

Purpose:To compare the effective-dose rate delivered to the patient using the small field-of-view (FOV) MAF to that of the standard larger FOV XII during clinical neuro-interventional procedures.

Methods:The MAF camera has been installed for clinical evaluation during neuro-interventional procedures on a Toshiba Infinix fluoroscopic c-arm system so it can be interchangeably used with the standard imaging system. This camera has a small FOV (3.6x3.6 cm) but provides high-resolution (35-micron pixels) and high-sensitivity. The standard system is a 9-inch XII, with the 5-inch mode (124-micron pixels) being used most frequently. We used the program PCXMC 2.0 (STUK, Helsinki, Finland) to calculate effective-dose rates for the MAF and 5-inch mode of the XII using the technical parameters employed in patient procedures. Parameters such as kVp, mAs, beam filtration, and frame rate were logged during the procedure so the dose could be retrospectively calculated. The effective-dose rates for the PA projection were calculated for the fluoroscopy and DSA components of 15 neuro-interventional procedures.

Results:The effective dose for fixed mAs was found to increase with increasing x-ray tube voltage for PA imaging of the neurovasculature for both FOV's. The effective-dose rate in the clinical procedures was substantially lower for the MAF compared to the 5-inch mode of the XII, ranging from a factor of about 4 to 12 times lower for fluoroscopy and 12 to 46 times lower for DSA.

Conclusions:Effective dose is very much dependent on the FOV. Substantial reduction in effective-dose rate is realized using the MAF as compared to the standard imaging system; this reduction could allow the dose with the MAF to be increased by over an order of magnitude to provide increased contrast resolution without increasing the stochastic risk to the patient compared to full-FOV imaging.

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