AbstractID: 1208 Title: Characterization of a Prototype Micro-Angiographic Fluoroscope and Its Application in Neuro-Interventional Phantom Studies

Minimally invasive neuro-interventional treatment procedures require high-resolution imaging guidance with spatial frequency requirements of 4-10 lp/mm within a small region of interest (~5 cm). The new Micro-Angiographic Fluoroscope (MAF) achieves both high-resolution angiography and fluoroscopy. The updated model of the MAF with effective image pixel size of 31 microns consists of a 350-µm-thick CsI (Tl) phosphor coupled by a 2:1 fiber-optical taper to a light image intensifier, a 45 degree mirror, a high quality macro lens, and a 12-bit, 1024x1024, 30 frame per second Dalsa 1M30 CCD camera and Bitflow Roadrunner RUN-PCI-24M digital camera interface board. At spatial frequencies of 4 lp/mm and 10 lp/mm the MTF was 14% and 1.5%, respectively, and the DQE was 12% and 1.2%, respectively, while DQE (0) was 60%. All values were measured using 21 mm aluminum filtration at 70 kVp. A Guidant Penta coronary stent image taken using the MAF shows substantially more detailed stent strut architecture than using a conventional image intensifier for the same exposure. A silicone aneurysm phantom made of Sylgard 186 elastomer was used to simulate a neuro-interventional procedure. The MAF was used in fluoroscopic mode (20 µR/frame) at a rate of 30 fps during the neuro-interventional procedure including stent positioning and deployment. After the procedure, the MAF was used in angiographic mode (450 µR/frame) to acquire the high quality images exhibiting detail structure. The results strongly encourage continued research leading to clinical application. (Partial support: NIH Grants R01EB002873, R01NS38746)