Département de psychiatrie
Centre de neurosciences psychiatriques
Site de Cery
CH-1008 Prilly - Lausanne

Centre de Neurosciences Psychiatriques

CNP SEMINAR

ANNOUNCEMENT

Friday, October 17, 2014, 11:00 a.m.

"Stress glutamate transmission and neuronal architecture. A key to pathophysiology and treatment of psychiatric disorders"

Prof Maurizio Popoli

Laboratory of Neuropsychopharmacology and Functional Neurogenomics-
Dpt. Of Pharmacological and Biomolecular Science, University Milano, Italy
e-mail: maurizio.popoli@unimi.it

Invited by Fulvio Magara
(Fulvio.Magara@chuv.ch)

Salle Hirondelle, Hôpital Psychiatrique de Cery
Site de Cery, CH-1008 Prilly-Lausanne

Depression and chronic stress are associated to reductions in hippocampal volumes and neuronal atrophy in both humans and animal models. Excessive glutamate release might be at the origin of these changes, yet the mechanisms are still unknown.
We have previously shown that acute stress induces rapid enhancement of depolarization-evoked glutamate release/transmission in prefrontal and frontal cortex (PFC/FC), by increasing corticosterone levels and stimulation of synaptic glucocorticoid/mineralocorticoid receptors (GR/MR). In addition, we have shown that chronic antidepressants are able to prevent the enhancement of glutamate release induced by acute stressors (3). We have now evidence that acute stress rapidly enhances glutamate vesicles mobilization and increases the readily releasable pool (RRP) size, through activation of synaptic GR/MR-mediated non-genomic mechanisms. In vitro application of corticosterone to purified PFC/FC synaptosomes mimics vesicle mobilization, but does not enhance depolarization-dependent glutamate release and transmission (2). Our results suggest that rapid (non-genomic) synaptic action of corticosterone on the RRP size is necessary, but not sufficient, to increase glutamate release/transmission in PFC/FC. Enhancement of glutamate release/transmission likely needs the activation of delayed, possibly genomic, mechanisms. These studies may help defining new targets for pharmacological treatments of mood and anxiety disorders.

Selected Publications:

1. Popoli M et al. (2012) The stressed synapse: the impact of behavioral stress and glucocorticoids on glutamate transmission. *Nat. Rev. Neurosci.* 13:22-37

2. Treccani G et al. (2014) Stress and corticosterone increase the readily releasable pool of glutamate vesicles in synaptic terminals of prefrontal and frontal cortex. *Mol. Psychiatry* 19:433–443.

3. Musazzi L et al. (2010) Acute stress increases depolarization-evoked glutamate release in the rat prefrontal/frontal cortex. The dampening action of antidepressants. *PLoS ONE* 5(9):e12596