AbstractID: 10508 Title: Testing of the high-resolution ROI micro-angio fluoroscope (MAF) detector using a modified NEMA XR-21 phantom

Purpose: To test the MAF in conditions and tasks specific to minimally invasive neurovascular procedures.
Materials and Methods: A high-sensitivity, high-resolution MAF detector was built and incorporated into a standard angiographic C-Arm system. This detector consists of a 300μm CsI input phosphor coupled to a dual stage GEN2 micro-channel-plate light image intensifier, followed by minifying fiber-optic taper coupled to a CCD chip. The detector is attached to a very stable detector-changer onto a Flat-Panel (FP) C-arm angiographic unit to allow facile placement of the detector into the field-of-view whenever high resolution is needed. A NEMA XR21-2000 phantom was modified to evaluate neurovascular x-ray imaging systems. The phantom was restructured to be head-equivalent; two aluminum plates shaped to fit into the NEMA phantom geometry were added to a 15cm thick section. Digital subtraction angiography (DSA) testing was enabled by adding a removable central section with a hollow slot which allows insertion of various angiographic test blocks. DSA and DA were tested using a standard removable insert having simulated arteries with thicknesses of 4, 2 and 1 mm and 15mg/cm^3 iodine contrast and with stenoses and aneurysms (AAPM Report 15). Features on the central plates of the NEMA XR21 phantom such as bar pattern and iodine-detail-contrast-targets were also imaged. The results of the evaluation of the MAF with the modified phantom were compared with the images obtained with a standard flat panel.
Results: The phantom imaging results presented as (MAF-detected-features/Flat-Panel-detected-features) are: bar pattern - (5.0/3.1) lines/mm; smallest iodine-contrast target group detectable - (10/10) mg/cm^2, details of smallest simulated vessel in DSA - (1/2) mm.
Conclusions: The MAF detector performs at least as well as a standard FP in detection of low-contrast objects, and is superior in the visualization and identification of the small details. (Support: NIH grant R01-EB002873, R01EB0008425).