Abstract ID: 15784 Title: Use of radiochromic film for the estimation of CTDI100 and in-phantom dose profiling

Purpose:To establish a methodology for the use of radiochromic film in the estimation of CTDI100 and provide an in-phantom spatial description of the radiation dose profile.

Methods:Standard CTDI 32cm body and 16cm head phantoms were used with a modified Acrylic pin to allow for the insertion of radiochromic. Two CT scanners were evaluated at various beam collimations in both center and 12 o'clock pin locations. For comparison purpose, CTDI100 measurements were obtained using a 100mm pencil ionization chamber. A 48-bit optical scanner was used to scan the radiochromic film. Software code was written to analyze the film images. A set of calibration films was acquired on a fluoroscope with similar beam quality (kVp and HVL) as the CT scanner.

Results:For reproducibility three films from each of 21 different collimation and pin location combinations were analyzed. Three films were excluded because of prominent moiré patterns observed likely caused by moisture on the film or scanner platform. Three images that were included slightly exceeded the calibration range of the film. The percent differences between the CTDI100 values obtained with the 100mm pencil chamber and the film ranged from 0-17.2% with an average difference of 8.6%. The relative standard deviation of the CTDI100 film values ranged between 0.3-3.6% with an average of 1.9%. Though not novel, visual indication of the z axis in phantom beam profile provided very clear evidence that at large collimations radiation dose extends well beyond a 100mm region.

Conclusions:Radiochromic film has the potential to estimate CTDI100 with reasonable accuracy; future calibration methods may bring better accuracy. This method provides additional value by yielding a visual indication of the CT dose profile and potential for easily incorporating dose beyond 100mm.