



# **TIFR Centre for Interdisciplinary Sciences, Narsingi, Hyderabad 500075**

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## **Seminar**

### **Long-term Potentiation Requires Unique Postsynaptic SNARE Fusion Machinery**

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**Abstract:** A central dogma of modern neuroscience is that activity-dependent modifications in the neuronal synaptic connections underlie most of the fundamental adaptive features of the brain, including 'learning and memory formation'. Such long-lasting activity-dependent strengthening of synaptic activity is known as long-term potentiation (LTP). Trafficking of the AMPA receptors to the post synaptic membrane at excitatory synapses play critical role in synaptic plasticity during NMDA receptor mediated long-term potentiation (LTP). Vesicular membrane fusion during exocytosis of receptor is mediated by assembly of SNARE (for soluble NSF-attachment protein receptor) and SM (for Sec1/Munc18-like) proteins. The SNARE and SM proteins involved in presynaptic vesicle fusion during neurotransmitter release are comparatively well understood. In contrast, the identity of the molecular players involved in the exocytosis of AMPAR at the post-synaptic cell surface during NMDA receptor -dependent long-term potentiation (LTP) is undefined. This seminar will focus on results obtained from chemical LTP assays of AMPAR exocytosis in cultured neuron and electrophysiological measurements of LTP in acute hippocampal slices demonstrating that the Q-SNARE proteins syntaxin-3 and SNAP-47, a SNAP-25 homolog of unknown function, are required for regulated AMPAR exocytosis during LTP but not for constitutive basal AMPAR exocytosis. In addition, the R-SNARE protein synaptobrevin-2/VAMP2 is required for both regulated and constitutive AMPAR exocytosis. Mutagenesis of synaptotagmin-3 revealed that its binding to complexin as well as Munc18 are essential for its postsynaptic role in LTP. Thus, postsynaptic exocytosis of AMPARs during LTP is mediated by a unique fusion machinery that is distinct from that used during presynaptic neurotransmitter release.

**Date: *Wednesday, February 06<sup>th</sup> 2013***

**Time: *11:30AM (Tea/Coffee at 11:15AM)***

**Venue: *Conference Hall, TCIS***

***All are cordially invited***