## $^{99m}$Tc-Apcitide Scintigraphy and the Detection of Acute Deep Vein Thrombosis

**TO THE EDITOR:** In a recent study, Taillefer et al. (*1*) reported encouraging results in the detection of acute deep vein thrombosis (ADVT) by $^{99m}$Tc-apcitide, a synthetic glycoprotein IIb/IIIa receptor-binding peptide. The authors reported a sensitivity of 86.4% in the detection of ADVT when early and delayed sets of images were analyzed together. However, the inclusion of patients (7/22) with discordant results of scintigraphy (i.e., association of negative and positive results on the 3 sets of images) may be misleading and should be discussed.

Five of 7 patients displayed late positivity only. This result could be explained by a low activity of the thrombus. Inclusion of these patients among the positive results can be accepted. However, 2 patients had early positivity only, with negative results at 120 min, and were included when all datasets were considered. The critical question is why does a thrombus result in early positive and late negative images? This could be explained by the hemodynamic action of the thrombus, which, though no longer active, delays the regional blood-pool clearance. However, other conditions that mimic ADVT in daily practice may also delay the regional blood-pool clearance (e.g., calf cellulitis and calf hematoma). Therefore, to include patients with positive early results only is questionable and may have deleterious therapeutic implications such as prescription of an anticoagulant in a patient with calf hematoma.

Takatsu and Fujiwara (*2*) correctly stated in their editorial that contrast-enhanced venography, although considered the gold standard, has real limitations. They argued that the accuracy of $^{99m}$Tc-apcitide scintigraphy for detecting ADVT might be much higher than that obtained in this study. Their statement is valid for only 2 of 17 patients with late positive scintigraphy and negative contrast-enhanced venography. Their statement is not relevent however for the 3 patients (of 22) with proven ADVT and negative scintigraphy. Therefore, the sensitivity of $^{99m}$Tc-apcitide scintigraphy to detect ADVT is lower than contrast-enhanced venography in this small series of patients. The sensitivity seems to be 76% when early positivity only is not considered. If the 2 patients with late positive scintigraphy and negative contrast-enhanced venography were assumed to have ADVT that was not detected by the gold-standard technique, this would lead to a sensitivity of 78% (18/23).

ADVT diagnosis is a tough clinical challenge. Because of the major potential complications of ADVT, a new diagnostic tool should have a sensitivity that is at least equal to a reference technique. Regarding the results of this preliminary study, we cannot share the optimism of the authors of this paper and editorial.

### REFERENCES

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**Reply:** We thank Drs. Weinmann and Moretti for their comments and note their concern over the inclusion in our study (*1*) of patients with discordant results on the 3 sets of $^{99m}$Tc-apcitide images, which suggested that the final overall sensitivity of the test was ''falsely'' high.

As stated in our article (*1*), the major purpose of our study was to compare the diagnostic accuracy of early and delayed $^{99m}$Tc-apcitide scintigraphy in patients with suspected acute deep vein thrombosis (ADVT) of the lower extremities. The major conclusion of the study was that although images obtained at 2 h after $^{99m}$Tc-apcitide injection show the greatest overall accuracy compared with earlier images, combined analysis of image sets from at least 2 time points provides greater accuracy in the detection of ADVT. Therefore, it was clear that it was necessary to use both static and temporal criteria to obtain a high diagnostic accuracy. Although the 3 sets of images were all positive for a given patient in 54.5% (12/22) of patients with proven ADVT, $^{99m}$Tc-apcitide studies with false-negative findings in 1 or more sets of images were seen in 10 cases. $^{99m}$Tc-apcitide scintigraphy was positive in at least 2 sets of images in 3 cases, positive only on the delayed images in another 3 cases, and totally negative in 3 patients. $^{99m}$Tc-apcitide scintigraphy was positive at 10 min in 1 patient only (and not in 2 patients as stated in the above Letter to the Editor). In this particular case, in a subanalysis looking at the diagnostic certainty of the test (not published yet), the $^{99m}$Tc-apcitide study was read as definitely abnormal at 10 min and probably normal at 60 and 120 min, although the asymmetry of the vascular uptake was persistent but judged to be not significant on the separate reading by the observers who were blinded to the experiment. After the 3 images had been analyzed together, the observers agreed that this case should be read as positive for ADVT, taking into consideration the aspect of the asymmetrical vascular uptake on the 3 sets of images. Access to the 3 sets of images together was definitely beneficial to the observers, especially in more difficult cases.

Although $^{99m}$Tc-apcitide uptake has been described at various degrees in cellulitis or hematoma, these conditions usually can be differentiated from ADVT by the extent, shape, and localization of the uptake. Other possible explanations will have to be evaluated to understand why some cases show more initial uptake, such as the size, localization, and age of the thrombus; the effect of anticoagulant and antiplatelet medication; and other localized hemodynamic parameters.

We must remind readers that $^{99m}$Tc-apcitide scintigraphy is a novel type of diagnostic imaging procedure now available in clinical nuclear medicine. Therefore, criteria for positive and negative tests must be established and tested against a gold-standard method for ADVT, even an imperfect one such as

contrast-enhanced venography. It is likely that the accuracy of $^{99m}$Tc-apcitide scintigraphy will improve with more extensive clinical experience. However, preliminary results of investigative studies performed with other radiolabeled peptides in the detection of ADVT (*2*) seem to confirm that changes of uptake or target-to-background ratio over time are important criteria in the diagnosis of ADVT, as demonstrated in our study.

## REFERENCES


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