BEATSON ADVANCED IMAGING RESOURCE

Head
Leo Carlin
Fellow of the Royal Microscopical Society (FRMS)

Scientific Officers
Beatrice Bottura
Ryan Corbyn
Tom Gilbey[1]
Lynn McGarry
Claire Mitchell
Nikki Paul
Peter Thomason

[1]Joint Cancer Sciences Flow Cytometry Facility

Light microscopy and flow cytometry allow us to gather information about important regulatory mechanisms in tumours and the microenvironment. Using these techniques, we can simultaneously analyse large numbers of important molecules and cells with subcellular sensitivity and resolution in living samples whilst maintaining the context of the microenvironment, be that model substrate or living organism.

The Beatson Advanced Imaging Resource (BAIR) team works closely with the Institute's researchers to uncover and interrogate important molecular pathways in cancer. The BAIR is thus involved at some stage in nearly every study from researchers at the Institute that contains a light micrograph, or a flow cytometry plot or uses sorted cells for downstream analysis using one of the other advanced technologies. All of the beautiful fluorescence light microscopy images you see in this report were captured in BAIR. We are keen and able to assist from experimental design right through to the finished figures. We train scientists in all stages of modern cytometric and microscopical research, from advice and help with sample preparation, basic and advanced microscope and cytometer operation, and data acquisition through to quantitative image analysis and interpretation. At the start of a new project or application, we are enthusiastic to help researchers identify how our methods can be used to develop and test their hypotheses and help them to design experiments that make the most of our advanced instrumentation. We also identify and acquire new technology and methodology that allow our researchers to take the most elegant approaches.

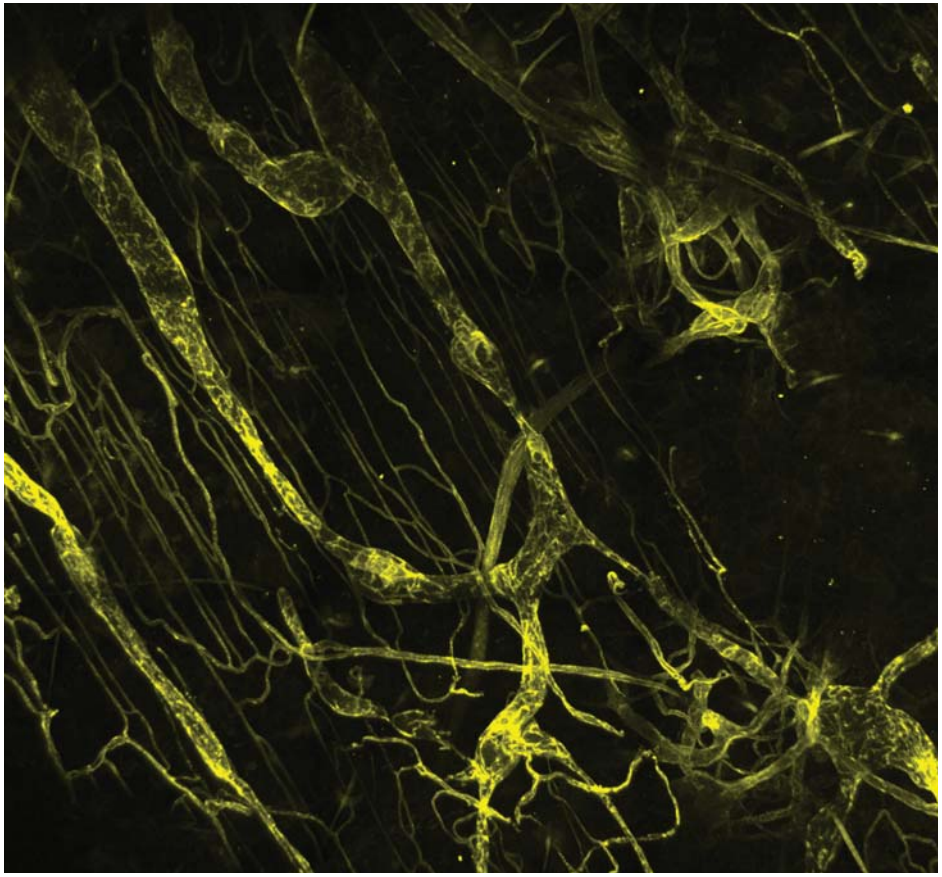
Imaging across different spatial and biological complexity scales

We have the expertise and instruments to:

- Perform automated liquid / multi-well plate handling and very high-throughput imaging experiments to analyse cell behaviour over thousands of experimental conditions via high-content imaging
- Image, spatially separate, and quantify up to eight markers simultaneously in thick tissue (3 and 4D) by combining fluorescently labelled antibodies and probes with label-free approaches (e.g. second harmonic generation to look at fibrillar collagen) using tissue clearing, multiphoton excitation and spectral imaging
- Image cell behaviour over several days in tissue culture incubators
- Address the physicochemical environment, molecular activity, and signal transduction of pathways below the diffraction limit at different spatiotemporal scales using FLIM, FRET and super-resolution imaging
- Monitor cell function in intact living organisms via advanced intravital microscopy
- Address multiplexed panels of up to 45 markers in liquid phase and dissociated tissue samples by flow cytometry and sort cell populations (with a smaller number of markers) for downstream analysis (with the joint Cancer Sciences Flow Cytometry Facility)

In this way, we underpin cancer research at the Institute, UoG School of Cancer Sciences and beyond by allowing our researchers to work up and down the biological complexity scale, taking the best and most important aspects of different models and patient samples and combining them into a larger more complete picture.

This year we were delighted to welcome Beatrice Bottura to the team and that Claire Mitchell and Tom Gilbey were both promoted to Principal Scientific Officer at the Institute, well done and well deserved. As noted in the Leukocyte Dynamics Group report, the BAIR team were instrumental in my own promotion to Senior Staff Scientist.



Expansion Microscopy of Drosophila Brain - *Nikki R. Paul and Jack Holcombe*