The Surprising Effects of Transient Magnetic Fields in Computed Radiography

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Radiographic sensitivity as determined by image quality indicators is inherently dependent on image contrast and resolution. While intensifying screens can improve image contrast, it is largely controlled by x-ray energy, which is often predetermined based on the penetration necessary to radiograph an object's internal features. Resolution in computed radiography is dependent upon image plate structure and scanner basic spatial resolution. However, we discuss here the effects of a novel method which improves radiographic sensitivity by means of the application of a magnetic field to image plates following x-ray exposure. We conducted tests using a 6 MeV x-ray source to radiograph a test phantom containing ASTM E1025 Group 1 image quality indicators of identification number 5 through 100. Following x-ray exposure, we applied a magnetic field to the image plates prior to scanning and subsequently evaluated the radiographs for their image quality level. Despite a reduction in resolution, the increased contrast resulted in significant improvements in sensitivity when compared to radiographs taken without the magnetic field application. We also observed pixel value inversion and low-Z material objects that are not ordinarily visible in high energy radiography. These findings, while unexpected, suggest that dramatic improvements in sensitivity are achievable through the application of a magnetic field to image plates following exposure to x-rays. This presentation will detail the methodology used in this study, examine the multiple unexpected effects on resultant radiographs, and discuss the practical considerations of refining and implementing such a technique for real-world applications.