PET/MRI in Neuroendocrine Tumours: Blessings and Curses

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Neuroendocrine Tumours (NETs) include a variety of tumour types, having small bowel and pancreas as the most frequent sites of origin [1].

The precise definition of the extent of disease is of utmost relevance for therapy decision, as near-total resection has been demonstrated to correlate with good-long-term outcomes [2].

The most common pathway of metastatiscation of abdominal NETs flows from the nodal disease to the liver, therefore one of the major goals of using cross-sectional imaging is to detect the primary lesion and hepatic metastases [3].

Currently, Positron Emission Tomography/Computed Tomography (PET/CT) with radiolabelled Somatostatin Receptors (SSTR) analogues is considered as standard imaging to be performed for staging and treatment monitoring of NETs [4].

Magnetic Resonance Imaging (MRI) offers well-known advantages over CT imaging for its superb soft tissue contrast and Diffusion-Weighted Imaging (DWI) is an invaluable tool to depict small liver lesions not detected on PET or CT; moreover, the possibility to combine 3-Tesla and DWI, together with the administration of liver specific contrast media may provide further improvement of sensitivity and specificity in detecting small hepatic metastases [5-7].

Therefore, fully integrated PET/MRI systems that have been quite recently introduced in clinical practice represent a powerful technology to be applied in the field of NETs.

Hence, it has been observed the best candidates to be imaged with SSTR PET/MRI are those patients candidate to hepatic debulking or having liver predominant disease.

The latter, are patients likely to die for liver disease-related complications and so hepatic metastases are a fundamental element to be investigated for assessing treatment response. Furthermore, in patients who are likely to undergo MRI on regular bases to monitor treatment efficacy, the use of PET/MRI should be preferred over PET/CT in order to reduce radiation exposure and also to avoid the possible difficulties coming from the need to compare CT and MRI images.

Of note, MRI is able to better evaluate anatomic changes and enhancement characteristics used in RECIST criteria; however, RECIST criteria are of limited applicability in NET in spite of their slow-growing behaviour and limited response to treatments. For these reasons, there has been a growing interest in implementing SSTR PET to be used as a response criteria in place of CT and MRI. SSTR-RADS Version 1.0 response criteria have been in fact recently introduced as a promising alternative and valuable tool for response assessment in NETs [8].

Concerning upcoming innovation in the field of hybrid imaging, innovative radiotracers by means of 68Ga-labeled SSTR antagonists have been proposed and tested in phase II studies showing better performances compared to 68Ga-DOTA labelled peptides. This pathway of innovation provides further support regarding the essential role of PET and hybrid imaging as diagnostic tools for NETs to be placed in the first line.

Despite the several blessings that PET/MRI might bring to NET patients, there are some curses that need to be pointed out.

Firstly, MRI is not as same accurate in detecting lung lesions as CT and so if a PET-negative or small lung finding is depicted, a CT scan would be recommended additionally to PET/MRI [9, 10].

Moreover, MRI has lower sensitivity in identifying hypersclerotic bone lesions compared to other imaging modalities and SUV quantification with attenuation correction is still suboptimal [11].

These few limitations will probably be improved in the very next future, thanks to technological advances. Therefore, we believe that on the weight scale of blessings and curses of PET/MRI, the merits are considerably much weighty than the demerits.

REFERENCES


