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Assessment of the Patient-Specific Image Quality for Chest Computed Tomography with Automatic Tube-Current Modulation

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INTRODUCTION

Automatic tube-current modulation (ATCM) is the recent advances in computed tomography (CT) scanning techniques. Tube currents of ATCM are automatically adjusted according to the individual patient anatomy. The utilization of adjusted tube currents has the potential to reduce CT radiation doses while maintaining diagnostic image quality at some level. The purpose of this study is to further investigate the effect of patient size on the subjective and objective image quality associated with ATCM in chest CT scans.

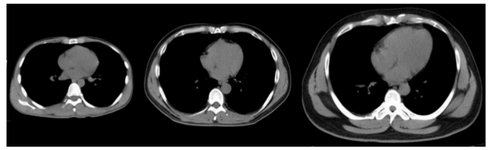
AIM

To ensure the image quality of different sized patients to meet diagnostic requirements is one of the key points of ATCM technology. This study is designed to further investigate the effect of patient size on the image quality associated with ATCM in chest computed tomography (CT) scans

METHOD

Tips for making a successful poster:

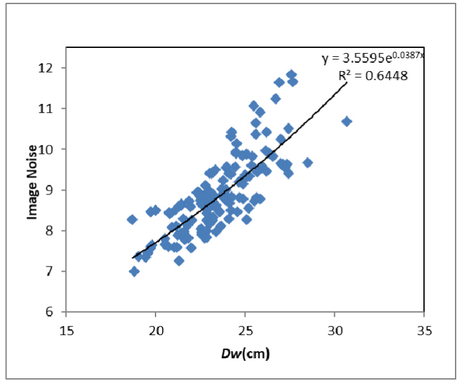
- Patients were classed into three groups (“small”, “medium”, and “large”) according to Water equivalent diameter (Dw).
- Image noise was used as an objective index to assess image quality using RadiAnt software (version 4.2.1, Poland).One professional radiologist was instructed to place a circular region of interest (ROI) of 4 cm_2 in a homogeneous area of the heart.
- Quantitative image noise was defined as the standard deviation of the average CT number (in Hounsfield units) within this circular region of interest.
- Subjective image quality was assessed by two radiologists independently compared CT images acquired with ACS+DOM for diagnostic acceptability, using a 5-point scale.



Transverse CT images of a (a) small patient (b) medium patient (c) large patient

RESULTS

- *The image noise were 7.94±0.46, 8.83±0.59, 9.45±0.90 for small, medium and large size groups respectively and had positive correlations with Dw (r =0.80, P < .001)*
- *For the subjective assessment of image quality, the κ coefficient was 0.615 for diagnostic acceptability (P < .001). A coefficient of 0.61–0.80 indicates substantial agreement*
- *For different-sized patients, the median scores were greater than 4 out of 5 and the diagnostic acceptability differences were not significant (P = .141, P=.165).*



The relationship between image noise and Dw

CONCLUSIONS

For chest CT scan with ATCM, although the image of all patents were diagnostic acceptable the image noise increased with patient size The methods and results delineated in this study may aid radiologists in making decisions concerning image utilization and provide guidance for the design and optimization of chest CT protocols using ATCM.

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