

AbstractID: 9269 Title: Discrepancies in exposure conditions for the EZ CR-DIN phantom

**Purpose:** To determine whether discrepancies between exposure conditions recommended by the manufacturer of the EZ CR-DIN phantom, by the DIN standard, and by a user affect evaluation of phantom images.

**Method and Materials:** Computed radiographs (CR) of the Nuclear Associates EZ CR-DIN phantom (Fluke Biomedical, Cleveland, OH) were acquired in triplicate for three exposure conditions: 72 kVp, the manufacturer's<sup>1</sup>; 80 kVp, the user's<sup>2</sup>; and 70 kVp plus 25 mm Al added filtration, the DIN specification<sup>3</sup>. Aluminum 1100-H14 was substituted for 99.4% Al.<sup>4</sup> kVp was verified non-invasively. Projections of the phantom used AEC or manual technique on STVI imaging plates (IP) at 100 cm SID in the undertable Bucky tray. IPs were developed without delay with test menus in Semi-automatic EDR mode using a FCR5000 (FujiFilm USA, Stamford, CT) calibrated for sensitivity and uniformity. DICOM images were transmitted to the PACS system using unity rescale slope and zero intercept. Images were exported from the PACS to a PC and analyzed using MATLAB (MathWorks, Natick, MA). Spectra for the three exposure conditions were generated using a semi-empirical method.<sup>5</sup>

**Results:** Evaluation of low contrast features depended on exposure conditions, test menu selection, and subject contrast values. Contrast was exaggerated using the manufacturer's exposure conditions, but was indistinguishable between user and DIN conditions. Simulated spectra attenuated by the phantom indicated an average energy of 56, 61 and 59 keV for manufacturer, user, and DIN conditions. A high-contrast test menu improved visibility of low contrast features but did not resolve all six steps of the dynamic range feature. Detected contrasts were more consistent with the manufacturer's subject contrast values than with those in the current DIN standard.

**Conclusion:** Comparison of QC results among institutions depends on standard test objects imaged under standardized conditions. Differences in exposure and development conditions affect evaluation of test images.