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INVITED COMMENTARY

Prostate Cancer

PSMA-targeted imaging of prostate cancer: evolution of a success storyTobias Maurer¹, Matthias Eiber^{2,3}*Asian Journal of Andrology* (2017) 19, 388; doi: 10.4103/aja.aja_2_17; published online: 3 March 2017

Management of prostate cancer patients with biochemical relapse has long hampered due to insufficient capability to detect and localize recurrent disease with available imaging modalities such as CT, MRI, or bone scintigraphy. Recent advances in functional imaging, namely, PET and SPECT imaging, with novel tracers targeting the prostate-specific membrane antigen (PSMA) have led to a surge in imaging in prostate cancer patients with biochemical relapse since was able to reveal sites of recurrence in a clarity not seen before.¹

Su *et al.*² nicely demonstrated the superiority of SPECT/CT imaging utilizing a ^{99m}Tc-based PSMA small molecule (^{99m}Tc-HYNIC-Glu-Urea-A) compared to conventional bone scintigraphy and MRI investigation. This work is important for several reasons. First, it confirms the previously reported specificity of PSMA-based imaging (in part by histological validation, in part by responses to targeted radiation therapy). The high contrast between cancerous and noncancerous tissue (tumor-to-background ratio) obtained by SPECT with the described ^{99m}Tc-labeled PSMA tracer is noteworthy. In direct comparison to ^{99m}Tc-based bone scintigraphy, it provided not only more and more specific information for bone lesions but also revealed other prostate cancer-derived soft tissue lesions. Thus, second, as with PSMA PET/CT, PSMA SPECT/CT imaging also could provide a “one-stop-shop” imaging investigation for prostate cancer patients rendering multiple investigations (e.g., bone scintigraphy and MRI or CT of the pelvis) in most cases unnecessary. As PET/CT devices are not widely available in most countries, PSMA-based SPECT/CT imaging might here represent an interesting and less expensive imaging alternative. Finally, Su and colleagues described that in a significant number of patients (31 of fifty patients), the results of ^{99m}Tc-labeled PSMA-SPECT/CT changed the further disease management. This finding (albeit still based on preliminary experience) underlines the impact of PSMA-targeted imaging in patients with recurrent prostate cancer.

However, there are also limitations to the presented work that have to be adequately addressed. The presented data based on a small patient cohort can only give a glimpse on the real value of ^{99m}Tc-labeled PSMA-SPECT/CT and have to be confirmed by larger studies. Of note, especially in patients with biochemical

relapse at low PSA values <1 ng ml⁻¹, the obtained detection rates of ^{99m}Tc-labeled PSMA-SPECT/CT are lower than those reported by ⁶⁸Ga-PSMA PET/CT imaging.¹ This is in line with our experiences in early recurrent prostate cancer patients and low PSA values investigated with PSMA tracers for SPECT/CT imaging.³ Although very useful for PSMA-radioguided surgery,^{4,5} ¹¹¹In-labeled PSMA I&T (or ^{99m}Tc-labeled PSMA I&S)-based SPECT/CT detects only less than half of the metastatic lesions that are identified by previous ⁶⁸Ga-PSMA PET/CT. This is among other reasons just merely related to the different sensitivity and imaging resolution of SPECT versus PET systems. Therefore, it can be expected that also SPECT/CT with ^{99m}Tc-labeled HYNIC-Glu-Urea-A will not be able to reliably identify recurrent disease at these very low PSA values.

Still, the authors have to be congratulated for their initial report on ^{99m}Tc-labeled PSMA-SPECT/CT and are very much encouraged to further pursue this novel imaging technique.

COMPETING INTERESTS

Both authors declared no competing interests.

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