Real-time visualisation of skin dendritic cells by two-photon microscopy
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Background:
We have developed a novel approach to study skin dendritic cell behaviour in vivo using two-photon intravital imaging (2P-IVM). This model facilitates the tracking of fluorescently-labelled dendritic cells within the skin in steady state and pathological conditions.

Outcomes:
• This technique allows the study of immune cell activities within their natural microenvironment in a four dimensional manner (x,y,z and time).

Progress to date:
We have performed time-lapse imaging in the skin of CD11c-YFP mice, in which all dendritic cells express YFP. We observed that while langerhans cells (LC) were sessile, dermal dendritic cells (DDC) were highly motile.

Motility patterns of dendritic cell in the skin, each symbol represents an individual cell.

Significance:
The outcome of an immune response in physiological state is not solely dependent on a function of a single immune cell, most often, generation of a productive immunity involves the convergence of different immune cells from both innate and adaptive immune system. This process involves numerous cellular and molecular interactions occur at a defined time and space. Using 2P-IVM, we will be able to directly visualise the cellular behaviour of dendritic cells in the skin in homeostatic state and inflammatory condition. Mechanistic understanding of these processes may point towards novel strategies for vaccines development and treatments for skin diseases.

Funding is sought to:
  o Extend this study to examine the dendritic cell activities in response to defined inflammatory stimuli
  o Extend this study to examine the host cell-parasite interactions in the skin (eg. Leishmaniasis)
  o Extend this study to other immune cells in the skin