

AbstractID: 11803 Title: Precision of exposure measurements obtained on current multi-slice CT scanners

Purpose: The stability of exposure measurements made over time on CT scanners is not well understood. To determine the stability of exposure measurements, the precision of such measurements must first be determined. Precision can be characterized by the coefficient of variation (CV) which is the standard deviation divided by the mean times 100%. The least significant change (LSC) is defined as the smallest change between two measurements that reflects a real change in the system with 95% confidence and is calculated by multiplying the CV by 2.77. **Method and Materials:** Exposure readings were collected on CT scanners of three makes and models using a 10-cm pencil ionization chamber and electrometer. Three GE VCT, three GE Lightspeed 16, and three Siemens Sensation 64 scanners were used to determine the precision of scanners over time and across sibling scanners (scanners of the same make and model). Precision of the scanners was evaluated at consistent techniques using in air exposures and CTDI phantom measurements. **Results:** The maximum observed in air exposure CV for individual scanners over several minutes was 0.25%, over three weeks was 1.13%, and over four to six months was 3.34%. In CTDI phantoms, the maximum observed CV of the individual scanners was 3.77% in measurements taken over weeks and 3.91% in measurements taken over months. When sibling scanners were compared, the maximum observed CV was 4.33%. **Conclusion:** Using a maximum CV of 4 %, the LSC is 11%. Therefore, repeated exposure measurements taken on a CT scanner, during annual testing, for example, must vary by more than 11% to be considered a real change with 95% confidence.