MICHELSON DIAGNOSTICS
OCT FOR SKIN IMAGING

D. Woods
Introduction

- Michelson Diagnostics Ltd
  - Established 2006
  - ~15 FT employees in UK, USA and German subsidiaries
  - Clinical research collaborations in Germany, UK, USA, Denmark, Australia, Switzerland, Italy.
  - Level 1 Clinical Evidence for NMSC identification
• 2006 aim:

“To develop MultiBeam OCT technology into a viable medical imaging tool”
Optical coherence tomography - OCT

- OCT non-invasively captures tomographic images

“OPTICAL ULTRASOUND”
Optical Coherence Tomography

1991
1st generation

1996

2002
2nd generation

2010

Time-domain OCT
Ophthalmology

Fourier-domain OCT
Dermatology

Cardiology

See what we can see...
MultiBeam OCT gives

- Lateral resolution which is spatially invariant and > 2x better than traditional single beam OCT
- Great resolution gives limited depth-of-focus
- Better contrast uniformity lower speckle noise and better penetration in skin.

Tomlins, P H, Ferguson, R A, Hart, C, Woolliams, P D
“Point-spread function phantoms for optical coherence tomography,” OP 2, August 2009; ISSN: 1754-2944
VivoSight Topical OCT

- Low-power eye-safe 1300 nm laser
- Patented MultiBeam probe for increased performance
- < 7.5 μm lateral resolution
- < 5.5 μm axial resolution
- Up to 2 mm depth penetration
- 2D or 3D – 6 x 6 x 2 mm
- Real time
- Non-invasive
- Non-ionising
Healthy glabrous skin

See what we can see...
Pathology? Basal Cell Carcinoma

Image: Dan Siegel

See what we can see...
Application #1

• Avoid biopsy
  • Excellent correlation of diagnostic features in OCT and histology $^{1,2}$
  • 7-center trial publication summer 2014

"VivoSight OCT enabled a statistically significant improvement in the specificity and Negative Predictive Value (NPV) of BCC diagnosis over both clinical and dermoscopy in this cohort of challenging pink patches. So many biopsies can be rendered unnecessary, with VivoSight OCT, patients can instead be treated non-invasively."

Dr. med. Martina Ulrich, Berlin, Germany

http://www.vivosight.com/clinical-dermatology/
Superficial BCC

http://www.vivosightatlas.com/
Mohs surgery

- Time consuming
- Expensive
- Accurate – great cosmetic results
- Low recurrence
Mohs mapping

See what we can see...
Mohs mapping

- “Breadslice” sampling creates a fly-through
- Reconstruction of multiple views
Mohs mapping

See what we can see...
Mohs Mapping

• Typically adds just 5 minutes to a procedure
• Lowers residual tumour requirement for second slice (by 0.8 slices in USA)
• Time- and cost-saving

Hurdles remaining

• Specific training
• Clinical studies
The VivoSight OCT imaging system has been developed with the support of clinicians. It is compliant with European CE mark directives and has FDA 510(k) clearance for use in the USA.

For more information please contact:
Daniel Woods
Michelson Diagnostics
Tel. +44 208 144 9836
Email: daniel.woods@vivosight.com

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.
Key papers


Selected Other Papers


Donnelly, R. F., et al. (2011) "Design, optimization and characterisation of polymeric microneedle arrays prepared by a novel laser-based micromoulding technique" Pharm Res,


Clark, C., et al. (2013) "Confirmation of Squamous Cell Carcinoma Clearance using Optical Coherence Tomography Imaging".


Messer, D. (2013) "Revolutionary changes in the treatment of onychomycosis; laser-Foot PinPointe ".

Messer, G., et al. (2013) "Die Revolutionierung der Behandlung der Onychomykose".


Babalola, O., et al. (2013) "Optical coherence tomography (OCT) of collagen in normal skin and skin fibrosis" Arch Dermatol Res.

