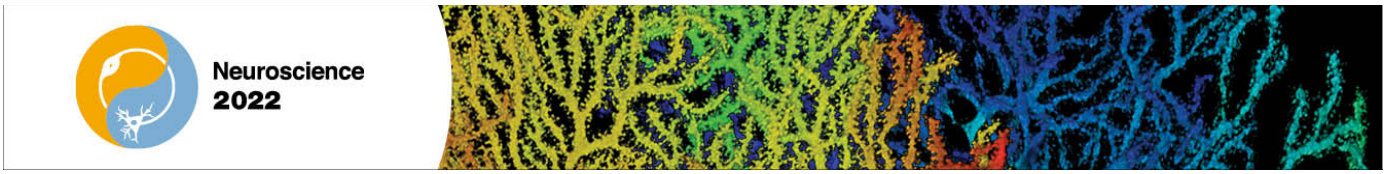

Print this Page for Your Records Close Window

Control/Tracking Number: 2022-S-8025-SfN
Activity: Scientific Abstract
Current Date/Time: 7/12/2022 3:27:36 PM

Reorganization of Synaptic Vesicles Associated with Mitochondria Following Long-Term Potentiation

AUTHOR BLOCK: ***G. C. GARCIA**[1], T. M. BARTOL[1], L. M. KIRK[2], K. M. HARRIS[2], T. J. SEJNOWSKI[1];
[1]Computat. Neurobio. Lab., Salk Inst. for Biol. Studies, La Jolla, CA; [2]Dept. of Neuroscience, Ctr. for Learning and Memory, Inst. for Neurosci., Univ. of Texas at Austin, Austin, TX

Abstract:
Functional and structural elements of synaptic plasticity are tightly coupled, as has been extensively shown for dendritic spines and presynaptic terminals. We interrogated structural features of presynaptic terminals in 3DEM reconstructions from CA1 hippocampal axons that had undergone control stimulation or theta-burst stimulation (TBS) to produce long term-potentiation (LTP). The total volumes of the presynaptic bouton, mitochondria, and synaptic vesicles were measured, in addition to distances between neighboring vesicles and to the active zone. Finally, we computed the vesicle-associated volume, volume and density of the cloud of vesicles. The outcomes revealed that vesicles in the core of the presynaptic vesicle cloud are reduced two hours following the induction of LTP. These findings support the hypothesis that the greater vesicle loss in boutons associated with mitochondria (Smith et al., 2016) occurs at the core of the vesicle cloud, and not restricted to the docked, readily-releasable, or reserve pool of vesicles. Furthermore, the distances between neighboring vesicles were greater in less dense terminals that present greater percentage of mitochondria volume and lower percentage of total vesicle volume. These findings further support the involvement of mitochondria on vesicle mobilization (Smith et al., 2016) and allow the identification of presynaptic terminals with extreme morphometric changes following the induction of LTP.
Smith HL, Bourne JN, Cao G, Chirillo MA, Ostroff LE, Watson DJ, and Harris KM (2016) Mitochondrial support of persistent presynaptic vesicle mobilization with age-dependent synaptic growth after LTP. eLife, 5:e15275. PMCID: PMC5235352

Author Disclosure Information:

G.C. Garcia: None. **T.M. Bartol:** None. **L.M. Kirk:** None. **K.M. Harris:** None. **T.J. Sejnowski:** None.
Presentation Preference (Complete): Nanosymposium Preferred
Linking Group (Complete): None selected
Theme and Topic (Complete): B.05.f. Structural plasticity - Synapses ; B.05.c. LTP and LTD - Pre- and postsynaptic mechanisms
Nanosymposium Information (Complete):
Great Science : False

Keyword (Complete): SYNAPTIC PLASTICITY ; LTP ; MITOCHONDRIA
Support (Complete):
Support: Yes
Grant/Other Support: : NSF NeuroNex Technology Hub (Award number 1707356)
Grant/Other Support: : NSF NeuroNex 2 (Award Number 2014862)

Special Requests (Complete):
How do you plan to participate in Neuroscience 2022?: In-Person and Virtually
Religious Conflict?: No Religious Conflict
Additional Conflict?: No
Is the presenting author of this abstract a high school or undergraduate student?: None
Newsworthy : False

Status: Finalized