

Jonathan Kipnis, PhD

MIND Institute Distinguished Lecturer Series – January 13, 2016

Biographical Information

Dr. Jonathan (Jony) Kipnis's research group focuses on the complex interactions between the immune system and the central nervous system. The goal is to elucidate the cellular and molecular mechanisms underlying the beneficial effects of immune cells in central nervous system (CNS) homeostasis after CNS injury and in chronic neurodegenerative conditions.

Dr. Kipnis's research team showed that the immune cells mediate their beneficial effects on the CNS from within the meningeal spaces. After cognitive task performance or in response to CNS injury, meningeal T cells in mice are activated and express high levels of IL-4, which is one of the key molecules mediating beneficial effects of the immune system in the CNS. Elimination of meningeal T cells or their produced IL-4 results in cognitive impairment.

The fascination with meningeal immunity and its role in healthy and diseased CNS is what brought the team to study immune cell trafficking in and out of this understudied compartment. These studies have recently resulted in a discovery of meningeal lymphatic vessels that drain the macromolecules and the immune cells from the cerebrospinal fluid/CNS into the deep cervical lymph nodes. The main focus of the Kipnis lab now is to address the role of meningeal lymphatic vessels in regulation of the immune response in different neuroinflammatory and neurodegenerative diseases.

Jony Kipnis graduated in 2004 from the Weizmann Institute of Science in Israel, where he was a Sir Charles Clore scholar. Upon graduation, he received the Prize of Excellence for doctoral studies awarded by the Feinberg Graduate School of the Weizmann Institute of Science. He is also a recipient of a distinguished prize for excellence awarded by the Israeli Parliament, The Knesset. He was awarded the Robert Ader New Investigator Award for 2011 by the PsychoNeuroImmunology Research Society and the 2012 Jordi Folch-Pi award by the American Society for Neurochemistry. Recently, Jony became a Gutenberg Research College Fellow at the Johannes Gutenberg University Mainz Medical Center.

Presentation Abstract (4:30 pm presentation)

The Brain's Lymphatic System and Behavior

Immune cells and their derived molecules have major impact on brain function. We have shown that a proper T cell compartment is critical for higher brain function. Mice deficient in adaptive immunity have impaired cognitive function compared to that of wild-type mice. Importantly, replenishment of the T cell compartment in immune deficient mice restored proper cognition. Our recent works also demonstrates the effect of the immune system on social behavior. Despite the robust influence on brain function, T cells are not found within the brain parenchyma, a fact that only adds more mystery into these enigmatic interactions between T cells and the brain. These findings inspired 3 major questions that will be discussed in this lecture: Where do T cells mediate their effect? How do T cells affect brain function? And finally, why are immune cells equipped with the power to influence the brain?