Purpose: The ACR accreditation process requires the submission of images of the 200 mm ACR phantom to evaluate CT number accuracy using the institution's adult abdomen protocol. Difficulties in obtaining CT numbers that fall within the allowed limits may be due to the use of a protocol designed for a body significantly larger than the phantom. We show that adjusting the sFOV to a size appropriate for the phantom significantly shifts the CT numbers toward the expected values. We also show that consistent with the hypothesis that an over-correction for scatter results in the increased CT numbers, a reduced collimation, where less scatter correction is required for reconstruction, also shifts the CT numbers in the right direction.

Methods: The ACR Gammex phantom was scanned on a 64-slice GE LightSpeed-VCT scanner with various bowtie filters, beam collimation and sFOV using our institution's routine adult abdomen protocol.

Results: Our results show that the CT numbers for water and polyethylene fall well outside the required range if we rigidly adhere to scanning the ACR phantom with the standard protocol. The observed inaccuracy in reported CT numbers is believed to originate from over-corrections due to scatter contributions and beam hardening effects as the phantom is significantly smaller than a typical adult abdomen. CT number accuracy was improved when a small bowtie filter was used instead of the large one. The CT number dropped to 4.02 HU for water and to -87.32 for polyethylene. CT number accuracy further improved when scanning the phantom with a 20 mm beam collimation instead of 40 mm.

Conclusions: In performing the ACR image quality assessment task, the employment of a bowtie filter consistent with the size of the phantom resulted in a significant improvement in achieving the CT number accuracy requirements of the ACR.