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4th International Conference and Exhibition on
Medical Physics and Biophysics
2nd International Conference on &
Nuclear Medicine & Radiation Therapy

July 27-28, 2017 Rome, Italy

A phantom study of eye shielding for different CT scanners and imaging protocols

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Background Computed tomography (CT) scan of the brain is a good method for investigating cranial lesions. Given that chronic accumulation of oxidative stress in the eyes induces carcinogenesis and cataract, we aimed to protect the eyes during CT scans by understanding the effects of non-latex barium sulfate shields on image quality and radiation dose to lens of the eye.

Materials & Methods: A human head phantom was scanned either by a 16-slice CT scanner at a fixed tube current of 300 mAs or by a 256-slice Dual-Source CT (DSCT) scanner with automatic tube current modulation. For the assessment of image quality and radiation dose, various tube voltages were applied with or without eye shielding under clinical settings. Pencil-shaped ionization chambers were implemented for measuring air kerma close to the eye. CT images at slices that exhibit zygomatic, orbital and nasal bones were used for the calculation of signal-to-noise and contrast-to-noise ratios.

Results: The signal-to-noise and contrast-to-noise ratios of DSCT images maintained relatively consistent with the increasing number of barium sulfate shield(s). On the contrary, the ratios of 16-slice CT images deviated or elevated along with the shield increment, leading to greater reduction in image quality upon the application of one shield. Similarly, radiation dose decreased with decreasing tube voltage and the increasing number of shields. The application of two shields on the 16-slice CT scan reduced up to 52% of dose close to the eye.

Conclusion: Results of this study indicate that tube current modulation should be considered for acquiring better image quality with eye shielding.

Biography

Yuan-Hao Lee has completed her PhD from University of Texas Health Science Center at San Antonio and Postdoctoral studies from Mitchell Cancer Institute (Univ. of South Alabama) and University of Hawaii Cancer Center. She is currently being trained in the field of Medical Physics at the Wanfang Hospital, a JCR-accredited medical center. She has published more than 10 peer-review and proceeding papers as well as served as an Editorial Board Member of *Journal of Medical and Clinical Oncology*.

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