AbstractID: 3178 Title: Improved Image Quality And Dose Efficiency with a Next-Generation Interventional Cardiac Digital Flat Panel (DFP) System

Purpose
Cardiologists are treating smaller coronary vessels using stents with less metal content and smaller micro strut thicknesses designed to reduce in-stent restenosis rates[1, 2]. We present the image quality and dose measurements of a next-generation digital flat panel (DFP) cardiovascular angiography system optimized to meet the needs of these demanding interventional procedures. Specific improvements include a detector with higher DQE at fluoroscopic (73% at 1µR) and record (79%) doses, optimized xray exposure factors based on a neural-net patient thickness estimation, and an xray source with higher fluoro power and increased range of spectral filtration. Performance improvements are demonstrated in a controlled comparison with the most widely installed state-of-the art DFP system.

Methods
Measurements of image quality and dose were made using the standard cardiovascular benchmarking SCAI-NEMA phantom on a state-of-the-art Innova®2000 and the new DFP system. Low contrast iodine visibility and phantom entrance dose were measured for simulated medium and large patient sizes using 20 and 30 cm thicknesses of polymethlymethacrylate (PMMA), respectively. Other measurements included limiting resolution, dynamic range and moving guide wire visibility, using the standard 20 cm phantom configuration. Measurements were obtained using normal mode, 30 frames per second (fps) fluoroscopy over all fields of view.

Results
The new DFP system demonstrated significant improvement ($p<=0.05$) in low contrast iodine detectability, at equal or lower doses, and in moving wire visibility. Working thickness (dynamic range) was improved. Spatial resolution limits were comparable.

Conclusions
The SCAI-NEMA measurements strongly suggest that, compared to the current state-of-the-art DFP system, the new interventional cardiovascular DFP system will provide better dose efficiency with a significant improvement in device and vessel visibility in a cardiac environment marked by anatomical motion. Images and data demonstrating stent visualization improvements will also be presented.

Conflict Of Interest: Authors are employees of a medical imaging equipment manufacturer.