Dynamic Visualization of Signaling Activities in Living Cells

Jin Zhang
Departments of Pharmacology & Molecular Sciences, Neuroscience and Oncology, The Johns Hopkins University School of Medicine, Baltimore, MD 21205, USA

The complexity and specificity of many forms of signal transduction are widely suspected to require spatial microcompartmentation and dynamic modulation of the activities of protein kinases, phosphatases and second messengers. To achieve dynamic tracking of signaling activities in living cells, genetically encoded fluorescent biosenors for protein kinases, phosphatases, and second messengers such as cyclic AMP and phosphoinositides have been engineered. Their development and specific examples of their application will be discussed in this presentation. Furthermore, to achieve the goal of "illuminating the kinome", a strategy based on functional protein microarrays and bioinformatics has been used to identify kinase-substrate interactions (KSI) in humans. In addition to the identification of novel KSI recognition motifs *etc*. for use in biosensor design and protein engineering, this approach promises to provide global insights into the structure of phosphorylation networks and pathways in humans.