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PET/MRI –The Future is Now

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MRI fusion has been available to us with software techniques. Now with the development of dedicated PET/MR scanners we find ourselves having to learn yet another cross-sectional technique. The challenge for PET/MRI is understanding the physics of MRI and also understanding the required attenuation correction techniques.

While the cross sectional anatomy is the same for MRI and CT, the appearance of visualized structures will change depending on what MRI scan sequences we choose. This technique can only enhance our functional imaging capabilities and improve quantitation at the tissue and cellular level.

The lack of radiation for MRI is obviously an important consideration with the current increased awareness of radiation dose. The obvious use of this for imaging children has been widely discussed but has as yet not been well implemented. Initial indications would be where MRI has already proved to be most useful; i.e. in head and neck and musculoskeletal applications. Further applications are being explored for clinical use of PET/MR in oncology, neurology and neurooncology, cardiology and imaging of inflammation. Women's imaging particularly for breast and gynecologic diseases are also cited as having potential clinical utility.

Validation and adoption of this technique may take longer than for other functional hybrid imaging techniques due to the initial high cost of implementation and the ongoing operational costs. Notwithstanding these issues, we should be preparing ourselves for this modality by learning about MRI. The SNMMI has been offering MRI physics and anatomy courses at the recent mid-winter meeting and more CME courses will be offered at the National SNMMI meeting in Vancouver in June 2013. There are many good MRI review courses available. Below is a short reference list of the first clinical papers and recent Seminars in Nuclear Medicine issue that reviews issues with instrumentation.

"Failure to prepare is preparing to fail."-*John Wooden, basketball coach*

References:

1. Semin Nucl Med. 2013 Jan;43(1)1-68.
2. Hybrid PET/MR Imaging of the Heart: Potential, Initial Experiences, and Future Prospects.Rischpler C, Nekolla SG, Dregely I, Schwaiger M.J Nucl Med. 2013 Feb 12.
3. MR/PET or PET/MRI: does it matter? Beyer T, Moser E. MAGMA. 2013 Feb;26(1):1-4. doi: 10.1007/s10334-012-0365-0. Epub 2013 Feb 6
4. PET/MR in children. Initial clinical experience in paediatric oncology using an integrated PET/MR scanner. Hirsch FW, Sattler B, Sorge I, Kurch L, Viehweger A, Ritter L, Werner P, Jochimsen T, Barthel H, Bierbach U, Till H, Sabri O, Kluge R. Pediatr Radiol. 2013 Jan 11.
5. PET/MRI in cancer patients: first experiences and vision from Copenhagen. A, Loft A, Law I, Berthelsen AK, Borgwardt L, Löfgren J, Johnbeck CB, Hansen AE, Keller S, Holm S, HøjgaardL. MAGMA. 2013 Feb;26(1):37-47. doi: 10.1007/s10334-012-0357-0. Epub 2012 Dec 25
6. Clinical applications of hybrid PET/MRI in neuroimaging.Garibotto V, Heinzer S, Vulliemoz S, Guignard R, Wissmeyer M, Seeck M, Lovblad KO, Zaidi H, Ratib O, Vargas MI. Clin Nucl Med. 2013 Jan;38(1)
7. PET/MR in oncology: an introduction with focus on MR and future perspectives for hybrid imaging. Balyasnikova S, Löfgren J, de Nijs R, Zamogilnaya Y, Højgaard L, Fischer BM. Am J Nucl Med Mol Imaging. 2012;2(4):458-74.