PET in Breast Cancer Imaging

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After an initial overview of the most well established tracer 18F-FDG PET and its combination with CT and MRI in early and metastatic breast cancer, the session will then focus on new tracers like 18F-fluorothymidine (FLT) for proliferation imaging, 18F-fluoroestradiol (FES) for estrogen receptor imaging and 18F-fluoromisonidazole (FMISO) for hypoxia imaging. Their roles at the time of diagnosis and initial staging as well as imaging methods for response assessment will be discussed. Differences in the diagnostic accuracy and clinical utility between tracers in different intrinsic subtypes of breast cancer together with the roles of tracers throughout the different stages of breast cancer will be touched upon. Besides 18F, also the radioisotope 89Zr with its longer half-life will be discussed in light of its utility for immuno-PET and targeted HER2-imaging. 89Zr-labelled atezolizumab, for example, can be a useful radiotracer prior to immunotherapy for patient stratification and during immunotherapy for response assessment. Targeted HER2 imaging using 89Zr-labelled trastuzumab, for example, can aid in imaging tumor heterogeneity and patient stratification for different targeted treatments. Advantages of combining PET with CT and MRI will discussed. Towards the end of the session, hyperpolarised 13C-MRI using 13C-labelled pyruvate, a novel metabolic imaging technique free of ionizing radiation and a possible alternative to 18F-FDG PET will be introduced.

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