AbstractID: 7436 Title: xCAT: A Dedicated, Portable, Head and Neck Volume CT Scanner

Purpose:
Flat-panel x-ray detection technology has allowed for efficient data collection with simplified gantries. By using this technology and focusing on head and neck scanning, highly compact portable volume CT (VCT) scanners can be constructed. We present a portable unit designed with the intraoperative environment in mind. A number of novel approaches were used in this system design including a pivoting front axle for joint transportability and stability; a dual x-ray source design for maximizing field-of-view and minimizing source-to-detector distance; an offset geometry for maximizing the transaxial field-of-view; and built-in leaded acrylic to minimize scattered radiation.

Method and Materials:
We present the xCAT prototype, a portable flat-panel VCT system. We present CT images from this system of a head phantom, line pair phantom, and initial clinical studies. We also measured patient dose using thermoluminescent dosimeters and measured the scattered radiation profile at several points around the scanner. All acquisitions were made at 120 kVp and approximately 80 mAs.

Results:
The xCAT system is highly mobile and weighs around 450 pounds and is 31" wide, 40" long and 66" tall. The image volume has a 22 cm transaxial diameter and is 13 cm in axial extent. Line pairs up to 12 lp/cm are clearly visible in the reconstructed images. Head scans produce good images of high contrast features with a low patient effective dose (approximately 0.25 mSv). Measured scatter dose was 1.5 μGy at the position of the operator's thyroid.

Conclusion:
The xCAT is a highly portable VCT scanner that produces images acceptable for bone window imaging. As such, it should have significant utility for high contrast imaging situations such as intraoperative sinus imaging. For more general purpose scanning, significant improvements in low contrast imaging will be necessary.

Conflict of Interest:
Research sponsored by Xoran Technologies, Inc.