AbstractID: 5101 Title: New combined high-resolution region-of-interest microangiographic detector and large field of view image intensifier system: a contrast-to-noise comparison

Purpose: To demonstrate the advantage of combining a new high-resolution region-of-interest (ROI) microangiographic detector (MA) and a standard x-ray image intensifier (II), using contrast-to-noise ratios (CNR) of vessel phantoms within a scattering medium.

Methods and Materials: The MA was mounted onto a Toshiba Infinix 3000 C-arm angiographic unit so that the user can switch between the MA and II during an intervention at any viewing angle. Projection images can be acquired at nearly identical geometry with either detector, allowing for accurate inter-comparisons. CNRs were measured for vessel phantoms (50-1000μm inner-diameter polyethylene tubing) filled with iodine-contrast agent and placed on a uniform head-equivalent phantom used to simulate the scatter and beam hardening effects of the head. Both detectors were operated with optimal exposure techniques (allowing the II system to choose the 'best' kVp and mAs settings and selecting an exposure (mAs) that provides a sufficiently high signal for the MA). The CNR provides a quantitative measure of object visibility in the image, and hence system performance.

Results: Compared to the II, the MA provides consistently higher CNR for all vessel sizes, with an average improvement factor (CNR_{MA}/CNR_{II}) of 1.6. A clear trend is observed, with CNR improvement factors increasing with decreasing vessel diameter.

Conclusion: A new MA-II system has been developed allowing use of the high resolution MA as an alternative to a standard II and easy switching between the two during a procedure, when the imaging task demands. The MA is shown to provide increased CNR for all vessel phantoms in a uniform head-equivalent scattering material. This combined system should lead to improved neurovascular image-guided interventions.