Activity Dependent Neuronal Signaling

Tuesdays, 4:00-6 pm, Skirball 5th Floor Study Room

Course Director

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Overview

Brain functions change across a lifespan in response to experience, plasticity of neural circuits, homeostatic factors, and the environment. A key mechanism is the regulation of activity-dependent proteins and immediate early genes (or IEG's) and their participation in synaptic function and circuit formation. Among the paper topics that will be discussed are:

Identification of IEG's Transcriptional regulation Role of Ca²⁺ Axonal vs. dendritic targeting Cytoskeletal regulation Ion channels Critical periods Perineuronal nets Epigenetic modifications (DNA methylation, histone acetylation, ubiquitination)

Activity-dependent gene expression has an impact on many areas of neuroscience, which will be covered by the Readings. They include:

Learning and memory LTP and LTD Visual plasticity Epilepsy Regeneration Homeostatic scaling Development of circuits

Grading

Class participation (50%) and Oral presentations (50%): Everyone is expected to read all the papers listed on the syllabus, in advance of each class. We will attempt to feature a recent publication and an older paper. Each class session will have presentations on 1-2 research papers. Everyone will be assessed on participation, presentation skills and comprehension. As a presenter of papers, you should be prepared to answer questions and help lead the discussion.