Two distinct vesicle pools of spontaneously recycled inhibitory synaptic vesicles

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In this talk, the speaker will talk about two distinct vesicle pools of inhibitory synaptic vesicles. Neurons release neurotransmitters via activity or spontaneously. Despite important roles of spontaneous release, the features of inhibitory synaptic vesicles undergoing spontaneous release are poorly understood. Here, we labeled single GABAergic vesicles undergoing spontaneous release with quantum dots and tracked them in three dimensions until exocytosis. Spontaneously labeled GABAergic vesicles undergoing spontaneous release have distinct spatiotemporal dynamics and fusion time compared with activity-dependently recycled vesicles. Final dwell times of tethered spontaneously labeled vesicles were longer compared with untethered vesicles whereas activity-dependently labeled vesicles showed no difference. Stimulation induced exocytosis of approximately one-third of spontaneously labeled GABAergic vesicles. These vesicles exhibit different dynamics, fusion time and final dwell time compared with spontaneously releasing vesicles. These results suggest that there are two distinct vesicle pools in spontaneously recycled inhibitory synaptic vesicles