

## AbstractID: 13006 Title: Radiation dose penalty in axial scan mode

**Purpose:** To determine whether a dose penalty exists when scanning patients in axial scan mode on General Electric (GE) Computed Tomography (CT) scanners. A 10-millisecond-long rise of the x-ray tube output occurs immediately before image acquisition and is suspected to contribute additional dose near the start angle of the x-ray tube. This dose penalty may exist for axial scanning because the rise time occurs for every 360° rotation of the x-ray tube, whereas rise time only occurs once in helical scan mode.

**Method and Materials:** 10-, 15-, and 32-cm CTDI phantoms were scanned on a GE VCT scanner for a single axial rotation in service mode. Exposure was measured at a constant peripheral location (12:00) and recorded for various x-ray tube start angles. These methods were repeated on the 32-cm phantom, changing its vertical position in 2-cm increments from 6-cm below to 12-cm above iso-center.

**Results:** Exposure, measured at the 12:00 peripheral chamber position, was 5.5%, 1.8%, and 1.0% higher in the 32-, 15-, and 10-cm phantom, respectively, when a start angle of 0° was used versus a start angle of 270° (this start angle was used for comparison to avoid attenuation from the patient table). The exposure penalty ranged from 2.9% to 12.7% when the 32-cm phantom was 6-cm below and 12-cm above iso-center, respectively.

**Conclusion:** In light of the dose penalty observed in this study, axial acquisitions should feature a start angle of 180° to avoid imparting this penalty on superficial radiosensitive organs (i.e. breast, testes, and thyroid), which are near the anterior side of patients. Also, dose is not consistent around the periphery of a phantom scanned in axial mode and contiguous helical scanning (pitch = 1.0) provides a dose advantage over axial scanning (all other technique factors being equal).