

28 October 2020, 11:30 – Online Seminar

Development of silica microparticles based fluorescent sensors for real-time in vitro microenvironment monitoring of pancreatic cancer spheroids

Anil Chandra
CNR-NANOTEC Lecce

Pancreatic cancer is one of the deadliest cancer types with detection in late stages of the disease. Therefore, finding the right combination of anticancer drugs in a short time is desired to help the patients. To this end, we wanted to develop a 3D culture platform to grow patient-derived tumor cells as spheroids and study their microenvironment properties in addition to observing the effect of therapeutics. It is important to study the tumour microenvironment (TME) as it is quite different from that of normal tissues and plays an important role in tumorigenesis and metastasis. The spatiotemporal monitoring of certain important TME parameters such as pH, dissolved oxygen and ion concentrations in a cell culture system could provide important insight. Therefore, we worked on the development of silica-based fluorescent microparticle reporters to monitor and understand the dynamics around a growing tumoroid and how they could affect the cell's behaviour under different therapies. Different types of microsensors were synthesized using the modified Stöber process to sense pH, dissolved oxygen and potassium ions. These sensors were modified in terms of their surface charge, size, and composition to yield desired stability and sensitivity.

A 3D PDAC spheroid model has been designed with embedded microsensors which could be used for drug assessment studies. The cellular encapsulation for 3D cell culture and sensing platform was developed using high voltage microdroplet production, where cancer and fibroblast cells were encapsulated in the microgel of alginate mixed with matrigel. The next stage will be to study patient-derived cancer cells and incorporation of multiple sensors in the same platform.

Keywords: Microenvironment, Sensing, pancreatic cancer, 3D cell culture

Short BIO: Anil Chandra received his Master's degree in Biotechnology from the Indian Institute of Technology - Guwahati, INDIA in 2012. In Nov 2018 he was awarded PhD in Biomedical Engineering at the Indian Institute of Technology Delhi, INDIA. He joined CNR Nanotec, Lecce as a postdoctoral research fellow in July 2018 to work on ERC-StG project INTERCELLMED (Sensing cell-cell interaction heterogeneity in 3D tumor models: towards precision medicine) coordinated by L. L. del Mercato. His scientific interests concern the development of smart in-vitro disease models.

For info : [alessandra.lanotte \(at\) nanotec.cnr.it](mailto:alessandra.lanotte@nanotec.cnr.it)