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Homeostatic synaptic plasticity (HSP) is a diverse group of compensatory mechanisms allowing neurons to regulate their excitability according to network activity levels. These phenomena have mainly been observed in neuronal and organotypic cultures incubated for long periods (days) with drugs that increase or decrease network activity, or in vivo after sensory deprivation. In contrast, we here report a form of HSP developing spontaneously in a few hours in pyramidal neurons from acute hippocampal slices. We observed a rise in the frequency of miniature excitatory postsynaptic currents (minis) over time. Moreover, we detected an increase in minis amplitude that obey a multiplicative scaling up rule, i.e. their distribution increased proportionally. This suggests a fast-occurring HSP process not requiring pharmacological manipulations and presumably caused by a decrease in synaptic activity after removal of afferents during slice preparation. Data suggests that both pre and postsynaptic mechanisms are involved in this form of HSP. To our knowledge this is the first time that a relatively fast (4-8 h) form of homeostatic synaptic scaling is reported in acute hippocampal slices without drug treatment. These observations may contribute to the understanding of fast reactive phenomena taking place in the brain after injury.
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S3P819. CHANGES IN THE KINETIC PROPERTIES OF THE A9A10 HAIR CELL NICOTINIC RECEPTOR INCREASE THE LEVEL OF OLIVOCOCHLEAR INHIBITION IN AUDITORY SYNAPSES

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Medial olivocochlear (MOC) fibers innervate the cochlear outer (OHCs) hair cells and also transiently during development, the inner hair cells (IHCs).The MOC-hair cell synapse is cholinergic, inhibitory and is mediated by a9a10 nicotinic receptors (nAChR). In mice bearing a point mutation in the a9 nAChR subunit (Kin), in-vivo cochlear efferent-mediated inhibition is dramatically lengthened and enhanced (Taranda 2009). We now investigated whether there are changes in the short-term plasticity properties (STP) of MOC-hair cells synapses that could account for this enhanced efferent suppression. Evoked synaptic currents were recorded in IHCs and OHCs of isolated mouse organs of Corti. MOC-OHC synapses from Kin mice significantly facilitated upon 20 and 40 Hz stimulation (p2/p1- 20Hz= 2.6; p2/p1- 40Hz= 3.2; n=4-8). The probability of release increased during the trains, whereas the size of the events remained stable suggesting a presynaptic origin. Moreover, stimulation of MOC fibers at 80 Hz for 10 s resulted in postsynaptic responses of longer duration and slower onset times in both OHCs and IHCs from Kin mice (n=8-16). In accordance, preliminary experiments show that efferent inhibition of calcium action potentials is more potent in IHCs from kin mice. We conclude that the alteration in the STP patterns of MOC-hair cell synapses caused by the mutation could contribute to the observed changes in the dynamics of in-vivo cochlear efferent inhibition.
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S3P820. CHRONIC STRESS ALTERS SYNAPTIC EXCITATORY-INHIBITORY RATIO IN AN INTERLEUKIN-6 TRANS-SIGNALING-DEPENDENT MANNER IN THE PREFRONTAL CORTEX OF THE MOUSE

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Chronic stress induces of a number of neuropsychiatric conditions including depression, psychosis, and anxiety disorders. It is not know yet whether and how stress alters synaptic function. Cytokines are immune system modulatory peptides involved in the regulation of the central nervous system (CNS). In order to test the hypothesis that pro-inflammatory cytokine interleukin-6 (IL-6) is involved in stress-induced changes in synaptic function we compared wild type (WT) C57BL/6 mice with a transgenic (TG) mice of the same strain in which the promoter of the astrocytic marker glial fibrillary acidic protein (GFAP) was linked to a soluble version of the membrane transducer of the IL-6 cascade, glycoprotein 130 (TG, GFAP-sgp130Fc), which mediates most CNS IL-6-dependent effects.
WT and TG animals were submitted to a 10-day 15 min-long sessions in which they shared the cage with a CD1 mouse whose aggressive behavior had been previously determined (Social Defeat, SD). We evaluated the balance between synaptic excitation and inhibition (sE/I) in the medial prefrontal cortex –a brain area particularly sensitive to stress– by using whole-cell patch-clamp to record excitatory and inhibitory postsynaptic currents (EPSCs and IPSCs) evoked electrical stimulation of the same neuron. Preliminary results show that stress reduces sE/I in WT mice (57±11 % ctr vs. 32±3 %, SD, $p<0.05$), but not in TG (GFAP-sgp130Fc) mice (60±9 % ctr vs. 51±12 % SD, n.s.), suggesting an IL-6 involvement in stress.

Theoretical and Computational Neuroscience

S3P821. MOTION DIRECTION SELECTIVITY IN CENTRAL AND PERIPHERAL RETINAL GANGLION CELLS IN A DIURNAL RODENT

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