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Foreword

A Note from the Editorial Board

Welcome to this year's annual magazine from the Global Scientific Collaboration team.

uInnovation is a scientific magazine published by United Imaging Healthcare that has been successfully distributed for over past three years. It aims to serve as a platform for sharing ground-breaking advancements, emerging trends, and future possibilities in the vast expanse that is oncology.

uInnovation is currently in its fourth edition. This year's edition will inform, engage, and inspire you about the latest developments and applications of United Imaging Healthcare. This journal includes quick read sections for those in a rush, and appealing images to promote visual understanding.

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The Transformative Role of AI in Lung Cancer Screening

Samuel Reefath
MGM Healthcare, Chennai, INDIA

"*Screening in the AI era is more patient-centered than ever before. And this, in the end, is what matters most: earlier diagnoses, safer care, and better chances at life*."

Artificial Intelligence (AI) has shifted from being a futuristic idea to becoming a daily reality in radiology. Few areas showcase its impact as vividly as lung cancer screening. Over the past decade, I have seen the field evolve from painstaking manual review of chest CTs to AI-augmented workflows that are faster, sharper, and more consistent. For a disease where early detection is everything, this evolution is not just technological—it is lifesaving.

Cardiovascular related deaths are dominated by vascular diseases of the heart (coronary and microvasculature), and the large great vessels. Diagnostic cardiac catheterization was introduced by André Cournand and Dickinson Richards in the 1940s, followed by selective coronary angiography by Mason Sones in the 1960s. With the advent of catheter-based interventions, pioneered by Andreas Gruentzig in the 1970s. In the last 50 years, there has been tremendous progress in the refinement and expansion of these techniques. Today, percutaneous coronary intervention (PCI) access is through the femoral and the radial arteries. Coincidently, never ending development of interventional technologies have emerged from discrete single coronary artery (CA) lesions procedures to left main CA interventions, and more recently to multivessel coronary disease cases with risks too high for surgical solutions.

Has AI changed my practice?

The short answer is yes, and in a profound way. AI has altered the very rhythm of my day. What once involved long hours of scrolling through hundreds of CT slices to hunt for subtle nodules is now supported by AI algorithms that flag suspicious lesions, calculate volumes, and track growth across time. Instead of being consumed by the mechanics of detection, I can devote more attention to interpretation, context, and communication with patients and colleagues.

What AI tools I use currently

In my current practice, AI is woven into several steps of the lung cancer screening process:

- Nodule detection and volumetry software highlights even very small lesions and quantifies their growth across time.

- Deep learning-based reconstruction algorithms (DLR, including Delta reconstructions) enhance CT images while allowing us to reduce radiation exposure.

- Risk-stratification platforms combine imaging data with patient demographics and clinical risk factors to guide screening intervals.

These tools are not replacements for radiologists, but rather extensions of our skillset-helping us see more, measure more precisely, and decide more confidently.

Has AI made my practice better?

The gains are clear. Efficiency has improved, turnaround times have shortened, and my diagnostic confidence has increased. For example, when dealing with a patient who has multiple tiny nodules, manual tracking used to feel like assembling a jigsaw puzzle under pressure. Now, AI automatically compares current and prior scans, providing volumetric growth curves that allow me to focus on clinical judgment rather than raw measurement.

Perhaps more importantly, AI levels the playing field. It empowers junior radiologists to produce reports of consistent quality, aligning with international screening standards, and reducing inter-observer variability.

How has AI changed my interaction with colleagues?

AI has also reshaped conversations in the multidisciplinary tumor board. Instead of debating whether a nodule "looks a little bigger," we now discuss growth rates, malignancy risk scores, and structured AI-generated metrics. This has led to more precise planning with oncologists, particularly around

decisions of surveillance versus biopsy versus intervention. Among radiologists, too, AI has encouraged a culture of evidence-based dialogue rather than subjective hierarchy.

The pre-AI era: how was screening done?

Before AI, lung cancer screening was laborious and imperfect. Radiologists manually scrutinized hundreds of CT images, often revisiting the same dataset multiple times to ensure no subtle lesion had been missed. Nodule volume estimation was rudimentary, usually involving caliper measurements that were time-consuming and prone to variation. Reporting was slower, and despite best efforts, the risk of missed nodules remained high.

AI-based reconstructions: the new era

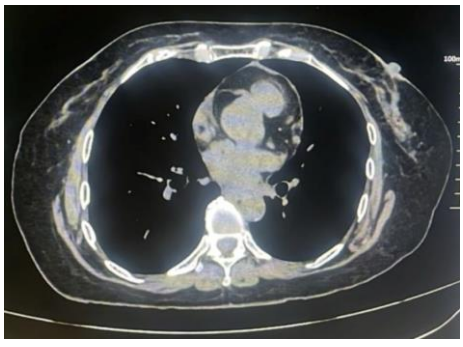
AI has brought a paradigm shift in CT reconstruction. Deep learning reconstruction (DLR) techniques now generate images that are cleaner, sharper, and less noisy—even at ultra–low radiation doses.

In our practice, we use ultra–low dose CT protocols with an effective dose of 0.18 mSv. To put this in perspective, that is equivalent to less than the radiation dose of two standard (assuming 0.1mSv effective dose for standard two-view) chest radiographs—while still providing full chest CT coverage. Importantly, these studies are performed without contrast yet retain the diagnostic clarity for nodule detection.

What makes this transformation even more remarkable is the ability to confidently detect nodules as small as 2.5 mm, with better characterization using advanced Delta reconstructions. Features such as the subtle solid component in a subsolid nodule, or early spiculation at the margins, are now easier to appreciate. The image quality is consistently good for assessment, even at ultra–low dose, allowing us to balance safety with precision.

Image quality improvements: examples from practice

The leap in image quality is not abstract; it plays out in everyday cases. Ground-glass nodules, once blurred at the edges, now appear with remarkable clarity, helping distinguish early adenocarcinomas from benign inflammatory opacities. Subsolid nodules with tiny solid components are more conspicuous, prompting timely intervention. Even delicate findings such as pleural tags or vascular convergence, which can signal early malignancy, are better appreciated with AI-enhanced reconstructions. These details directly influence patient management and outcomes.



Limitations of AI in lung cancer screening

That said, AI is not without limitations. False positives remain a significant challenge, sometimes leading to unnecessary follow-up imaging and patient anxiety. Integration into existing hospital systems can be uneven, and not all radiology teams are equally comfortable adopting AI.

Importantly, AI cannot yet replicate the nuanced judgment of a radiologist—whether a flagged nodule is relevant in the context of a patient's history still requires human insight.

The future of AI in screening

Looking ahead, AI's role will only deepen. I foresee systems evolving beyond detection to true longitudinal care orchestration: automatically tracking patients over years, integrating imaging with genetic and clinical data, and tailoring screening intervals to individual risk. Cloud-based AI solutions may democratize access, allowing smaller hospitals to deliver the same standard of lung cancer screening as large academic centers.

In the future, AI could even help identify pre-cancerous changes before nodules become visible—shifting screening from early detection to true prevention. But as powerful as these technologies become, radiologists will remain central: not just as image interpreters, but as communicators, guides, and decision-makers in the patient's cancer journey.

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Dr. Samuel Reefath is a consultant radiologist at MGM Healthcare, Chennai, with a special interest in chest imaging, oncologic radiology, and the clinical applications of artificial intelligence combining his clinical work with academic research as a PhD student at the Indian Institute of Technology Madras. He holds radiology credentials (including DMRD, DNB) and has experience in interventional imaging, contributing to MGM's advanced diagnostic and interventional radiology services.

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