

AbstractID: 13291 Title: Variation of Effective Dose with Projection Angle During Cardiac-catheterization Imaging

Purpose: Cardiac catheterization is a high-dose x-ray imaging procedure that includes several radiosensitive organs in the beam. This work demonstrates the variation of effective dose with projection angle for this procedure.

Methods and Materials: ICRP 103 effective doses were calculated using PCXMC 2.0 for the geometry of simulated cardiac procedures with the Toshiba Infinix C-Arm unit equipped with a 20 x 20 cm flat-panel detector (FPD). With the heart at isocenter, effective dose was calculated per mAs for cranial/caudal (CRA/CAU) angles from 50° CRA to 50° CAU and left-anterior oblique / right-anterior oblique (LAO/RAO) projection angles from 90° LAO to 90° RAO from the posterior-anterior (PA) direction. An estimate of view effective dose was made using technique parameters that were recorded for cardiac imaging of a Rando torso phantom at various projection angles with the unit operating under automatic brightness control.

Results: Effective dose per mAs values are seen to peak at an LAO/RAO angle of about 30 degrees and drop rapidly as the beam moves more laterally, with a reduction of about 60% at 90 degrees. A decrease of about 20% is seen as the CRA/CAU angle is increased. With the phantom, there was an increase in technique parameters with increasing projection angle that tends to offset the effective dose per mAs decrease, so that the view effective dose generally increases with angle.

Conclusion: The stochastic risk increment to the patient as reflected in the effective dose varies with the projection view used during the cardiac-catheterization procedure. In general, the more that larger CRA/CAU and RAO/LAO angles are used, the greater will be the cumulative effective dose.

(Support: Toshiba Medical Systems Corporation)