for imaging done in the neck than the head, and DT is 4 times greater in the L than the PA projection.