BBB Seminar (BMED380)

SCAN ME

Thursday, January 16. 14:30 at the BBB, Auditorium 4

Locus coeruleus and dopamine-dependent memory consolidation in the hippocampus

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Although most of our everyday memories are forgotten, the retention of these memories is enhanced for longer periods when novel or salient experiences occur shortly before or after memory encoding via a memory stabilization process known as “memory consolidation”. We and others previously showed that noradrenergic neurons in the locus coeruleus (LC) are capable of co-releasing dopamine (DA) as well as norepinephrine (NE) in the hippocampus, enhancing DA-dependent retention for everyday memory (Takeuchi *et al.*, Nature, 2016). Here we focus on (i) DA and NE dynamics of LC axons in the hippocampus and (ii) molecular mechanisms governing novelty-induced enhancement of memory retention. To directly detect DA release from LC axons in the hippocampus with high spatiotemporal resolution, we developed a genetically encoded red fluorescent DA (red-DA) biosensor with high selectivity for DA over NE (66-fold selectivity). Through dual-color fluorescence live imaging, we selectively detected extracellular DA even in the presence of NE at a single hippocampal neuron level *in vitro* (Nakamoto *et al.*, Molecular Brain, 2021). To explore the molecular basis of novelty-induced memory boosts, we examined candidate key genes induced by a novel experience in the dorsal hippocampus. The 5-minute exploration of a novel environment up-regulated *Agap3* mRNA expression, which controls AMPA-type glutamate receptor trafficking in synapses and might be involved in maintaining functional plasticity. Identification of AGAP3’s role in memory consolidation may provide a better understanding of the process and guide future research.

Chairperson: Clive Bramham, Department of Biomedicine