

# Comment on “State-of-the-Art Imaging in Pulmonary Embolism: Ventilation/Perfusion Single-Photon Emission Computed Tomography versus Computed Tomography Angiography—Controversies, Results, and Recommendations from a Systematic Review”

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Hess et al<sup>1</sup> believe that ventilation/perfusion scintigraphy with single-photon emission computed tomography and low-dose X-ray computed tomography (V/Q SPECT/CT) should be considered the first-line imaging modality for diagnosing pulmonary embolism (PE) in most clinical settings, based on overall better diagnostic performance. We believe that this conclusion is not substantiated by the data presented in their meta-analysis: First, there was no significant difference in the diagnostic performance of V/Q SPECT and V/Q SPECT/CT in the studies included (although there was only a single study included for V/Q SPECT/CT, and another study included from the same group dealing with planar and V/Q SPECT). Second, the authors did not include several studies that met their inclusion criteria.

In a study on V/Q SPECT based on 1,785 patients with suspected PE who underwent clinical follow-up, PE was reported in 607 patients (34%).<sup>2</sup> In 608 patients with a final diagnosis of PE, 601 patients had positive V/Q SPECT (99%). In 1,177 patients without a final diagnosis of PE, 1,153 patients had negative V/Q SPECT (98%). The report was nondiagnostic in 19 patients (1%). Six cases were classified as false negative for PE, because PE was diagnosed at follow-up and was fatal in one case. Six cases were classified as false-positive for PE because the clinician decided not to treat. In addition, in this study, 152 patients had both CTA and V/Q SPECT, due to continuing clinical suspicion of PE after the first test. In this subgroup, CTA showed a sensitivity of 43% and specificity of 73%, measured against a decision to treat, while V/Q SPECT

had a sensitivity of 97% and specificity of 89%. CTA applied as second procedure had a low diagnostic impact in this and a previous study.<sup>3</sup>

The authors<sup>1</sup> also did not include, in their meta-analysis, another study that involved almost 2,000 patients, and which showed that sensitivity, specificity, and positive and negative predictive values of V/Q SPECT against a composite reference standard were all greater than 95%.<sup>4</sup>

The authors<sup>1</sup> also cite data from 81 patients simultaneously imaged with V/Q SPECT and V/Q SPECT/CT, 38% of which had PE.<sup>5</sup> They showed 97% sensitivity and 88% specificity when only V/Q SPECT was used. However, when adding low-dose CT, the sensitivity was unchanged, but specificity increased to 100%. Interestingly, 18% of patients had a false-positive diagnosis of PE when V/Q SPECT alone was interpreted. A reason for this may be that every mismatch was interpreted as PE rather than only mismatches that conform to segmental lung anatomy, as recommended by European guidelines.<sup>6,7</sup>

In our opinion, the recommendation to use a hybrid system for PE diagnosis is premature. Coco and O’Gurek<sup>8</sup> showed that CT utilization has increased dramatically in the evaluation of patients with suspected PE, without improving the rate of PE or other clinically significant diagnoses. Moreover, patients are exposed to ever greater radiation doses from imaging.<sup>9</sup> Therefore, it is important to properly validate V/Q SPECT/CT and not adopt it too quickly, without fully assessing the benefits and risks.

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