AbstractID: 11497 Title: Verification of reported DLP for Philips Brilliance CT scanners

Purpose: Recent concerns about accumulated radiation dose and collective risk prompted a check of the software reported CT dose index ($CTDI_{Vol}$) and dose-length-product (DLP) of the Philips Brilliance CT scanners. The $CTDI_{Vol}$ and the DLP were measured for comparison with the reported values using the high-resolution chest protocol (commonly used for COPD). **Method and Materials:** A Philips Brilliance 40-slice CT scanner was used with the high-resolution chest protocol, which has a technique of 120 kVp and 200 mAs/slice, a detector collimation of 2x0.625 mm, a reconstructed scan thickness of 1.25 mm, and a table increment of 10 mm. Measurements were made using a cylindrical Lucite phantom 32 cm in diameter and 15 cm in length, with axial holes drilled in the center and near the surface at 90 degree intervals. The radiation dose was measured using a Keithley electrometer and a 10 cm pencil chamber. Dose measurements were made along the phantom's center axis and along its surface. **Results:** While the dose measurements are consistent with the reported $CTDI_{Vol}$, a serious error was discovered in the reported DLP. The reported value appears to be calculated as the product of the $CTDI_{Vol}$ multiplied by the number of shots (16) and the collimation width (1.25 mm) while the correct formulation of DLP is the $CTDI_{Vol}$ multiplied by the scan length (151 mm). This results in an underestimate of dose by a factor of 8. **Conclusion:** Accurate estimates of radiation risk require correct reporting of the effective dose, which is related to DLP. We have verified that the Philips 64-slice also has the same error and it is possible that other Philips protocols with a large table increment relative to the slice width will too. A physicist should verify that the DLP reported is consistent with actual measurements.