



YCCSA Seminar Series Summer 2015

Implantable Microsystems for Personalised Anti-Cancer Therapy

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Abstract:

A malignant tumour is an uncontrolled growth of cells that can spread (metastasise) to distant organs. The microenvironment of a tumour is key to this spread and also to the tumour's resistance to radiotherapy and chemotherapy. For example, well-oxygenated human tumours are 2-3 times more vulnerable to RT than are hypoxic tumours and advanced RT technologies can deliver radiation with sub-mm accuracy to a hypoxic volume.

This talk will describe a programme to develop in vivo, wireless biosensors of hypoxia and other key parameters of cancer biology that will allow a patient's tumour biology to be monitored continuously and without further intervention. The sensors are being integrated on a wireless silicon substrate. The initial system will integrate existing sensing technologies on one miniaturised device (estimated to be 7mm \times 500 μ m \times 500 μ m to facilitate minimally-invasive insertion) to probe physical characteristics (temperature, pH, O₂) of the microenvironment that give an indirect measure of tumour biology. The talk will also describe novel electrochemical sensors of direct and specific tumour biomarkers.