



CME Session 13

Translational Molecular Imaging & Therapy + Oncology & Theranostics + Radiopharmaceutical Sciences Committee

Wednesday, September 13, 08:00-09:30

Session Title

Diagnostic Imaging and Theranostics in Breast Cancer - Old Targets, New Tracers

Chairpersons

Pedro Fragoso Costa (Essen, Germany)

Eleni Gourni (Bern, Switzerland)

Programme

08:00 - 08:30 **Marleen Keyaerts** (Brussels, Belgium): Targeting HER2 from Preclinical to the Clinics

08:30 - 09:00 **Gary Ulaner** (New Port Beach (CA), USA): Estrogen Receptor-Targeted Imaging: Appropriate Use Criteria (AUC) and Interpretation

09:00 - 09:30 **Philipp Backhaus** (Münster, Germany): Clinical Targets Beyond the Classical Approaches

Educational Objectives

1. Understand the underlying mechanisms of targeted imaging and therapy applied on breast cancer
2. Gain insight on the translational process of bringing molecular targeted biochemical compounds to the clinics
3. Get acquainted with the current body of knowledge for a correct clinical use and image interpretation of the most implemented receptor-targeted probes for imaging in breast cancer
4. Gain insight of new and innovative strategies to visualise breast cancer

Summary

Breast cancer is a heterogeneous disease that can be challenging to diagnose and treat. Nuclear medicine imaging techniques have been developed to help identify and target specific biological features of breast cancer beyond the classical approaches. These features include biomarkers, tumour microenvironment, and metabolic pathways.

Biomarkers, such as oestrogen receptor (ER), and human epidermal growth factor receptor 2 (HER2), are commonly used to subtype breast cancer and guide treatment decisions. Nuclear medicine imaging can provide non-invasive evaluation of these biomarkers, such as using radiotracers that bind to the specific receptor, which can help in patient selection and monitoring the response to targeted therapies.

Targeting HER2 is a therapeutic strategy that has shown great potential in cancer treatment, particularly in breast cancer. HER2 is a protein that is overexpressed in some types of cancer, making it an ideal target for therapy. Nuclear medicine techniques, such as positron emission tomography (PET) have played an important role in identifying HER2-positive tumours and monitoring the response to HER2-targeted therapies. In preclinical studies, nuclear medicine imaging has been used to evaluate the uptake and distribution of HER2-targeted radiotracers in tumour-bearing animal models. This has helped researchers identify promising candidates for clinical translation. In clinical trials, nuclear medicine imaging has been used to assess the effectiveness of HER2-targeted therapies in patients with HER2-positive breast cancer.



ER-targeted imaging using PET and SPECT radiotracers is a useful tool for non-invasive detection and monitoring of ER-positive breast cancer. The AUC for ER-targeted imaging recommends its use in patients with newly diagnosed or recurrent ER-positive breast cancer, as well as in patients with suspected metastatic disease. The interpretation of ER-targeted imaging involves assessing the uptake of the imaging agent in the tumour tissue to evaluate the extent and distribution of ER expression and to monitor the response to endocrine therapy.

Nuclear medicine imaging has expanded beyond classical approaches to identify and target specific biological features of breast cancer. This includes the use of radiotracers to evaluate biomarkers, the tumour microenvironment, and metabolic pathways. This has the potential to improve patient selection, monitor response to therapy, and develop new treatment approaches for breast cancer.

Key Words

Breast cancer, oestrogen receptor, HER2, targeted theranostics, tumour microenvironment