AbstractID: 3323 Title: MTF Measurement of Digital Imaging Systems Used In Radiotherapy-

Purpose: The pre-sampled MTF was used to investigate the resolution of a storage phosphor plate. Three commercial computed radiography (CR) cassettes (Kodak EC-L fast and regular, and Agfa fast) were used. The MTF of the CR system was compared to the MTF of an electronic portal imaging device (EPID) system.

Method and Materials: The MTF was measured using the edge method. For kilo-voltage simulation images, the edge device was a 180x100x2 mm^3 lead plate with a 104 mm polished edge, and the standard spectrum (RQA3) and geometry specified in IEC 62220-1 were used. The edge device for 6 MV portal images was a 75x50x50 mm^3 lead block with one of the 75x50 mm^2 surfaces polished. A new method based on multiple over-sampled edge profiles was developed to verify the edge angle determined by the other two methods, which were based on edge detection techniques. The line spread function was calculated by the finite-element difference method and then Fourier transformed to obtain the MTF.

Results: For simulation images: the MTFs obtained with the Kodak regular cassette were slightly lower than those obtained using the two fast cassettes. The MTFs in the line scan direction fell off slightly faster than those in the perpendicular direction. The MTFs obtained with large and small pixel sizes were almost identical. For the portal images: the MTFs for the EPID and CR systems were similar at frequencies lower than 0.4cycles/mm.

Conclusions: Although the cassettes were designed for film use, the fast cassette allows exposure reduction for the use of CR plates, and results in slightly better MTFs. For CR systems, the laser spot size remains the same regardless of the pixel size, so changes in pixel size have little impact on the MTF. The smaller-pixel-size CR system gives better MTFs than the EPID system.