

Real-time Single Vesicle Tracking for Studying Vesicle Dynamics

Hyokeun Park

Division of Life Science, The Hong Kong University of Science and Technology, Hong Kong SAR,

P. R. China

Email: hkpark@ust.hk

Though vesicles have been extensively studied, the precise vesicle dynamics remain elusive. Here, we develop a fluorescence imaging techniques to track single synaptic vesicle in small central synapses in living neurons. Single vesicle tracking has revealed a wealth of information about synaptic vesicle dynamics both within and outside the presynaptic terminals, which was previously inaccessible using conventional measurements. Using this method, we tracked single vesicle tracking with high spatiotemporal resolution and found that the motion of vesicles is heterogeneous. Furthermore, single vesicle tracking shows the abnormal dynamics and vesicle pools of synaptic vesicle in mouse neurons of Huntington's disease (a neurodegenerative disease). Therefore, single vesicle tracking provides an effective avenue for studying vesicle dynamics and offers new insights into pathogenic mechanisms of neurodegenerative diseases.