



Science and Technology Group

Annual Report FY2014: Charlotte Fournier

Charlotte Fournier

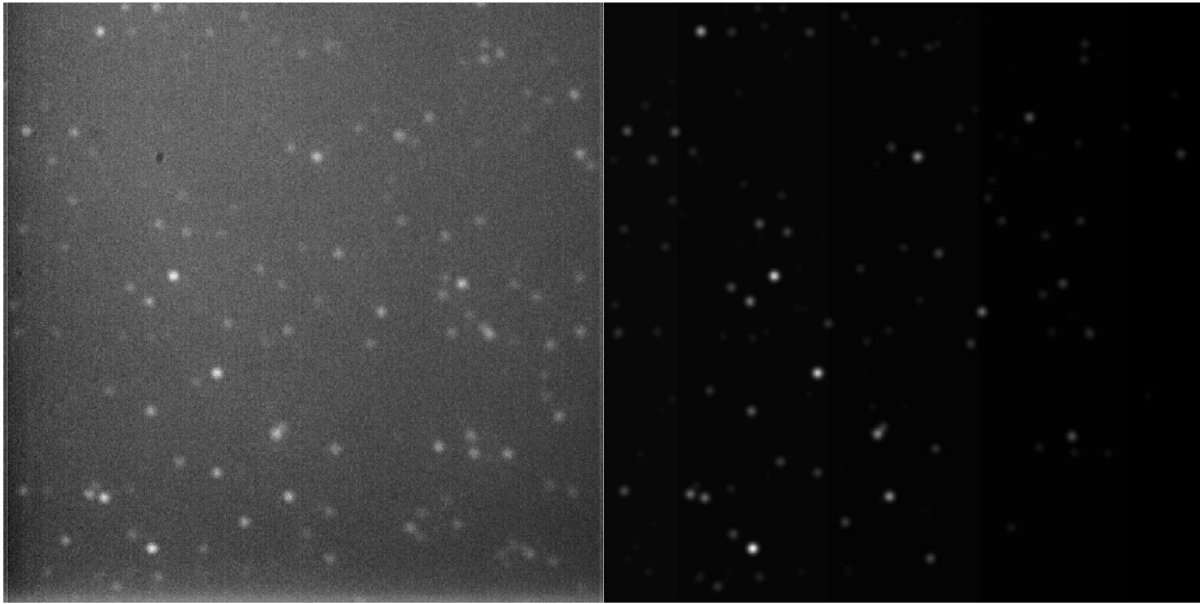
Science and Technology Associate

1. Introduction

My interest is in the dynamics of proteins within the cell membrane. During the 2014 financial year I have been investigating, in live cells, the dynamics of the receptor protein, epidermal growth factor receptor, using total internal reflection (TIRF) microscopy and single molecule tracking algorithms. This work is in collaboration with Prof. Walter Bodmer, Prof. Mark Leake, Dr. Isabel Llorente Garcia and Dr. Oliver Harriman, and was presented as an invited talk at the 2014 Workshop on Single Particle Dynamics in Cellulo.

2. Activities and Findings

Many proteins within the cell membrane are receptors. Receptors collect signals, usually in the form of a small protein molecule, from outside the cell, and transmit those signals inside the cell. While waiting to receive a signal, receptors can move around within the cell membrane. During this time, receptors were thought to exist as individuals and diffuse laterally within the cell membrane. But there is now evidence that these receptors exist in groups of two or three or more. I am interested in identifying these different sized groups of epidermal growth factor receptors, and their movements, within the cell membrane. TIRF microscopy enables us to visualise fluorescently labelled processes within the cell membrane, without the interference of fluorescence from other parts of the cell. Videos of the epidermal growth factor receptor fused to green fluorescent protein, in living cells, have been recorded using TIRF microscopy. A single molecule tracking algorithm is being developed to identify these fluorescent molecules, and track them over time. This provides information about the size of the groups of the receptors and the dynamics of these groups.



(a) Original Image

(b) Simulated image

Figure 1: TIRF microscopy image of single green fluorescent protein on a glass slide (a) and a reconstruction of green fluorescent protein detected by the single molecule tracking algorithm (b) without the addition of the background.

3. Collaborations

- Theme: The dynamics of the Epidermal Growth Factor Receptor
 - Type of Collaboration: Joint research
 - Researchers:
 - Prof. Sir Walter Bodmer, Weatheral Institute of Molecular Medicine, University of Oxford, UK.
 - Dr. Charlotte Fournier, OIST, Japan.
 - Dr. Isabel Llorente Garcia, University College London, UK.
 - Dr. Oliver Harriman, University of Tokyo, Japan.
 - Prof. Mark Leake, University of York, UK.

4. Publications

4.1 Invited Lecture

Fournier, C. *The dynamics of the Epidermal Growth Factor Receptor*, Single Protein Dynamics in Cellulo, OIST, Japan, 2014