

AbstractID: 9785 Title: CT Accreditation Program: Image Quality and Dose Measurements

The ACR's CT Accreditation Program will evaluate the following primary determinants of quality in the practice of CT:

- qualifications of personnel
- equipment performance
- clinical images and exam protocols
- reference doses for three specific exams.

The qualified medical physicist plays an essential role in this accreditation program, as he or she must perform initial performance testing upon installation of a CT system, supervise the ongoing equipment quality control program, be available for consultations relating to radiation dose to the patient or facility personnel, and work in close collaboration with the radiologist, technologist, and manufacturer to optimize imaging protocols. As the use of CT continues to grow, both in the number and type of examinations, as well as the complexity of the equipment, it is imperative that the medical physics community assists in the safe and efficient use of this powerful imaging tool.

In order to assess the technical performance of each CT scanner, phantom images of the ACR CT Accreditation Phantom will be required using the facility's typical head and body exam protocols. This affordable, high quality CT phantom was developed to permit a standardized and comprehensive evaluation of all QC parameters. The phantom is comprised of four contiguous solid modules, each 4 cm in width and 20 cm in diameter. The specific performance criteria evaluated using the phantom include:

- Slice width and positioning
- CT number accuracy
- Low contrast resolution
- High contrast resolution
- Image uniformity

Dose measurements are required on each of a facility's CT scanner(s) and are to be made using standard head and body CTDI phantoms and a pencil ionization chamber. Using these CTDI measurements, the physicist must calculate (with the aid of a provided Excel spreadsheet) various descriptors of dose for an adult head, pediatric abdomen (5 y.o.) and adult abdomen examination. The calculations use the technique factors provided by the site. Thus, a measure of each facility's dose for these three examinations will be submitted to the ACR.

Reference dose values are given in the program documentation and are to be used by the ACR and the site to identify situations where the level of patient dose is unusually high. If a dose for any of the three exams exceeds the respective reference value, the site will be required to submit documentation detailing their investigation, corrective action if necessary, or justification of the higher dose level. The current reference CTDI_w values are as follows: Adult head, 60 mGy; Pediatric Abdomen (5 y.o.), 25 mGy; Adult Abdomen, 35 mGy.

Educational Objectives:

To become familiar with:

- 1) the general requirements of the ACR CT accreditation program,
- 2) the role and responsibilities of the medical physicist,
- 3) the image quality and dose phantoms used in the program,
- 4) the particular image quality and dose measurements required by the program,
- 5) how to calculate CTDI_w, CTDI_{vol}, DLP and an estimate of Effective Dose,
- 6) answers to frequently asked questions.