AbstractID: 7768 Title: A Modulation Transfer Function Comparison of Dual-Screen CR Systems

Purpose: The goal of this study is to measure MTF of two dual-screen CR systems, and to explain the correlation between their system resolution and the physical properties of phosphor screens.
Method and Materials: Modulation transfer function (MTF) is commonly used method to characterize the performance of an imaging system. The well-established edge method is used to quantify the MTF of digital radiographic systems. We use a sharply polished edge slanted with respect to sampling detector grid, which allows measurement of oversampled edge function profiles. The focus of this study is on the comparison of the presampled MTFs obtained for different thicknesses of phosphor screens and pixel sizes. MTFs were measured with both diagnostic and 6 MV x-rays. The storage phosphors used in this study were two commercially available CR plates: Kodak EC-L fast and Kodak EC-L regular cassettes.
Results: The scan times per pixel for both high (0.171 mm) and low (0.342 mm) resolution are much shorter than 558 μs of the dominant luminescence lifetime for Gd_2O_2S:Tb, used in this study. Consequently, the spatial resolution of KODAK 2000RT CR system is lower in the scan direction than in the moving direction due to the afterglow effect. A comparison of the MTFs with Kodak EC-L fast and regular cassettes indicates that the spatial resolution of dual-screen CR systems does not depend on the total thickness of phosphor screens but is determined by the thickness of the thicker phosphor screen in the dual-screen CR system.
Conclusion: MTFs in laser scan direction roll off faster than in phosphor transport direction with KODAK 2000RT CR system. The resolution is related to the thickness of individual phosphors layers.

Conflict of Interest (only if applicable):