**Biography:**

Prof. McHale was educated in Ireland where he received a B.Sc. degree (1978) and Ph.D. (1981) in Biochemistry from University College Galway which was part of the National University of Ireland at the time. He then accepted a post as postdoctoral fellow at Baylor College of Medicine, Houston, Tx., USA, and subsequently returned to Ireland to take up a post as lecturer at Trinity College Dublin in 1985. During his time at Trinity, he became interested in photodynamic therapy and continued to develop that interest following a move to Ulster University in 1992. During his career at Ulster, he progressed from lecturer, through reader and finally to full professor in 2000 and from then, his research interests developed to include stimulus responsive drug/gene delivery systems for applications in oncology and tissue regeneration. Since his research is highly applied in nature, he was interested in the translation of their research to the clinic, and this has led to his involvement as founder in several commercial spinouts. In addition to serving Ulster as Professor of Medical Biotechnology, Prof. McHale is a co-founder of StimOxyGen Ltd., a company aimed at commercializing a nanoparticle preparation that can generate oxygen in hypoxic tumours to enhance therapeutic outcomes. He currently serves this company as a director and advisor. Additionally, he is a co-founder of SonoTarg Ltd., a company aimed at commercializing microbubble formulations for site-specific, ultrasound-mediated co-delivery of chemotherapeutic and sonodynamic functions for the treatment of cancer. Prof. McHale serves this company as a director and as Chief Technical Officer.

**Title**

**Nanoparticle mediated sonodynamic therapy for treatment of pancreatic cancer.**

**Abstract**

Pancreatic cancer is one of the most recalcitrant forms of cancer and 5-year survival statistics are extremely poor. Treatment options primarily include chemotherapy, surgery, or combinations of both. Although conventional chemotherapy plays a significant role in treatment, introduction of novel emerging therapeutics has had little impact on survival statistics, primarily because they exhibit limited therapeutic efficacy, or resistance to these precise targeting agents occurs. Successful treatment of pancreatic cancer is hindered by the observation that the tumour microenvironment is extremely desmoplastic, consisting of extensive and extremely dense fibrotic tissue or tumour stroma, through which nests of cancer cells are dispersed. Essentially, in addition to providing a growth support function to cancer cells, this dense tumour stroma also provides a protective effect against therapeutic drugs. It can also mediate immune suppression by either physically excluding cells of the immune system or via crosstalk mechanisms. Sonodynamic therapy (SDT) represents a novel approach for the treatment of cancer. The approach employs a sonosensitizer that is taken up by the target tissue (e.g. tumour). The sensitizer remains inactive in the absence of ultrasound, however on exposure to ultrasound, the sensitizer mediates the generation of cytotoxic reactive oxygen species (ROS). Since ultrasound transmits efficiently through most soft tissues and can be focused to a single point, a site-specific targeting effect can be achieved if the target contains the sensitizer. One of the major challenges therefore in achieving an efficiently targeted effect with SDT is ensuring that the sensitizer tracks to the tumour. Unfortunately, many of the efficient sonosensitizers are either cleared rapidly from circulation or are taken up by non-target tissues. In this presentation, we will discuss how nanotechnology can be exploited to ensure the sensitizer gets to the target tumour, demonstrate efficacy in preclinical models of pancreatic cancer and explore some of our findings relating to the impact of SDT on tumour stroma and immune suppression.