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Improved spatial resolution and lower-dose pediatric CT imaging: A feasibility study to evaluate narrowing the x-ray photon energy spectrum

Mark G Benz
Engineering Horizons International, USA

This feasibility study has shown that improved spatial resolution and reduced radiation dose can be achieved in pediatric CT by narrowing the x-ray photon energy spectrum. The approach used to evaluate narrowing the spectrum was to place a hafnium filter between the x-ray generator and a pediatric abdominal phantom. The CT platform used for this study was a GE system originally manufactured in 1999 in the process of being refurbished. This system had the advantage that it provided easy access to the x-ray portion of the system to add the hafnium filter. The observational measurements taken with the hafnium filter in place at 120 kVp showed a Spatial Resolution Metric of 2.3 mm at the low dose of 12 mGY. This is to be compared to the higher dose of 32 mGy required when the hafnium filter was not used. Further improvements are anticipated with installation of modified noise reduction software, currently under development. The research team completing this study included: Mark G Benz ScD, metallurgist retired from GE, consultant for Engineering Horizons International and Safer Pediatric Imaging; Matthew W. Benz MD, pediatrician with Southboro Medical Group; Steven B. Birnbaum MD, radiologist with Dartmouth Hitchcock; Eric Chason PhD and Brian W. Sheldon ScD, materials scientists with Brown University; and Dale McGuire, Director of CT Operations at BC Technical, Inc. A complete description of this study is published in *Pediatric Radiology*

Biography

Benz is a metallurgist and currently working on new technologies to reduce the cancer risk associated with the x-ray dose for pediatric CT. From 1961 to 2001 Dr. Benz was on the research staff of the GE Corporate Research and Development Center. Dr. Benz is a graduate of Middlebury College (AB in Chemistry), and the Massachusetts Institute of Technology (SM and ScD in Metallurgical Engineering). He is a recipient of the GE Coolidge Fellowship, a Fellow of ASM International, and a Member of the National Academy of Engineering. He has presented 98 papers and has received 123 patents.

benzmg@gmavt.net

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