AbstractID: 5956 Title: Design and Performance Characteristics of Computed Radiographic Acquisition Technologies

Digital Radiography (DR) using Storage Phosphors, also known as Computed Radiography (or CR), has been commercially available for a quarter of a century. Each new generation of scanners and screens has brought improvements in image quality, throughput, physical size and cost. With these improvements has come a high level of clinical acceptance, with a corresponding displacement of screen/film systems as the standard for projection radiography acquisition.

Scanner improvements include better, more reliable light sources, more efficient light collection systems, higher quality photodetectors, and better electronics. The latest CR scanner advances have done away with traditional flying-spot (point-at-a-time) scanning in favor of line-at-a-time scanning, bringing significant throughput, image quality, and size advantages. At the same time, advances in the design and manufacture of powder-based, particle-in-a-binder CR screens, or image plates, have enabled improved inherent signal and noise properties (x-ray absorption, Modulation Transfer Function, Noise Power Spectra, Detective Quantum Efficiency, etc.), and a better matching of screen absorption and emission spectra to the scanner characteristics. Screens with transparent substrates have produced improved image quality due to the ability to extract latent image signal from both sides of the screen. The latest storage-phosphor screen materials can be grown in needle form, similar to the scintillators used in indirect flat-panel detectors, resulting in dramatically improved image sharpness and higher x-ray absorption due to the absence of binding material.

This presentation will review the form, function and performance of CR systems, with an eye towards more recent developments. The current state of the art in CR will be placed into the larger context of newer DR acquisition systems (e.g., active-matrix flat panels), looking at the advantages and disadvantages of each. Advances made in CR technologies in recent years portend continued expansion of CR-based medical imaging.

Educational Objectives

1. Describe the form and function of today's computed radiography (CR) systems
2. Identify the main factors that influence the image quality of CR systems
3. Compare modern CR systems to other acquisition technologies
4. Describe the latest and future developments in CR

Conflict of Interest Statement

The author is employed by Agfa Corporation.