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Dynamics of receptors on the plasma membrane landscape

Bridget S Wilson

University of New Mexico, USA

Initiation of tyrosine kinase signaling at the plasma membrane is a major focus of the NM Spatiotemporal Modeling Center. We study immunoreceptors (particularly FcεRI) and growth factor receptors (the EGFR/erbB family). These receptors are heterogeneously distributed on the cell surface, residing in clusters that can be imaged by immuno-electron microscopy of plasma membrane sheets (“rip-flips”) and by super-resolution microscopy. To address the dynamics of receptor interactions, we use a combination of live cell microscopy approaches and mathematical modeling. Single Particle Tracking (SPT) experiments permit the direct observation of dimerization and higher order oligomerization. Analysis of large SPT data sets permits calculation of interaction lifetimes, such as the off-rates for erbB homo- and heterodimers. These data have been used as parameters for spatial stochastic simulations, to evaluate the impact of membrane features (domains, corrals) on the probability of productive encounters between receptors and their signaling partners.

Biography

Bridget S Wilson is a Cell Biologist with over 20 years experience studying signal transduction, intracellular trafficking and membrane biology. Her laboratory specializes in innovative imaging approaches, including live cell, fluorescence-based assays, intra-vital imaging and electron microscopy methods. She is director of the New Mexico Center for Spatiotemporal Modeling, an NIGMS-funded Center of Excellence in System Biology. As Center director, her goal is to build interdisciplinary teams that integrate novel quantitative data sets into mathematical models for improved understanding of complex processes that regulate signal transduction. She is the Maralyn S Budke Professor in Cancer Cell Signaling and is a program leader at UNM's NCI-designated Cancer Center. She was elected as a Fellow of AAAS in 2012.

bwilson@salud.unm.edu