

Highlights from JMI Issue 4

Bennett Landman

Editor-in-Chief, *Journal of Medical Imaging* (JMI)



JMI Community,

I can hardly believe how quickly summer 2024 has gone by! So much has happened, including your contributions to JMI's 2024 [Issue 4](#).

- *From the [Physics of Medical Imaging](#)*, we see how X-ray attenuation imaging using phase contrast imaging (PCI) can improve quantitative thickness measurements in biomedical samples.
- *In [Image Processing](#)*, we report on many innovations with biomarker development and artificial intelligence (AI), including segmentation of lung lobes and the red nucleus, detection of embolization coils, and mapped potential dose reduction.
- *In [Computer-Aided Diagnosis](#)*, characterizing and optimizing detection of lesions remains a top priority, especially in the lung. Synthetic datasets and adversarial training approaches continue to gain momentum for effective algorithm development. Mirror trends in image processing, learning with limited imaging and limited annotations promises more effective analyses, and AI approaches are showing strong promise across new imaging modalities.
- *In [Image-Guided Procedures, Robotic Interventions, and Modeling](#)*, statistical shape models continue to offer effective ways to enforce anatomical understanding.

© The Authors. Published by SPIE under a Creative Commons Attribution 4.0 International License. Distribution or reproduction of this work in whole or in part requires full attribution of the original publication, including its DOI.

- In *Image Perception, Observer Performance, and Technology Assessment*, we see that deep learning-based computer-aided detection (CADe) systems enhance (not replace) radiologists' ability to detect small signals and that considering observer impressions is important to evaluating image quality in clinical settings.
- In *Biomedical Applications in Molecular, Structural, and Functional Imaging*, we see hyperpolarized He3 MRI texture analysis with machine-learning predict accelerated lung function decline.
- In *Digital Pathology*, we report that AI can generate synthetically stained histology images by altering the original contrast.
- On the cover of this issue: "CT reconstruction using diffusion posterior sampling conditioned on a nonlinear measurement model" by S. Li et al.

Our research team just put the finishing touches on our submissions for [SPIE Medical Imaging 2025](#) (to be held in San Diego, California, February 16–20, 2025). This is going to be a great year for research in our community. I'm looking forward to seeing the amazing new ideas and getting to know many new researchers to our field.

To close Issue 4, I want to extend my gratitude to Cheenu S. Kappadath, Darko Pucar, Heather M. Whitney, and Yan Zhuang for their guest editorship of the upcoming special section I am excited to announce: [Theranostics in Medical Imaging](#). From the call for papers:

Theranostics, the combination of the terms therapeutics and diagnostics, is an emerging field of medicine that uses a radiopharmaceutical to identify and locate disease based on specific targets or receptors (diagnosis), followed by a second radiopharmaceutical to deliver therapeutic levels of radiation absorbed dose to target tissue (therapy). Building upon its foundation in nuclear medicine, more recently the field has gained additional attention because of demonstrations of its ability to improve patient outcomes with low side effects. Successful clinical applications of theranostics include treatments for neuroendocrine tumors and prostate cancer.

Medical imaging plays a vital role in theranostics. In addition to the critical role imaging plays in disease diagnosis, staging, monitoring, and response evaluation, accurate visualization of in vivo radiopharmaceutical biodistribution provides critical information on patient selection for theranostics. Theranostics can incorporate ultrasound, magnetic resonance imaging (MRI), computed tomography (CT), positron-emission tomography (PET), single-photon emission computed tomography (SPECT), and many others. Further, rapid expansion of artificial intelligence (AI) that has revolutionized several aspects of medical imaging is also poised to accelerate advances in theranostics.

This JMI special section invites original research papers that explore innovative theranostic agents, imaging methods, computational dosimetry, AI applications, and more. We also welcome high-quality submissions from prominent conferences such as SNMMI, EANM, AAPM, MICCAI, SPIE MI, ISBI, and others that focus on advancing the role of theranostics in clinical care. Submissions open on November 15, 2024, aiming for inclusion in a complete issue for SPIE Medical Imaging 2025.

To celebrate curiosity and AI in JMI (along with the multiple uses of synthetic imaging/style transfer), my profile picture this week has two snapshots of our new rescue kitten Yip Yip Nip Nip of the Zoomies Tribe ("Yip Yip" for short, after my kids' current dive into the show "Avatar: The Last Airbender") along with ChatGPT 4o's style transfer of the images to match the show's style. While the adorable factor is definitely present, we still have some work to do to figure out how to use these technologies in practice.

Warm regards,
Bennett