

Go

About Us

International Journal of Biomedical Imaging About this Journal Submit a Manuscript Table of Contents International Journal of Biomedical Imaging Volume 2006 (2006), Article ID 95754, 8 pages

doi:10.1155/IJBI/2006/95754

Abstract

1	Full-Text	
	I UII-I EXL	FDI

il Detectability	Dinked References
	? How to Cite this Article

Impacts of Filtration on Contrast-Deta of an X-ray I maging System

Qirong Zhang,¹ John Rong,² Xizeng Wu,³ Yuhua Li,¹ Wei R. Chen,⁴ and Hong Liu¹

¹Center for Bioengineering and School of Electrical and Computer Engineering, University of Oklahoma, Norman 73019, OK, USA

²Department of Radiological Sciences, University of Oklahoma Health Science Center, Oklahoma City 73104, OK, USA

³Department of Radiology, University of Alabama at Birmingham, Birmingham 35294, AL, USA ⁴Department of Physics and Engineering, University of Central Oklahoma, Edmond 73034, OK, USA

Received 29 August 2005; Revised 8 November 2005; Accepted 2 December 2005

Academic Editor: Seung Wook Lee

Abstract

The purpose of this study is to investigate the impacts of added filtration on the contrast-detail detectability of a digital X-ray imaging system for small animal studies. A digital X-ray imaging system specifically designed for small animal studies was used. This system is equipped with a micro X-ray source with a tungsten target and a beryllium window filtration and a CCD-based digital detector. Molybdenum filters of 0 mm, 0.02 mm, and 0.05 mm in thickness were added. The corresponding X-ray spectra and contrast-detail detectabilities were measured using two phantoms of different thicknesses simulating breast tissue under different exposures. The added Mo filters reduced the low-energy as well as the high-energy photons, hence providing a narrowband for imaging quality improvement. In the experiments with a 1.15 cm phantom, the optimal image detectability was observed using 22 kVp and the 0.05 mm Mo filter. With the 2.15 cm phantom, the best detectability was obtained with 22 kVp and the 0.02 mm Mo filter. Our experiments showed that appropriate filtrations could reduce certain low- and high-energy components of X-ray spectra which have limited contributions to image contrast. At the same time, such filtration could improve the contrast-detail detectability, particularly at relatively low kVp and high filtration. Therefore, optimal image quality can be obtained with the same absorbed radiation dose by the subjects when appropriate filtration is used.

Copyright © 2009 Hindawi Publishing Corporation. All rights reserved

Journal Menu

- Abstracting and Indexing
- Aims and Scope
- Article Processing Charges
- Articles in Press
- Author Guidelines
- Bibliographic Information
- Contact Information
- Editorial Board
- Editorial Workflow
- Reviewers Acknowledgment
- Subscription Information

Open Special Issues

- Published Special Issues
- Special Issue Guidelines

Call for Proposals for Special Issues