

**AbstractID: 5404 Title: Evaluation of the contrast-detail response of digital radiographic systems using the CDRAD contrast-detail phantom with the CDRAD Analyser software**

**Purpose:** The CDRAD phantom is frequently used to subjectively evaluate the contrast-detail response of diagnostic imaging systems. We investigated the use of this phantom in conjunction with the automated CDRAD Analyser program as a quantitative tool for the evaluation of digital radiographic systems.

**Method and Materials:** Three DR systems (Trixiell Pixium 4600, Canon CXDI-50G, and DirectRay detectors), and one CR system (35-cm x 43-cm FUJI ST-VI plates) were evaluated under two experimental conditions. For the first, the CDRAD phantom was positioned directly on the detector housing, the anti-scatter grid was removed, and the detector was exposed with two different beam qualities. Quality A: 0.5-mm Cu filtration, ~75 kV, 7.1-mm Al HVL, and Quality B: 0.5-mm Cu filtration, ~125 kV, 10.2-mm Al HVL. The detectors were exposed to ~0.4, ~0.8, ~1.5, ~2.5, and ~5.5 mR, for both beam qualities. For the second condition the phantom was sandwiched between two 10-cm slabs of Lucite, and placed on the patient table. The exposure conditions were the defaults for the Abdomen examination for each system, and the "skin" entrance exposures employed were ~180, ~250 and ~350 mR. Results were compared using the CDRAD Analyser contrast-detail figure of merit IQFinv.

**Results:** For the Trixiell detector the IQFinv increased with exposure from 6.31 to 7.67 for beam quality A, from 5.45 to 7.43 for beam quality B, and from 2.91 to 3.91 for the Abdomen exam. Corresponding values for the Canon detector were 2.88 to 4.77, 2.50 to 4.61, and 1.56 to 2.14. Those for the DirectRay detector were 2.49 to 5.00, 1.86 to 4.93, and 1.34 to 2.15, and those for the CR system were 2.89 to 4.16, 2.82 to 4.00, and 1.89 to 2.32.

**Conclusion:** Our results indicate the potential of the CDRAD phantom/CDRAD Analyser as a quantitative image quality analysis tool.