Light Microscopy

www.cambridgecancer.org.uk/research/coreresources/light_microscopy

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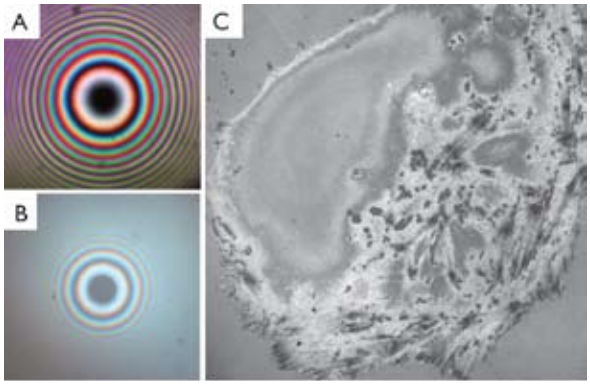
The Microscopy Facility provides the CRI with state-of-the-art light microscopy and develops new imaging modes.

This year has seen a further extension of the light microscopy techniques.

The **CompuCyte iCys** research imaging cytometer has become a very popular research tool in the CRI, providing quantitative high-throughput image analysis. Heather Zecchini is collaborating on this with many of our researchers. Current applications include the behaviour of endocytic adaptors in prostate cancer (Neal laboratory), death receptor involvement in human smooth muscle cells (Murphy laboratory), tumour vasculature and drug distribution (Tuveson laboratory), and ligand uptake and DNA damage in cancer cells (Kerstin Meyer, Ponder laboratory). Also, we have installed the first **LaVision TriMscope** system in Cambridge. The TriMScope is a very sensitive and rapid multi-photon scanning system, which scans the specimen with 64 beams simultaneously. The TriMScope will be used mainly for live applications, which Lorraine Berry is developing.



Full-colour Newton's rings obtained with super-continuum laser: (a) wide field IRM image. (b) A confocal IRM image. Note that the fringe contrast is stronger in confocal images but that the higher order fringes still fall off because the image is polychromatic.
Interference Reflection Microscopy image of Fibroblasts: (c) Super-continuum IRM imaging of fibroblasts: close contacts e.g. focal adhesions appear black.

Virgilio Failla is working with CRI researchers in using the **Leica SP5** system for multi-photon and **fluorescence life-time (FLIM) imaging**. Studies on senescence markers with the Narita laboratory have also involved the development within the CRI of new analysis software tools, e.g. in MatLab. The new parallel-scanning **spinning-disc confocal** system (Improvision) provides fast image acquisition at high sensitivity. A fast piezo-drive facilitates the imaging of cells in XYZ at full frame resolution at 30 frames/second acquisition speed (Gergely laboratory).

In 2009 a new server structure and **OMERO data base** will be implemented to allow CRI researchers to access and analyze their imaging data from their own desktops.

Research and Development

Our research goal is to develop the diagnostic and research imaging tools of tomorrow. Current projects include:
(i) **Second harmonic imaging** which is based on a scattered signal, e.g. to demonstrate the formation of vessels from endothelial cells (in collaboration with the Murphy laboratory) as well as the extracellular matrix in tumours (Tuveson laboratory). This microscopy development (in collaboration with the University of Heidelberg, University of Utrecht and Nikon Instruments Europe BV) is funded through EUREKA-EU funds.
(ii) Use of **white light supercontinuum laser** excitation for reflection interference imaging of focal adhesions (paper in preparation). Part of this work was carried out by Liang-Da Chiu, a EU-funded Monabiphot master student (program directed by Prof Zyss, École normale supérieure de Cachan).
(iii) The **Confocal 'Macroscope'** project includes the design of a novel lens system with an unprecedented ratio of resolving power to magnification. Designed by our collaborator Brad Amos (MRC Laboratory of Molecular Biology, Cambridge), the system gives great improvements in imaging of whole mouse embryos or large tissue biopsies. CRI scientists now have access to a working prototype.

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*Joined during 2008 †Left during 2008