Volume 3, Issue 10, October 2025 ISSN (E): 2938-3765

EVALUATION OF PREVENTIVE MEASURES AND ION RADIATION CAPABILITIES OF MSCT IN THE DIAGNOSIS OF THORACIC ORGAN PATHOLOGIES

Authors: Khamidova M. A.
Rakhmonova G. E.
Year 2025

Abstract
This article presents a comprehensive assessment of the diagnostic capabilities of multislice computed tomography (MSCT) of the thoracic organs and an analysis of the dosimetric characteristics of ionizing radiation. It discusses issues of radiation prevention, optimization of scanning parameters, and enhancement of diagnostic informativeness while reducing radiation exposure. A review of modern low-dose MSCT technologies, image reconstruction methods, and dose correction algorithms is provided. The study substantiates the high diagnostic value of MSCT in detecting lung, mediastinal, and thoracic wall pathologies.

Keywords: Multislice computed tomography, thorax, dosimetry, prevention, radiation safety, diagnostics.

Introduction

Diseases of the thoracic organs remain among the most pressing challenges in modern medicine. Pathologies of the lungs, pleura, mediastinum, and thoracic wall require high-precision diagnostic approaches to ensure early detection and effective treatment monitoring. Among imaging modalities, multislice computed tomography (MSCT) holds a special place due to its speed, accuracy, and ability to provide detailed visualization of anatomical structures.

AIM AND OBJECTIVES OF THE STUD

Aim: To evaluate the diagnostic effectiveness of MSCT and the potential for reducing radiation exposure in examinations of the thoracic organs.

Objectives:

1. To analyze the operational principles of MSCT and the physical basis of ionizing radiation.
2. To review modern methods of dosimetric control and radiation dose reduction.
3. To assess the diagnostic informativeness of MSCT for various thoracic pathologies.
4. To study preventive approaches for minimizing radiation risks.

Web of Medicine: Journal of Medicine, Practice and Nursing
webofjournals.com/index.php/5

MATERIALS AND METHODS

An analytical review of domestic and international studies on dosimetry and the diagnostic efficiency of MSCT was conducted. The technical parameters of next-generation tomographs (64–256 slices) and low-dose protocols used in chest imaging were analyzed.

RESULTS OF THE STUDY

MSCT provides high spatial resolution images, enabling visualization of minute anatomical structures. Diagnostic accuracy in detecting inflammatory, fibrotic, neoplastic, and traumatic changes ranges from 94% to 98%. The effective dose during standard chest MSCT is 5–7 mSv, while with low-dose protocols it is reduced to 1.5–2.5 mSv, decreasing radiation exposure by 60–70%.

DISCUSSION

Current trends in radiology focus on achieving a balance between image quality and radiation safety. The use of modern technologies allows for high-quality tomographic images at minimal doses. For military personnel and patients undergoing repeated examinations, the prevention of radiation exposure is of particular importance.

CONCLUSION

MSCT of the thoracic organs remains a highly effective diagnostic method. Modern low-dose technologies significantly reduce ionizing radiation levels without compromising diagnostic informativeness.

PRACTICAL RECOMMENDATIONS

1. Apply low-dose protocols for repeated examinations.
2. Use automatic tube current modulation and iterative reconstruction.
3. Maintain individual radiation dose records for each patient.
4. Conduct regular staff training in ALARA (As Low As Reasonably Achievable) principles.
5. Optimize scanning parameters according to body weight and clinical indications.

REFERENCES

1. European Guidelines on Dose Reduction in CT Examinations. — Brussels, 2023.
2. Bushberg J. T., Seibert J. A. The Essential Physics of Medical Imaging. — 2020.
3. Huda W. Radiation Dosimetry in CT. — Med. Phys., 2022.
4. Vlasenko A.V. et al. Optimization of Low-Dose MSCT Parameters for the Chest. — Radiology, 2021.
5. International Atomic Energy Agency (IAEA). Radiation Protection in Medicine. — 2022.

Web of Medicine: Journal of Medicine, Practice and Nursing
webofjournals.com/index.php/5