GLOBAL COE SEMINAR

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演題 ： STORM: Super-Resolution Microcopy with Twinkling Molecules

日時 ： 平成22年12月6日（月） 15：00〜16：00

場所 ： 医学部教育研究棟13階　第5セミナー室

The ability of fluorescence microscopy to perform noninvasive imaging of live samples with molecular specificity has made it one of the most powerful imaging techniques to study cellular processes. However, the diffraction of light limits the spatial resolution of conventional visible light microscopy, leaving many biological structures too small to be observed in detail. To overcome this limit, we have developed the Stochastic Optical Reconstruction Microscopy (STORM) technique. By stochastically switching the fluorescence signal from individual probe molecules and determining their positions, STORM has achieved a 20-30 nm resolution in the xy direction and 50-60 nm resolution in the z direction using astigmatic imaging. We have also created photoswitchable fluorophores for multicolor imaging by combinatorial pairing of various activator dyes and reporter dyes. Enabled by these imaging capabilities, we have used STORM to study the clathrin-mediated endocytic machinery in an in vitro reconstituted system. Combining time-lapse fluorescence imaging, STORM and electron microscopy observations, we have discovered an unexpected role of FBP-17, an F-BAR domain protein, in membrane tubule and vesicle formation. We have also used STORM to investigate the molecular architecture of chemical synapses in mouse brain. In this study, the organization of 10 protein components of the presynaptic active zone and the postsynaptic density was determined. Variations in synapse morphology, neurotransmitter receptor composition, and receptor distribution were characterized both among synapses and across different brain regions.

・ A. Dani, B. Huang *et al.*, Neuron, in press.
・ M. Wu, B. Huang *et al.*, Nat. Cell. Biol., 12, 902, (2010)
・ B. Huang, S. A. Jones *et al.*, Nat. Methods, 5, 1047, (2008)
・ B. Huang *et al.*, Science, 319, 810, (2008)