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HEAD AND NECK IMAGING

LETTER TO THE EDITOR

Letter to editor: dual-energy computed tomography-based volumetric thyroid iodine quantification: correlation with thyroid hormonal status, pathologic diagnosis, and phantom validation

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Dear Editor,

I read with great interest the article by Lee[1], which presents a promising non-invasive method for quantifying intrathyroidal iodine concentration using dual-energy computed tomography (DECT). Their study demonstrates that DECT-derived iodine maps can effectively distinguish between thyroid functional states and detect diffuse thyroid disease without the need for contrast enhancement. This approach holds particular promise in the peri-radioactive iodine (RAI) therapy setting, especially when applied both before and after treatment to monitor iodine organification.

However, a key translational challenge remains: The optimal timing of DECT imaging in relation to RAI therapy and contrast exposure is still poorly defined. As noted in the American College of Radiology Manual on Contrast Media[2], iodinated contrast agents are contraindicated during active RAI treatment phases due to the risk of competitive inhibition. Although the guideline recommends a conservative delay of several months, emerging evidence suggests that the kinetics of iodine organification and clearance may not support such prolonged avoidance windows.

Nimmons et al.[3] conducted a prospective study assessing urinary iodine clearance after intravenous contrast administration. In their cohort, the median time to return to baseline urinary iodine levels was 43 days, with 75% of patients normalizing within 59 days and 90% within 74 days. This study not only highlights the interindividual variability in iodine kinetics but also raises the question of whether personalized biomarkers–such as serial urinary iodine levels or DECT-based iodine density–could better guide the safe reinitiation of RAI planning.

Given this, DECT could potentially evolve from a diagnostic modality into a monitoring tool for individualized iodine readiness. It may be employed to quantify residual iodine load following contrast exposure to help determine the optimal timing for RAI therapy, to longitudinally track thyroidal iodine washout without relying on urinary measurements, to identify iodine-induced dysregulation–such as prolonged retention or the Wolff-Chaikoff effect–in elderly patients or those with renal impairment, and to implement contrast-deferred DECT protocols that help avoid unnecessary delays in oncologic management.

Still, standardization is needed. Future DECT protocols should be prospectively validated against urinary iodine and RAI uptake metrics. Additionally, combining DECT with functional nuclear imaging (e.g., single photon emission computed tomography/computed tomography) may enhance clinical decision-making by simultaneously capturing iodine content and tracer uptake. These integrations could ultimately reduce uncertainty in post-contrast scenarios where thyroid nodules are incidentally discovered.

In conclusion, the work of Lee[1] offers a valuable step forward, but its clinical integration–particularly in the nuanced post-contrast period–demands further clarification. DECT's capacity to measure thyroidal iodine *in vivo* opens a pathway toward more tailored and efficient RAI planning, provided it is used with informed caution and in concert with evolving evidence on iodine kinetics.

KEYWORDS
Agent, contrast, opaque, radionuclide, thyroid, thyroid gland

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Footnotes

Conflict of interest disclosure

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References

1. Lee Y. Dual-energy computed tomography-based volumetric thyroid iodine quantification: correlation with thyroid hormonal status, pathologic diagnosis, and phantom validation. *Diagn Interv Radiol*. 2025;31(3):226-233. [CrossRef]
2. ACR Committee on Drugs and Contrast Media. ACR Manual on Contrast Media. Version 2024. American College of Radiology. 2024. [CrossRef]
3. Nimmons GL, Funk GF, Graham MM, Pagedar NA. Urinary iodine excretion after contrast computed tomography scan: implications for radioactive iodine use. *JAMA Otolaryngol Head Neck Surg*. 2013;139(5):479-482. [CrossRef]