

Thomas McHugh, PhD Team Leader Circuit and Behavioral Physiology Physiological Signatures of Memory

Thomas McHugh majored in molecular and cellular biology at the University of California, Berkeley, before moving to the Massachusetts Institute of Technology (MIT) where he finished a PhD in biology. At MIT, he studied genetics and the physiology of spatial memory with Matt Wilson and Susumu Tonegawa, and continued to study the circuits of hippocampal memory as part of his postdoctoral studies. In 2009, he moved to what is now known as the RIKEN Center for Brain Science to start his own laboratory. His Laboratory for Circuit and Behavioral Physiology at RIKEN takes a multidisciplinary approach to understanding how memories are formed, stored and recalled in the mammalian brain, and how damage from factors such as stress and disease impair these functions.

Abstract: The hippocampus plays a critical role in memory and its dysfunction can lead to disorders ranging from epilepsy to dementia. Behavioral studies have shown that it is crucial for the formation of new episodic and contextual memories, as well as their consolidation, but how dynamic changes in its wellcharacterized neuronal activity map on to these functions and the theories explaining them has remained difficult to address. In rodents, genetic techniques allow specific access to discrete populations of neurons, both within the hippocampus and in areas projecting to it, permitting the manipulation of neuronal transmission and plasticity on a variety of timescales. In this talk I will introduce how we combine these tools with behavior and in vivo recording to gain a greater understanding of how information is processed in the structure. I will highlight some of the lab's recent efforts, including experiments designed to understand the links between place cell activity and the encoding of memory, as well as work focused on the identification of a dynamic physiological signature of memory age.