

Title: Implementation of an Optimized Low-Dose Chest CT Protocol for Routine Clinical Imaging: A Technical Note

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Abstract (Optional)

Reducing radiation exposure while maintaining diagnostic image quality remains a key objective in computed tomography (CT). This technical note describes the implementation of an optimized low-dose chest CT protocol using automatic tube current modulation and iterative reconstruction techniques. The modified protocol was evaluated in a pilot group of adult patients and demonstrated a reduction in radiation dose without compromising image quality. The proposed protocol is simple to implement and may improve patient safety during routine chest CT examinations.

Keywords: Low-Dose CT; Computed Tomography; Radiation Dose; Iterative Reconstruction; Imaging Protocol

1. Introduction

Computed tomography is widely used for the evaluation of thoracic diseases because of its high diagnostic accuracy. However, concerns regarding cumulative radiation exposure have encouraged the development of dose-optimization strategies. Advances such as automatic exposure control and iterative reconstruction algorithms enable substantial dose reduction while preserving diagnostic image quality. This technical note describes a practical protocol modification that can be incorporated into routine clinical practice.

2. Technical Description / Methodology

A standard chest CT protocol was modified by reducing the tube voltage from **120 kVp to 100 kVp** in appropriate patients and enabling automatic tube current modulation. Images were reconstructed using an advanced iterative reconstruction algorithm at a 1-mm slice thickness. The modified protocol was implemented in **30 adult patients** undergoing routine chest CT examinations. Image quality was independently assessed by two experienced radiologists using a five-point subjective image quality scale, while radiation dose was evaluated using the CT dose index (CTDIvol) and dose-length product (DLP).

Preliminary evaluation demonstrated an average **28% reduction in radiation dose** compared with the conventional protocol, with no clinically significant reduction in diagnostic image quality.

3. Applications and Significance

The optimized protocol can be readily adopted in routine clinical practice without requiring additional hardware or software. It is particularly beneficial for patients requiring repeated CT examinations, such as those with chronic lung disease or oncological conditions. The technique supports the **ALARA (As Low As Reasonably Achievable)** principle by minimizing radiation exposure while maintaining diagnostic confidence. This protocol may also contribute to improved patient safety and standardization of CT imaging practices across healthcare institutions.

4. Conclusion

The proposed low-dose chest CT protocol provides a practical and effective method for reducing radiation exposure while preserving diagnostic image quality. Further multicentre studies involving larger patient populations are recommended to validate its clinical performance and broader applicability.

5. Declarations

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Conflict of Interest: The authors declare no conflict of interest.

Author Contributions: All authors contributed to the study design, protocol development, manuscript preparation, and final approval.

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Data Availability: The data supporting the findings of this technical note are available from the corresponding author upon reasonable request.

6. References

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