一般社団法人日本生物物理学会　第 7 回 Biophysics and Physicobiology 論文賞受賞講演会

The 7th Award Seminar for outstanding Biophysics and Physicobiology paper

オーガナイザー：日本生物物理学会 Biophysics and Physicobiology 論文賞選考委員会

Organizers: Award committee for outstanding Biophysics and Physicobiology paper

日　時：9 月 15 日（土）12:50 - 13:20／Sept. 15 Sat.

場　所：B 会場（一般教育棟 A21）／Room B (Building for General Education A21)

形　式：講演会／Lecture

第 7 回 Biophysics and Physicobiology 論文賞受賞者

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細胞内情報処理蛋白質 SOS の 1 分子機能解析

Single-molecule analysis of a cell signaling protein, SOS

As a guanine nucleotide exchange factor (GEF) for a small G-protein RAS, Son of sevenless (SOS) regulates cell fate decision. SOS consists of six domains, five of which possess direct or indirect membrane association activity. Because RAS is on the cytoplasmic side of the plasma membrane, controlled membrane association is essential for SOS. Actually, two of the membrane association domains of SOS are responsible for its GEF function, i.e., Cdc25 domain has GEF activity and REM domain binds with the active form of RAS to form a positive feedback loop of RAS activation. However, roles of other three membrane association domains were obscure. Even if these domains are used for SOS translocation to the plasma membrane upon cell stimulation, why so many numbers of them are required? By using single-molecule imaging of fluorescently-labelled SOS in living cells, we investigated mechanism of SOS translocation and found that at least two of the membrane association domains (PH and G domains) are cooperatively used for membrane association coupled with a structural change in SOS molecule, which seems to be important for non-linear switching of SOS activity[1]. Using the same method, we analyzed three mutants of SOS found in a genetic disease Noonan syndrome[2]. Having multiple domains is a common nature of cell signaling proteins. Our studies show that single-molecule imaging is useful for the functional analysis of multi-domain proteins in cells.

1. Nakamura et al. Biophys. Physicobiol. 13:1-11 (2016)

2. Nakamura et al. Sci. Rep. 7:14153 (2017)