2nd PANHELLENIC CONGRESS OF MEDICAL PHYSICS
4-6 OCTOBER 2024| EUGENIDES FOUNDATION

Radiology Redefined: Unveiling the Impact of Artificial Intelligence on Radiation Protection

Georgios Alexiou[1], Ioannis Lamprinakos[1], Maria Skyrla[1], Georgia Vazoura[1], and Maria Zgkouri[1]*

[1]Department of Medical Physics, School of Medicine, University of Patras, Rion 265 00, Greece

Background

Radiation protection (RP) in medical physics is essential for ensuring the safety of patients and healthcare professionals. Integrating Artificial Intelligence (AI) technologies has emerged as a promising avenue for enhancing RP. This study explores current trends and prospects of AI in RP within the radiology domain.

Materials & Methods

A literature search was performed using Pubmed, Science Direct (Elsevier) and Google Scholar to search for relevant articles concerning the reviewed topic. The search included terms like "artificial intelligence," "machine learning," "deep learning," "radiation protection," "medical physics," "image quality," and "dose reduction," using Boolean operators to refine results. Research articles from 2015 to 2024 were considered to capture recent advancements in AI for radiation protection and medical imaging purposes.

The research focused on how AI contributes to minimizing radiation doses during imaging procedures, improving patient positioning and enhancing overall safety and workflow efficiency. It aimed to evaluate the effectiveness of AI technologies in optimizing these aspects to ensure better patient outcomes. A narrative synthesis compared AI models and techniques, highlighting key trends and challenges in the field.

Results

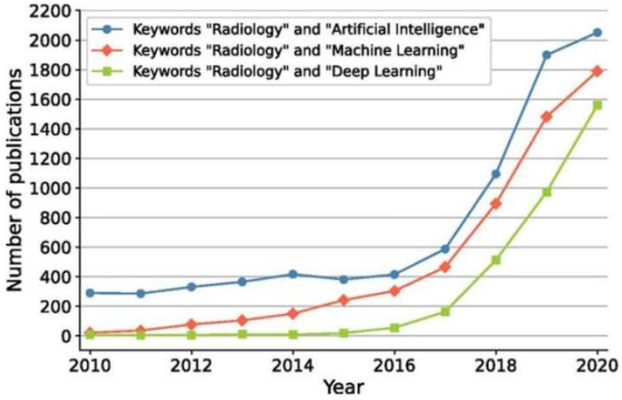
AI technologies enhance Radiation Protection (RP) in radiology

Key benefits include:

- ✓ Improved radiation monitoring
- ✓ Noise reduction
- ✓ Dose reduction
- ✓ Workflow optimization

Autonomous AI systems **enable**:

- ✓ Real-time monitoring
- ✓ Reducing occupational hazards
- ✓ Enhancing patient safety
- ✓ Improving patient positioning



Growth of AI in radiology, reflected by the number of publications on PubMed when searching for the terms 'radiology' in combination with 'artificial intelligence,' 'machine learning,' or 'deep learning,' adapted from Milan Decuyper et al., 'Artificial Intelligence with Deep Learning in Nuclear Medicine and Radiology.'

Conclusion

Integrating AI technologies marks a paradigm shift in RP practices within medical physics. AI has the potential to revolutionize RP strategies by offering more precise and personalized approaches. However, challenges like data privacy and algorithm bias require collaboration between medical physicists and AI researchers to ensure responsible AI deployment in RP. The future holds immense promise for AI-enabled RP, leading to safer and more effective radiation-related medical practices.

**all authors contributed equally*