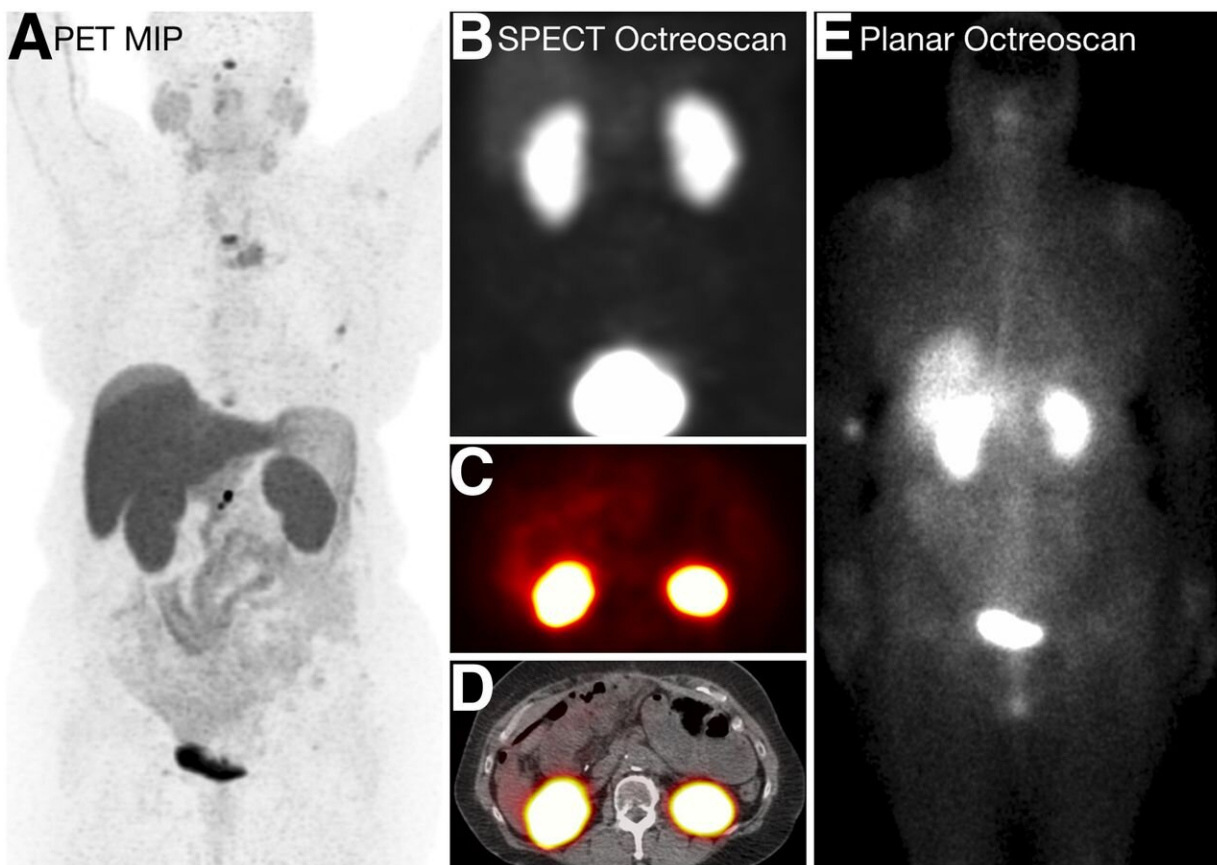


PET offers more precise screening method to select candidates for radionuclide therapy

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Example of SSTR PET demonstrating higher Krenning score than ^{111}In -pentetretotide in low-volume disease. This patient was graded as having Krenning score of 4 on SSTR PET (A) but 0 on SPECT (B-D) and planar imaging (E). Extent of disease was graded as 1 by 3 readers (e.g., 1-3 lesions smaller than 2 cm). MIP = maximum-intensity projection. Credit: TA Hope, University of California-San Francisco, and C Millo, National Cancer Institute

A new study published in *The Journal of Nuclear Medicine* evaluated the role of ^{68}Ga -DOTATATE positron emission tomography/computed tomography (PET/CT) in selecting neuroendocrine tumor patients who may benefit from peptide receptor radionuclide therapy (PRRT). Although historically guided by a Krenning score based on ^{111}In -pentetate scintigraphy, researchers found that Krenning scores based on PET/CT imaging were significantly higher and could more accurately detect patients eligible for PRRT. This is particularly relevant for patients with lesions of less than two centimeters, as the study showed that Krenning scores for these small-volume tumors were markedly higher when informed by PET/CT compared to ^{111}In -pentetate scintigraphy and could qualify the patients for PRRT when they would otherwise have been ineligible.

"In the past, physicians relied on ^{111}In -pentetate imaging with planar scintigraphy and single photon emission computed tomography (SPECT) to determine whether or not a patient is eligible to receive ^{177}Lu -DOTATATE PRRT," said Thomas A. Hope, MD, associate professor of radiology at the University of California, San Francisco. "However, limited literature is available on the accuracy of PET/CT in determining ^{177}Lu -DOTATATE PRRT eligibility. Our study aimed to compare the Krenning scores derived from the various imaging modalities and assess the impact on treatment decision-making."

The Krenning score is a relatively simple and reproducible method based on nuclear imaging used by physicians to make a quantitative estimate of the expression of somatostatin receptors (SSTR) in patients with neuroendocrine tumors. "Nuclear medicine physicians grade visually the uptake of the radiopharmaceutical in target lesions as compared to the uptake in the liver. This visual assessment is based on the target lesion with the highest uptake," said Jeremie Calais, MD, assistant professor of nuclear medicine and theranostics at the University of California, Los Angeles. Hope added, "The higher the Krenning score, the higher the

predicted uptake of the targeted therapy."

The retrospective study included 150 patients with suspicion of or biochemical evidence of neuroendocrine tumors. Patients underwent both ⁶⁸Ga-DOTATATE PET/CT and ¹¹¹In-pentetreotide imaging (planar scintigraphy and SPECT) within a span of less than one week. Three physician readers independently analyzed all imaging studies and graded them using the Krenning score based on the lesion with the highest uptake. The studies were reviewed after grading, and a consensus grade was created for each study. The volume and extent of tumor burden, lesion size and maximum standardized uptake value also were measured and compared with the Krenning scores.

Based on the Krenning score, the detection rate of SSTR-positive disease was 23 percent, 38 percent and 72 percent with ¹¹¹In-pentetreotide planar imaging, SPECT and ⁶⁸Ga-DOTATATE PET/CT, respectively. The Krenning score was significantly higher with ⁶⁸Ga-DOTATATE PET/CT than with the other modalities. Additionally, in patients with a Krenning score of at least three, the detection rate of ¹¹¹In-pentetreotide planar imaging and SPECT was much lower with lesions smaller than two centimeters (15 and 24 percent) than with lesions larger than two centimeters (78 and 89 percent).

"This head-to-head comparison research study shows for the first time that ⁶⁸Ga-DOTATATE PET/CT results in higher Krenning scores than ¹¹¹In-pentetreotide imaging in determining eligibility for PRRT, especially for neuroendocrine tumor patients with lesions smaller than two centimeters," Calais said. Most patients with lesions less than two centimeters would not have qualified for PRRT based on ¹¹¹In-pentetreotide imaging but would appear to be candidates based on ⁶⁸Ga-DOTATATE PET/CT.

"This is of significant importance as the NETTER-1 trial—the

international phase 3 clinical trial that proved the effectiveness of ¹⁷⁷Lu-DOTATATE PRRT and led to the approval of ¹⁷⁷Lu-DOTATATE PRRT—including only patients screened with ¹¹¹In-pentetreotide imaging," said Calais. "The results of the NETTER-1 trial should not be directly applied to patients with smaller lesions, as small [lesions](#) are typically negative on ¹¹¹In-pentetreotide scintigraphy and were not included in the trial. Many people assume the results of the NETTER-1 trial can be directly translated to patients screened with ⁶⁸Ga-DOTATATE PET/CT—which could be true but has never been formally proven."

Hope said, "It is important for patients to realize, however, that although one may have a high Krenning score informed by ⁶⁸Ga-DOTATATE PET/CT, it does not always mean that ¹⁷⁷Lu-DOTATATE PRRT is appropriate as the next treatment. There is a great amount of work left in order to understand how to use ⁶⁸Ga-DOTATATE PET/CT to select patients for treatment moving forward."

More information: Thomas A. Hope et al, ¹¹¹In-Pentetreotide Scintigraphy Versus ⁶⁸Ga-DOTATATE PET: Impact on Krenning Scores and Effect of Tumor Burden, *Journal of Nuclear Medicine* (2019). [DOI: 10.2967/jnumed.118.223016](https://doi.org/10.2967/jnumed.118.223016)

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