

Smart Target Image-Guided Diagnosis and Treatment of Localised Prostate Cancer

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Technology description

Summary

SmartTarget is a technology developed in UCL's Centre for Medical Image Computing (CMIC) that enables image-directed tumour targeting during minimally invasive biopsy and therapy procedures for prostate cancer patients.

The Technology and its Advantages

In current practice, early-stage prostate cancer is managed without knowing exactly where the tumour is within the prostate gland. Biopsies, which are an important part of the diagnosis pathway, are effectively performed 'blind', as samples are taken using ultrasound imaging for guidance, which cannot see tumour location, only the prostate gland itself. In most other cancers, biopsy needles are targeted using more detailed medical images for guidance as standard procedure. Therefore in the case of prostate cancer diagnosis, it means that some clinically important cancers that require treatment are missed completely, some clinically unimportant cancers are detected, and many other cancers are classified incorrectly as unimportant. As a result, current treatments try to compensate by treating not only the cancer, but the entire prostate gland. However, this approach gives rise to side-effects, such as incontinence, sexual problems, and back-passage symptoms, due to "collateral damage" to delicate structures surrounding the prostate.

SmartTarget is a technology developed at University College London (UCL) by a team led by Dr Dean Barratt of the Centre for Medical Image Computing which seeks to rectify this situation. Together with Professor Mark Emberton, clinical lead, a £2.1m grant from the HICF and Wellcome Trust is enabling them to develop and trial the SmartTarget device that combines state-of-the-art diagnostic magnetic resonance imaging (MRI) with advanced image guidance technology so that clinicians are provided with information on cancer location, shape, and size during surgical procedures. Not only does SmartTarget enable better targeting of biopsy needles for diagnosis, the technology will also transform prostate cancer treatment by enabling doctors to target treatment only to the area of cancer so that tissue damage is limited and the risk of treatment-related side-effects is reduced. This approach is standard practice in the treatment of almost all other cancers.

The SmartTarget system achieve this by presenting the clinician with a "picture" that overlays tumour information from detailed preoperative MRI scans with information from real-time ultrasound images that are widely used to guide the biopsy needle and treatment delivery. This allows the urologist to

identify and target the cancer on a computer screen in a similar way to a fighter pilot presented with a target on a heads-up display.

Advantages

Anticipated benefits of this technology include fewer biopsies and more accurate cancer diagnosis. It is also expected that the ability to implement a more selective treatment strategy will result in less harm and cost significantly less than current strategies which treat the whole prostate gland.

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