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Preface

PET/MR Imaging in Clinical Practice: After Expectations and (Some) Disillusion, a Slope of Enlightenment

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Editors

Like many other technical innovations, PET/MR hybrid imaging has followed Gartner's hype cycle theory that the innovation trigger leads to a peak of inflated expectations, followed by a dip of disillusionment, and finally, a slope of enlightenment leading to a plateau of productivity. Since its introduction in the clinical field in 2010, the method has raised very high expectations across almost all clinical applications. The previous issue of the *Magnetic Resonance Imaging Clinics of North America* about this topic published in 2017 was still influenced by the initial enthusiasm.

In the current issue, we invited experts to share their view on PET/MR imaging based on the evidence that has been collected over a decade of clinical use. The presentation of the main technological progresses focuses on quantitative approaches that are of particular interest in an academic environment, given that PET/MR imaging has a place not only in clinical routine but also in research. Unsurprisingly, the typical clinical indications for PET/MR imaging occurred in those clinical domains in which both PET and MR imaging were already routinely used as complementary modalities before the advent of combined PET/MR imaging acquisition. Key examples include advanced oncologic imaging in different organ systems and metabolic imaging in order to assess the viability of tissue of the brain and heart. Particular clinical interest has also been given to pediatric imaging, head and neck cancer, and radiation therapy planning.

The most important advantages of combining the information of PET and MR imaging enable radiologists and nuclear physicians together (1) to interrogate tissue by evaluating many different biomarkers, adding metabolic information to perfusion, diffusion, and other signal behaviors; (2) to localize changes with regard to anatomic structures that can be visualized only with MR imaging; (3) to facilitate image interpretation in complex situations (eg, after surgery of radiation therapy); and (4) to obtain information for both specific anatomic regions (eg, for local tumor staging) and large body regions (eg, for M staging).

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Despite all these advantages, the impact of combined PET/MR imaging on patient care still remains difficult to measure and depends on clinical situations. In clinical practice, the added value that combined acquisition of PET and MR imaging can bring to patient care must be weighed against the relatively high cost and examination time involved in this technique as opposed to separate acquisitions of each modality. Finally, although the use of multiple biomarkers often facilitates the diagnosis, this may also be quite challenging, as the different parameters may be contradictory.

The initial hype is over, and the community of PET/MR imaging users is now on the path of enlightenment, adequately discussing the pros and cons about this fascinating diagnostic approach in an informed and critical way and with evidence-based methodologies. We invite the reader to discover the key clinical aspects of this combined modality in this issue of *Magnetic Resonance Imaging Clinics of North America*.

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