

AbstractID: 8635 Title: Computed Radiography in Radiation Oncology: A Study of Cassettes and Technique

**Purpose:** This study was conducted to compare commercially available computed radiography (CR) systems and to determine the effect on image quality of cassettes and Monitor Units (MU) used for portal imaging.

**Materials and Methods:** The quality of CR portal images was assessed using a “Las Vegas”-type contrast-detail (CD) phantom. The 6MV beam from a linear accelerator (Varian 2100), collimated to phantom dimensions, irradiated the phantom in contact with the cassette using 1-6 MU. The commercial CR systems evaluated were: the Carbon XL (FujiFilm USA, Stanford, CT) with Fuji portal imaging cassettes, and the Kodak 2000RT (Carestream, Rochester, NY) with two types of portal imaging cassettes, Kodak Lightweight ( $K_{LW}$ ) and Oncology ( $K_{ONC}$ ). Images were analyzed using ImageJ (National Institutes of Health, USA). Five observers scored images under identical viewing conditions. Average number of features detected and standard deviation were used to assess image quality. Head and chest images of an anthropomorphic phantom (Computerized Imaging Reference Systems, Inc., Norfolk, VA) were acquired with cassettes under the couch to correlate with clinical imaging.

**Results:** The total number of objects detected increased with MU: 22% for  $K_{LW}$ , and 17% for  $K_{ONC}$  (1-6 MU), and 9% for Fuji (1-5 MU, saturation occurred at 6 MU). Fuji had better contrast detectability for all features at all MU; 19% more objects were detected. No difference was observed between  $K_{LW}$  and  $K_{ONC}$  cassettes. Fuji produced anthropomorphic-phantom images with better contrast. Increasing MU improves image quality, but high inter-observer variability made differences difficult to resolve at 2 MU and above.

**Conclusions:** Although all systems produced adequate portal images, the Fuji system performed best with the CD phantom and with anthropomorphic phantoms. Fuji’s advantage can be attributed to digital image processing and better system DQE. We found 2-3M U was adequate to get acceptable contrast for portal images.