

AbstractID: 7235 Title: Acceptance Testing and Quality Control of Computed Radiography Devices
Computed radiography (CR) devices are the primary means to capture digital two-dimensional projection images in a radiology department. These devices are composed of a photostimulable storage phosphor (PSP) to capture the transmitted x-ray distribution, a mechanical – optical reader to extract the latent image, image processing algorithms to identify, amplify and contrast enhance the resultant x-ray image, and interfaces for delivery of the images to display and storage devices. Over the past several years, the presence of CR devices in the clinic has dramatically increased, requiring the medical physicist to develop knowledge regarding acceptance testing and quality control procedures for these systems.

Acceptance testing is the first and crucial step towards clinical implementation to verify performance specifications and to set baseline values for periodic quality control testing. Recommended tests include inventory inspection, validation of CR/PACS interfaces, demographic accuracy, PSP imaging plate uniformity and dark noise, laser beam function, sensitivity (exposure) response, spatial and low contrast resolution, image processing algorithm configuration, distance calibration accuracy, erasure thoroughness, and artifact analysis.

Quality control (QC) and periodic maintenance oversight is the responsibility of the radiologic or QC technologist, in conjunction with the on-site engineer and the vendor service personnel. All QC activities should be documented in a logbook for each CR reader. Daily tests include inspection of the CR system and operational status of the reader, identification terminals, QC workstation, and laser printer (if used). Weekly and biweekly tests involve inspection/cleaning/erasure of all imaging plates, calibration of QC workstations (e.g., contrast/brightness settings with the use of a grayscale test pattern), calibration of the film laser printer output, QC phantom imaging/documentation, and minor maintenance such as filter and vent cleaning of the CR reader. Logbooks should document retake rates, exposure trends, image artifacts and service history, with quarterly review. Finally, a yearly conformance test procedure should be performed for each CR reader to reestablish and verify optimal imaging performance and baseline values.

Acceptance and QC methods described in this presentation are one step in determining adequate system performance data and applying practical QC procedures to verify reproducibility. Proper use of the equipment, including radiographic technique, anti-scatter grids, anatomic positioning, configuration management, and continuous training are also a necessary part of the overall QC program.

There is no doubt that CR implementation results in a significant increase in complexity, upkeep, expense, and quality control procedures compared to screen-film detectors; however, the benefits gained in digitally acquiring and distributing the images overcome these disadvantages.

OBJECTIVES:

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At the end of this lecture, the attentive attendee will be able to:

1. Understand the basic physics and technology of computed radiography
2. describe the similarities and differences of CR and screen/film systems
3. realize the importance of image processing for digital detectors
4. comprehend the variable speed attributes of CR and determine estimated exposures for an examination
5. implement acceptance testing procedures and periodic QC tests
6. know where to get further information