# AbstractID: 11127 Title: Reducing Dose to a Small Organ by Varying the Tube Start Angle in a Helical CT Scan

**Purpose:** Previous work demonstrated that there are significant dose variations on the peripheral, or surface of either a CTDI 32cm phantom or an anthropomorphic phantom when helical CT scanning is performed. The purpose of this work is to investigate the effectiveness of exploiting these variations to reduce dose to targeted radiosensitive organs solely by varying the tube start angle in CT scans. **Method and Materials:** Radiation dose to several radiosensitive organs (including breasts, thyroid, uterus, gonads, lens of eyes) from a MDCT CT scanner were estimated using Monte Carlo simulation methods on GSF Baby phantom. Whole body scans were simulated using 120kVp, 300mAs, 28.8 mm nominal collimation, pitch 1.5 under a wide range of start angles (0 to 340 degrees in 20 degree increments). The relationship between tube start angle and organ dose was examined for each organ and the potential dose reduction was calculated. **Results:** The organ dose shows obvious variation depending on the tube start angle. For small peripheral organs, (e.g. the lens of eyes), the minimum dose can be 35% lower than the maximum dose, depending on tube start angle. For pitch 1.5 scans, the dose is usually lowest when the tube start angle is such that the x-ray tube is posterior to the patient when it passes the longitudinal location of the organ. **Conclusion:** Helical MDCT scanning results in “cold spots” and “hot spots” that are created both at surface and even in-depth locations within patients. If organs have a relatively small longitudinal extent, their dose may be reduced by selecting the tube start angle such that the location of these “cold spots” may be manipulated by appropriately selecting the tube start angle. This dose reduction should not have any implications for image quality as there is no change in mAs or total mAs.