
First published application of Optical Coherence Tomography for *in vivo* mapping of non-melanoma skin cancer

A case study performed at University College Hospital London documenting the successful use of Michelson Diagnostics' VivoSight OCT scanner for *in vivo* mapping of non-melanoma skin cancer, has been published in the March 2011 issue of *Photodiagnosis and Photodynamic Therapy*¹.

The key benefit of Photodynamic Therapy (PDT) of non-melanoma skin cancers over conventional surgical excision is that it is non-invasive and therefore avoids surgery scars. This is a major advantage for the patient, because this type of skin cancer frequently occurs on the face, where disfiguring scars are highly undesirable. However, because no tissue is removed for analysis in the PDT procedure, it can be difficult for clinicians to be sure that they have successfully treated the tumour, and this has limited its clinical use. The case study shows that the use of a new 'VivoSight' laser scanner developed by Kent, UK based Michelson Diagnostics Ltd, to image skin before, during and after PDT treatment, could solve this problem.

The case study was performed by Zaid Hamdoon and a team led by Colin Hopper at the Unit of Oral & Maxillofacial Surgery, University College Hospital London, and was supported by Killing Cancer, the charity dedicated to helping successfully treat cancer patients with PDT. Supporters of Killing Cancer include Sir Alex Ferguson, Robert Plant CBE, and Chris Tarrant.

The VivoSight scanner uses a novel laser imaging technique called Optical Coherence Tomography (OCT). This provides images of sub-surface tissue similar to ultrasound, but at far higher resolution, enabling the clinician to see critical details of the skin epidermis and dermis in real time. Michelson Diagnostics has already obtained CE mark and FDA clearance for clinical use of the scanner in Europe and USA², and it is being evaluated at leading cancer clinics in Europe and USA.

According to the authors of the paper,

"For each clinically visible margin, the pattern of the damage and the degree of tumour extension were clearly identified. Some areas exhibited almost perfect co-registration between the visible margin and OCT scan in term of evident histological damage.... With the advent of new optical technologies such as OCT, we can now monitor lesions more precisely and accurately so obviating many of the previous shortcomings of PDT"

"To our knowledge, this case study reports the first application of OCT for in vivo imaging, mapping of non-melanoma skin cancer. Additionally, OCT may help clinicians to monitor the outcome after the

treatment, improving their understanding of the technique and offering an indication of the possible result to the patients....By other innovative approaches such as OCT-guided fine needle aspiration cytology of treated areas we can now confirm the absence of cancer or necessitate further treatment without the need to ablate normal tissues.”

Professor Colin Hopper, the Principal Investigator of the case study, added *“This case study is part of a larger programme of ground-breaking research at our unit into using OCT imaging for clinical benefit of cancer patients. As well as improving PDT, mapping skin cancer lesions with OCT should improve delivery of other treatments such as ‘Mohs’ surgery. We are looking to integrate OCT into our routine clinical pathway.”*

Non-melanoma skin cancer is a very common disease, affecting more than 100,000 people annually in the UK and up to 3.5 million in the USA^{3,4,5}. It is estimated to cost the NHS at least £100M and the US healthcare system \$2BN+ annually, largely through the costs of surgery. New techniques such as OCT-guided PDT could provide major cost savings as well as better clinical outcomes for patients.

Notes to editors

1. Zaid Hamdoon, Waseem Jerjes, Tahwinder Upile and Colin Hopper "Optical coherence tomography-guided photodynamic therapy for skin cancer: Case study" Photodiagnosis and Photodynamic Therapy (Elsevier), Volume 8, Issue 1, March 2011, Pages 49-52
2. For clinical use in the US FDA 510(k) K093520 applies: VivoSight is a Multi-Beam Optical Coherence Tomography (OCT) system indicated for use in the two-dimensional, cross-sectional, real-time imaging of external tissues of the human body. This indicated use allows imaging of tissue microstructure, including skin, to aid trained and competent clinicians in their assessment of a patient's clinical conditions. US Federal law restricts this device to sale by or on the order of a physician.
3. H. W. Rogers, M. A. Weinstock, A. R. Harris, et al. (2010) "Incidence estimate of nonmelanoma skin cancer in the United States, 2006" Arch Dermatol, 146(3), pp. 283-7.
4. S. Morris, B. Cox & N. Bosanquet (2009) "Cost of skin cancer in England" Eur J Health Econ, 10(3), pp. 267-73.
5. Cancer Research UK (2005) "Skin Cancer in the UK - 2005," Cancer Research UK

Image: A patient being scanned with the VivoSight laser scanner at University College Hospital London



About Michelson Diagnostics

Michelson Diagnostics was founded in 2006; it is privately owned and based in Kent, U.K. The company develops imaging products using a technology called Multi-Beam Optical Coherence Tomography. The technology provides real time images of up to 2 mm into tissue with a resolution of better than 10 microns. The company's VivoSight OCT scanner has CE and 510(k) clearance for use to aid clinical judgments in the field of dermatology including non-melanoma skin cancer assessment and guiding skin cancer surgery.

Further information about Michelson Diagnostics can be found on the Internet at <http://www.md-ltd.co.uk/> or by emailing enquiries@md-ltd.co.uk .

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Octopus has won a number of awards for its products and customer service. It has twice been voted one of the Best 100 SMEs to work for by the Sunday Times, and is one of only two fund management companies to be AAA rated by IFAs for customer service.