Purpose: To assess the ability of a real-time dose-tracking system (DTS) to accurately represent the skin dose distribution for fluoroscopic interventional procedures by comparison to that measured using Gafchromic film (XR-RV3, ISP, Wayne, NJ).

Methods: We have developed a dose-tracking system that calculates the radiation dose to the patient's skin in real-time using the exposure parameters and imaging-system-geometry obtained from the digital bus on a Toshiba Infinix C-arm unit. The DTS presents the cumulative dose values in a color mapping on a 3D graphic of the patient for immediate feedback to the interventionalist. Gafchromic film was used to verify the spatial correspondence of the mapped distribution and the accuracy of the dose accumulation on the graphic. The film was calibrated against the readings of a 6 cc ionization chamber (PTW-Freiburg GmbH, Freiburg, Germany) over a range of exposure values from 0 to 1500 R using cine-radiographic exposures on the same C-arm system. A simulated cardiac-catheterization procedure was performed with the film wrapped around an Alderson torso phantom; the density distribution and converted dose values on the film were compared to that of the DTS graphic.

Results: The DTS and film distributions were compared and excellent agreement was obtained within the cm-sized surface elements used for the patient model demonstrating proper geometric scaling of the graphic. The dose values for individual points on the phantom surface agreed within 10% between the film and DTS even with inexact contouring of the film with the phantom in the measurement.

Conclusions: As shown by the agreement with Gafchromic film, the DTS provides skin-dose distribution mapping with sufficient accuracy for use in monitoring interventional fluoroscopic procedures.

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