

## AbstractID: 8377 Title: Radiation Doses for Corresponding CT and Radiographic/Fluoroscopic Exams

If radiologists were given a choice of using only one imaging modality for all examinations, the majority would choose CT because of its improved contrast resolution and lack of superposition. However, CT also has disadvantages including increased cost of equipment and exams, limited number and availability of scanners, limited spatial resolution, and increased radiation dose. The risks associated with CT radiation dose have received much attention with the publication of several articles in the February 2001 issue of AJR and especially the related "CT scans in children linked to cancer later" article in USA Today. Although the USA Today article overstated the risks, it served as a wake-up call to radiologists, physicists and CT manufacturers that the risks from radiation dose in CT are small but significant, and there is a need for new methods to minimize the dose. This is especially true for children who are about 10 times more sensitive to radiation than adults. There is now more widespread use of the CT technique charts recommended in one of the AJR articles (AJR 2001; 176:303-306) for children of different weights, and similar charts are being developed for adults. In addition automatic tube current modulation scanning (an AEC control for CT) is being developed by manufactures to reduce the dose while maintaining image quality. Many issues need to be resolved including: how to best compute the CT doses, what radiation unit to use to compare CT and radiographic and fluoroscopic doses, what figure of merit to use to compare the CT doses and image qualities from different scanners, whether standard of care limits should be established for these figures of merit and/or maximum acceptable dose levels should be instituted, and what CT techniques (kVp, mA, scan time, pitch, slice thickness, number of simultaneous slices, spatial resolution (reconstruction kernel), etc.) for specific examinations should be recommended for achieving diagnostic images at reasonable doses. A comparison of effective doses (in mSv) from the literature for some conventional exams that are being replaced by CT includes: IVP (1.5) vs renal stone CT (3.5); chest radiograph (0.02) vs. low dose helical CT for lung cancer screening (0.4); DSA pulmonary angio (7.1) vs. CT pulmonary angio (4.2); C-spine (0.07) vs. CT C-spine (2.5); and cardiac cath (6-9) vs. coronary artery CTA (3-13). We will discuss these and additional comparisons using the x-ray techniques for screen-film, CR, DR, fluoroscopy, digital angiography, and multi-slice CT at our institution. Radiographic and fluoroscopic doses will be computed using XDOSE and CHILDOSE and CT doses will be computed using CT-Expo V1.0 and ImPACT. Finally, some other topics covered in a recent conference entitled "The ALARA Concept in Pediatric CT Intelligent Dose Reduction" (Pediatr Radiol 2002, volume 32) and in the book Radiation Exposure in Computed Tomography (edited by HD Nagel, COCIR, Frankfurt, 2000) will be brought up for debate.