CORRELATION BETWEEN MEMBRANE RIPPLES AND UNDERLYING CYTOSKELETONS OF A LIVING CELL MEASURED BY NON-INTERFEROMETRIC WIDEFIELD OPTICAL PROFILOMETRY

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ABSTRACT
Membrane activities involve in important cell dynamics including locomotion, adhesion, endocytosis, etc [1]. Membrane topography and motion are also closely related to the configuration and structure of the underlying cytoskeletons. However, simultaneous observation of both the membrane topography and the intracellular cytoskeletons is difficult for a single instrument.

The non-interferometric widefield optical profilometry (NIWOP) technique can provide surface topography with nanometer depth resolution by using a simple desktop optical microscope [2]. Recently we demonstrated non-intrusive measurement of cell membrane topography with a high imaging rate by using NIWOP [3]. Here we combine fluorescence microscopy with NIWOP for a more comprehensive study on cell dynamics. Using a fibroblast as the sample, we observe the correlation between the membrane ripples and actin filaments labeled by green fluorescence protein (GFP). As shown in Fig. 1, some of the actin filaments directly support the membrane topography. We also find that the ripple movements are driven by the actin filaments. After dissolving the actin scaffoldings in the cortex by cytochalasin D, we see that the propagation of membrane ripples disappears and the edge of the cell shrinks. The combination of NIWOP and fluorescence microscopy provides a complete method for the studies on the activities of cell membrane and cytoskeletons.

REFERENCE