Clinical PET/MR: Where Are We After Five Years?
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The first clinical simultaneous whole-body hybrid PET/MR system was installed in October 2010 with huge expectations following the introduction of this new hybrid imaging technique. The first reports focused obviously on technical aspects and the general feasibility and quality of PET/MR exams versus PET/CT (1-2). In summary, PET/MR showed generally comparable results to PET/CT and its feasibility for many clinical indications could be demonstrated, like pediatric oncology, head and neck cancer, prostate cancer, carcinoma of unknown primary or lung cancer (3–5). The same holds true for neurologic and cardiovascular applications (6–8).

However, while some studies with mostly limited patient numbers also showed some advantages of PET/MR versus PET/CT, a clear "killer application" has yet to be defined (9).

In this talk, the experiences of the first 5 years of PET/MR in the clinics will be summarized with a focus on what over the years turned out to be the most interesting applications, e.g. pediatric oncology and prostate cancer imaging.

However, with the PET/MR machines currently on the market still being very expensive, only subtle advantages compared to PET/CT will probably not justify such a substantial investment for most institutions outside the academia. Thus our focus has to shift from just using PET/MR as a better PET/CT. It has to be recognized that PET/MR is not just "PET/CT 2.0", it is a completely new imaging tool, allowing for extraction of information on tissue biology and physiology, which was not possible before in this complexity within one examination. Thus we have to define novel indications for PET/MR in the clinics, and find applications we did not even think of doing with PET/CT at the moment. In the second part of this talk, the focus will be on such novel ways of using PET/MR, like multiparametric multimodal molecular imaging for response evaluation, prognostic assessment or biopsy planning.

References: