

NEW FLUORESCENT PROBES AND NEW PERSPECTIVES IN BIOSCIENCE

Laboratory for Cell Function Dynamics
RIKEN Brain Science Institute
Atsushi Miyawaki

"Why bio-imaging, i.e. real time fluorescence imaging?" Currently, this is a topic of great interest in the bioscience community. Many molecules involved in signal transduction have been identified, and the hierarchy among those molecules has also been elucidated. It is not uncommon to see a signal transduction diagram in which arrows are used to link molecules to show enzyme reactions and intermolecular interactions. To obtain a further understanding of a signal transduction system, however, the diagram must contain the three axes in space as well as a fourth dimension, time, because all events are controlled ingeniously in space and time. Since the isolation of green fluorescent protein (GFP) from the bioluminescent jellyfish in 1992 and later with its relatives, researchers have been awaiting the development of a tool, which enables the direct visualization of biological functions. This has been increasingly enhanced by the marriage of GFP with fluorescence resonance energy transfer (FRET), fluorescence cross-correlation spectroscopy (FCCS), or bimolecular fluorescence complementation (BiFC), and is further expanded upon by the need for "post-genomic analyses." It is not my intent to discourage the trend seeking the visualization of biological function. I would like to propose that it is time to evaluate the true asset of "bio-imaging" or "in vivo imaging" for its potential and limitations in order to utilize and truly benefit from this novel technique.