Keynote speech (I)

Neural Plasticity from Bench to Bedside

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Location:生物醫學科學研究所 B1C會議室
Institute of Biomedical Sciences (IBMS) B1C

Time: Sept. 11 13:45-14:45

Abstract

During early brain development, synaptic plasticity allows experience-dependent formation and refinement of neural circuits. Impaired synaptic plasticity during development, resulting from either genetic or environmental factors has been linked to several mental disorders. As the brain matures, large-scale plasticity in the connectivity found in developing circuits is replaced by activity-dependent alterations of synaptic efficacy, with a limited extent of modifications of existing synaptic structure and connectivity. This limited plasticity is critical for the learning/memory and many cognitive functions of the adult brain, for adaptive changes of neural circuits following injuries and drug abuse, as well as for functional recovery following therapeutic treatment and rehabilitation. In this lecture, I will review our past findings on molecular, cellular, and physiological mechanisms underlying neurotrophin- and activity-dependent synaptic plasticity, and suggest potential intervention approaches for treating brain disorders, particularly the use of task-specific physiological and physical methods that aim at the modification of specific neural circuits associated with brain dysfunctions. I will also describe our efforts in using non-human primates for studying higher cognitive functions of primates and human brain disorders, including the use of gene-editing and cloning of macaque monkeys for developing disease models for studying brain disorders and developing therapeutic approaches. I will also describe our current effort in developing a broad-spectrum brain function diagnostic tool-box that provides quantitative measurements of a large number of brain functions in large human populations over prolonged periods, in order to help identifying early signs of brain disorders and developing early intervention approaches.

Selected recent publications:

Park H, Popescu A, **Poo MM** (2014) Essential role of presynaptic NMDA receptors in activity-dependent BDNF secretion and corticostriatal LTP. *Neuron* 84:1009-22

Yang Y, Liu D-q, Sun Y-g, Zuo Y, **Poo MM** (2016) Remodeling of amygadala-auditory cortex synapses associated with auditory fear learning. *Nat. Neurosci* 19:1348-55

Chang L, Zhang S, **Poo MM**, Gong N (2017). Spontaneous expression of mirror self-recognition in monkeys after learning precise visual-proprioceptive association for mirror images. *Proc. Natl. Acad. Sci. U S A.* 114:3258-3263

Liu Z, Cai YJ, Yan W, Nie YH, Zhang CC, Xu YT, Zhang XT, Lu Y, Wang ZY, **Poo MM**, Sun Q (2018) Cloning of Macaque Monkeys by Somatic Cell Nuclear Transfer. *Cell* 172:881-887

Qiu PY, Jiang J, Liu Z, Cai, YJ, Huang T, Wang Y, Liu QM, Liu F, Cheng JM, Li Q., Tang YC, **Poo MM**, Sun Q, Chang HJ (2019) BMAL1 knockout macaque monkeys display reduced sleep and psychiatric disorders. *Nat. Sci. Rev.* 6:87-100

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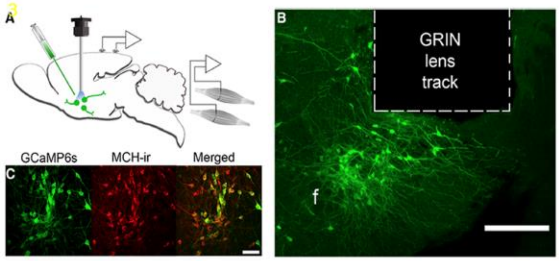

Blanco-Centurion et al., J Neurosci 2019

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