AbstractID: 8648 Title: Update on the development of a new dual detector (Micro-Angiographic Fluoroscope/Flat Panel) C-arm mounted system for endovascular image guided interventions (EIGI)

Purpose:

To develop a dual detector C-arm unit, capable of high-resolution microangiography and fluoroscopy, and Region-of-Interest Cone-Beam CT (ROI-CBCT).

Method and Materials:

The Microangiographic Fluoroscope (MAF) (1024x1024x12bits, 35μm pixels, 4 cm field-of-view, FOV) was attached with a specially designed holder to a standard C-arm Flat-Panel (FP) system. The MAF consists of a 300 μm CsI input phosphor coupled to a dual stage GEN2 micro-channel plate light image intensifier (LII), followed by a minifying fiber-optic taper coupled to a 30 fps CCD camera. The LII has a large variable gain allowing usage for very low (fluoroscopic) exposures while maintaining very good image quality. The holder allows facile placing of the new detector into the FP FOV when use is required or parking when not. The source-to-image distance and the orientation of this detector are selected using the same controls as for the standard C-arm unit. A special switch attached onto the holder allows automatic collimation of the x-ray beam to the active area of the MAF. The new system was tested in multiple experiments involving phantoms and animals for reliability and capability to perform EIGI procedures and also for dual detector ROI-CBCT.

Results:

The new system is being used routinely for EIGI fluoroscopic guidance and microangiography in our research lab. The design allows a variable SID between 69 and 104 cm. During rotational angiography and dual detector ROI-CBCT, 194 projections are acquired, one every degree. Interventional devices such as endovascular stents placed in the animals and phantoms were reconstructed with great accuracy, and virtually without artifacts.

Conclusion:

Implementation of such a high-resolution imager on a clinical system could bring substantial benefits for the treatment of cerebrovascular disease and also potentially increase the motivation to develop improved and more effective endovascular devices. (Funding: NIH Grants R01 EB002873, NS43924)