**CME Session 5**
Oncology & Theranostics Committee
**Monday, September 11, 08:00-09:30**

**Session Title**
**Will the Microenvironment Become Even More Important in Nuclear Medicine?**

**Chairpersons**
**Gracinda Costa** (Coimbra, Portugal)
**Ricardo Ruano Pérez** (Valladolid, Spain)

**Programme**

08:00 - 08:20 **Sofia Vaz** (Lisboa, Portugal): The future of the oldest *Mega*important Nuclear Medicine marker of the menvironment

08:20 - 08:40 **Wolfgang Weber** (Munich, Germany): Hypoxia- The importance of spotting such a hostile menvironment

08:40 - 09:05 **Niklaus Schäfer** (Lausanne, Switzerland): Immune system – Immunotherapy enthusiasm will fuel new techniques in Nuclear Medicine?

09:05 - 09:30 **Simone Dalm** (Rotterdam, Netherlands): Cancer-associated fibroblasts - Highlighting no-malignant cells that are in the dark, serving malignant cells

**Educational Objectives**

1. To get a comprehensive overview of the relevant molecular targets and the main radiopharmaceuticals for microenvironment imaging.
2. To understand tumour microenvironment image as a prognostic tool and to recognise its potential impact in treatment selection.
3. Recognise the main limitations of the available tumour microenvironment tracers.
4. Learn about the current research on the field.

**Summary**

The concept of the tumour microenvironment (TME) was indirectly proposed in 1889 by Stephen Page in the seed and soil theory. The Dictionary of Cancer Terms of the National Cancer Institute provides the following easy-to-understand definition of microenvironment (https://www.cancer.gov/publications/dictionaries/cancer-terms/def/microenvironment): “In biology, the cells, molecules, and structures … that surround and support other cells and tissues. Abnormal cells, … , can change their microenvironment. Changes in the microenvironment can affect how cancer cells grow and spread. Studying the microenvironment may help researchers understand how cancer cells form and find new ways to treat cancer.”

As the TME knowledge expands, it is increasingly recognised that this interactive, complex, and highly dynamic structure plays a fundamental role in the success history of each cancer cells. It is therefore without surprises, that the TME has been used, with a very interesting results, as a target, either for diagnosis or therapeutic purposes.

Nuclear Medicine soon has taken profit of this tumour community concept and has developed imaging and therapeutic techniques, based on specific features of the microenvironment.
Four relevant topics were selected to be presented in this CME Session; all highlight the Nuclear Medicine role in the functional characterisation of TME. The earliest Nuclear Medicine investigations of microenvironment focused the Osteoblastic Activity. The first well succeeded imaging studies in this field, were carried out in 1950s with [85Sr]SrCl2 and in early 1960s with Na[18F]F. Later, in 1971, technetium-99m labelled (di)phosphates began its journey, which lasts until today. More recently, the intense work of several research groups has brought to the spotlight other radiopharmaceuticals, synthesised to target different aspects of the TME. Is the case of hypoxia and fibroblast activation protein inhibitor-α (FAPI)-based PET tracers. The driving force of the increasing interest in immune-microenvironment tracers, comes from the growth of immunotherapy.

In an era marked by the enthusiastic use of various radiopharmaceuticals directly targeting a specific malignant cell of a specific tumour type, it is therefore important to ask if microenvironment tracers will keep, or even increase, their relevance in the future and if they will continue to contribute to the expansion of individualised medicine.

**Key Words**
Microenvironment, Molecular imaging, Osteoblastic activity, Hypoxia, Immune system, Cancer-associated fibroblasts