Trinity College Dublin
Coláiste na Tríonóide, Baile Átha Cliath
The University of Dublin

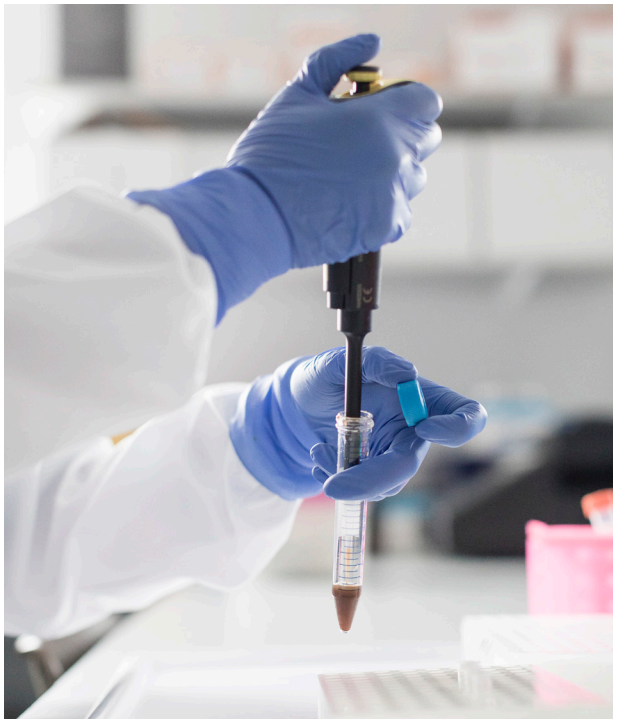
Trinity Translational Medicine Institute
Trinity Centre for Health Sciences

## Translational Immunology, Inflammation and Infection

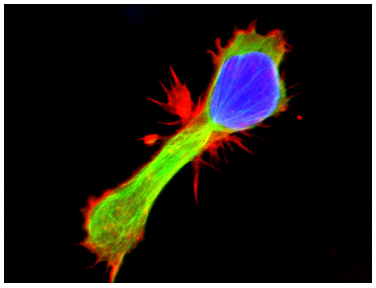
# Representative Case Study — Interrogating T cell migration – a High Content Analysis approach.

## Prof. Aideen Long

The continuous re-circulation of T lymphocytes between the blood and lymphatic systems and the localised recruitment of antigen-specific T cells to sites of inflammation is crucial to the surveillance and effector function of the immune system. At the same time, unregulated recruitment of T lymphocytes into inflamed tissues may result in autoimmune disease, leading to tissue damage and/or debilitating illness. T lymphocytes are considered to be key players in several autoimmune diseases such as multiple sclerosis, inflammatory bowel disease, rheumatoid arthritis and psoriasis. Over the past two decades, the signalling pathways and enzymes that control T lymphocyte migration have been the subject of intense scrutiny, mainly because of the promise that understanding the roles of these pathways in biology may provide novel targets for the manipulation of immunological responses, including anti-inflammatory therapies.



Prof. Long and her research team have utilized siRNA and pharmacological libraries in combination with high content analysis (HCA) to identify novel signaling pathways or enzymes involved in T cell migration. Image-based HCA is a technology that is ideal for the analysis of complex cellular phenotypes, as the automated image acquisition permits large cell populations to be rapidly analysed on a large scale. Furthermore, 10's–100's of descriptive features or parameters can potentially be extracted from each cell, thereby enabling multi-dimensional analysis of cellular phenotypes. In these studies, the ability of the inhibitor (siRNA or pharmacological) to modulate T cell polarity and migration in response to stimulation through the LFA-1 integrin was measured using HCA. The cytoskeletal elements (actin and microtubule) of the cells (+/- inhibitor) were immunofluorescently stained permitting multiple measurements of cell/cytoskeletal shape and intensity. This was followed by complex analysis of multiple parameters and hierarchical clustering which facilitates the elucidation of specific pathways involved in the regulation of lymphocyte migration.



*T-Cell polarised on ICAM-1*

**Collaborator/Funding Agencies**

European Commission

SEVENTH FRAMEWORK PROGRAMME