CASE STUDY:

IMAGING

CORE TECHNOLOGIES
at UCD Conway Institute

Research Question

What happens to the ultrastructural morphology of intestinal epithelial cell monolayers after perturbation with an intestinal absorption enhancer and then on removal of the enhancer? What is the effect of mucosal injury and repair on localisation of tight junction and adherens junction proteins?

Our Approach

Intestinal absorption enhancers are a class of pharmaceutical excipient that increase intestinal permeability by altering the barrier function of the intestinal epithelium. Several enhancers are in clinical trials in order to improve oral peptide delivery including the medium chain fatty acid sodium caprate. The surfactant-like action of sodium caprate causes mild, reversible damage to intestinal epithelial cells. We wanted to understand the time and concentration dependent actions of sodium caprate on intestinal epithelial cells, and the recovery mechanisms used to repair the barrier upon removal of the enhancer.

'The Core staff provide the highest level of expertise in microscopic techniques. They not only helped with study design by ensuring that the chosen microscopy was the correct option but they also outlined several other novel and established techniques that could help in answering the proposed scientific questions and progress the research'

Professor David Brayden,
UCD & Irish Drug Delivery Network

Dr Sam Maher
postdoctoral fellow

CASE STUDY:

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Research Question

Can we understand more about cilium biology and the molecular basis of human ciliary disease by looking at cilium ultrastructure in C. *elegans* nematodes?

Our Approach

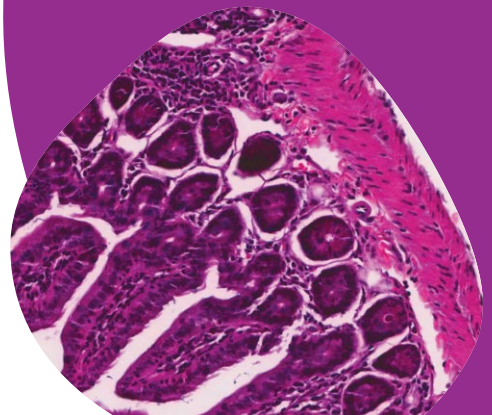
We have been using transmission electron microscopy (TEM) to assess the ultrastructure of sensory cilia in C. elegans roundworms. TEM of serial sections allows us to visualise all of the cilium subcompartments and structures. Using this technique, we have been able to link the functions of multiple genes, including ciliary disease gene homologues, to aspects of cilium structure formation and/or maintenance. We are also using this approach to address how proteins gain access to the ciliary organelle via the transition zone 'gate' at the ciliary base.

Resulting Publication

Kaplan et al., Endocytosis Genes Facilitate Protein and Membrane Transport in C. elegans Sensory Cilia, Current Biology (2012), doi:10.1016/j.cub.2012.01.060

'Without the Imaging Core facility, we could not have performed these projects. Not only has the facility provided all the necessary instrumentation and technical assistance required, but it also fully trained two of my team to conduct TEM to a very high level of quality. The ongoing support is always first rate and highly professional.'

Dr Oliver Blacque
UCD



CASE STUDY:

IMAGING

CORE TECHNOLOGIES
at UCD Conway Institute

Research Question

What are the pathway elements that connect cell cycle regulation and mitosis to the initiation of apoptotic cell death?

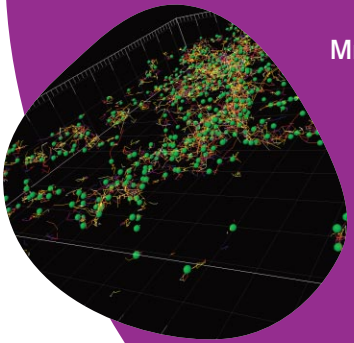
Our Approach

We research large-scale screens of mitochondrial proteome changes in response to certain microtubule-targeting chemotherapeutics. We have used microscopy to confirm the novel localisation of several protein targets to the mitochondria by co-localisation experiments, and how the pattern of intracellular distribution is affected by drug treatments. We also look at a particular centrosomal protein involved in the dynamics of cytokinesis, and the resolution of intracellular bridges in dividing cells. Using live-cell fluorescent microscopy to monitor individual cells over a timecourse of cell division in the presence or absence of our protein of interest allows a direct comparison of cytokinesis at the individual cell level.

'The array of imaging technologies available allows a great degree of freedom in designing experiments. In particular, Dimitri's expertise and the personal interest he takes in each researcher's experimental progress is hugely beneficial; from initial planning of experiments, to training on individual microscopes, to the post-imaging analysis of data.'

Dr Margaret McGee, *UCD*

Mr Darragh O'Donovan, *PhD student*



CORE TECHNOLOGY:

IMAGING

OUR EXPERTISE:

Offering imaging solutions to academic and commercial clients in a customisable range of services at each stage of the research pathway; from experimental design to final publication.

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