

Combined dynamic and nanoscopic investigation of dendritic spine compartmentalization

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Dendritic spines are the major sites of excitatory synaptic transmission in the brain. The bulbous heads of these small, mushroom-like protrusions bear glutamatergic, ionotropic synapses. The thin stalk connecting the spine head with the dendrite isolates each synapse biochemically. The role of this structural isolation of dendritic spines in health and disease remains poorly understood, mainly because the features of spines cannot be resolved by traditional microscopic methods. We combine here dynamic measurements of membrane and solute flow by fluorescence recovery after photobleaching with superresolution microscopy of the same spine to develop a model of spine isolation.