

AbstractID: 13738 Title: Monitoring Radiation Dose in Cerebral CT Perfusion Exams

PURPOSE: This paper is to study how to monitor and manage the radiation dose in cerebral CT perfusion exams with various CT scanners including a 10 slice MDCT, a 64 slice VCT and a 320 detector row volume scanner.

METHODS & MATERIALS: Several cerebral CT perfusion protocols have been studied with various tube current settings. Radiation dose measurements were done on an anthropomorphic head phantom using an optically stimulated luminescence (OSL) dosimeter device (MicroStar, Landauer) and an ion chamber dosimeter (Accu-Pro, RadCal). All the measurements were done at the skin surface. Several OSLs were used to cover the X-ray slice beam width. The readout of OSLs was performed right on site with a portable reading device.

RESULTS: The accuracy of the OSLs was verified through a side-by-side comparison with an ion chamber dosimeter. It is shown that the OSL sensor is angle independent that makes it advantageous over those solid state personal dosimeters for real-time CT dose measurements. For our study, 80 kVp was utilized for the cerebral CT perfusion exams. The tube current varied from 80 mA to 200 mA. The radiation dose varied directly with the selection of tube voltage and current settings. Considerable variations were also observed among different types of CT scanners.

Conclusion: Since there is a potential risk for the skin dose to be accumulated beyond the threshold for determinant effects such as skin erythema and epilation in CT perfusion exams, it is important to optimize the protocol and monitor the patient dose closely. This paper verifies a tool to do that. It can be utilized during the initial set-up of the protocol. Also, it will be useful for individual patient dose monitoring from case to case. It adds the safeguard to high dose CT scans such as cerebral CT perfusion exams.