Nanoscope odyssey into the presynapse

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With the advent of super-resolution microscopy, the door is now opened to dissect the mechanism of neurotransmitter release using nanoscale imaging techniques. We demonstrate in neurosecretory cells that Munc18-1, a key presynaptic protein, controls the engagement of Syntaxin1A into the SNARE complex *via* the opening of a critical hinge loop in domain 3A (Kasula *et al.*, 2016). We then turn to the drosophila synapse to demonstrate that syntaxin1A forms nanoclusters which are dynamically regulated during neurotransmitter release by poly-phosphoinositides and NSF-dependent SNARE disassembly (Bademosi *et al.*, 2016). Finally, we venture into the hippocampal presynapse to establish the first technique capable of imaging single synaptic vesicles in the crowded environment of the hippocampal synapse. Our results reveal that synaptic vesicles dynamically oscillate between several diffusion states with distinct rates of transition between these states (Joensuu *et al.*, 2016).

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