

Purpose: The role of fluoroscopic imaging is important and expanding for diagnostic and image guided therapy application. However, fluoroscopic imaging requires significant amounts of radiation leading to increased risk of cancer induction as well as non-stochastic effects such as radiation burns. Our purpose is to reduce the exposure and dose to the patient by an order of magnitude by the simultaneous application of previously established methods in a manner which alleviates the shortcomings of each.

Method and Materials: Pulsed fluoroscopy can reduce dose and exposure rate by replacing a 30 frame per second sequence by a 15 or 7.5 frames per second rate, but the unnatural jumpy nature of the reduced update rate disturbs the natural eye/brain comprehension of the image sequence.

Region of interest fluoroscopy is where the central region of the image has full exposure and the peripheral image, there to provide context only, has been reduced in dose. It has been shown in several studies to reduce exposure rate and dose to the patient by an interesting but not compelling amount of ~2 times. The scientific reason for this unimpressive result is the very poor DQE(0) of flat panel imagers at low exposure rates.

Results: A newly designed collimator which permits the exposure of only the region of interest to be inserted or removed between images at the 30 frame/second rate used in real time imaging has permitted a new approach to ROI imaging where the peripheral image can be obtained at very low frame rates and hence low total exposure while the central region can be obtained at full frame rate and normal exposure rates.

Conclusions: A practical technical solution to reduction of exposure and dose during fluoroscopic procedures has been identified and tested.

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IKON Inc. have agreed to provide prototype ROI collimators for use in this work at no cost to the authors.