BDR SEMINAR (Kobe & online hybrid)

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Tuesday, July 1, 2025 13:00-14:00 1F Auditorium, DB Building C, Kobe / Broadcast online via Zoom This seminar is open only to BDR Members.

Neuroimmune interaction in physiological regulation and behavior

Summary

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The coordinated communication between different organs and systems, particularly neuroimmune interactions, is fundamental for maintaining health, homeostasis, and behavior. Intriguingly, immune pathways, originally evolved to protect against pathogens, have been co-opted to influence neural circuits that regulate social behavior. However, the intricate molecular mechanisms governing these neuroimmune interaction remain largely unexplored.

This talk discusses how immune molecules, specifically the Interleukin-17 (IL-17) family and its receptors (IL-17Rs), regulate neuronal activities to modulate social behaviors. We identified the distinct brain regional expression of IL-17R subunits. Functional analyses revealed that IL-17RA and IL-17RB—but not IL-17RC—are critical receptor subunits for IL-17A-dependent enhancement of social behavior in autism model mice. Additionally, we pinpointed IL-17E, binding to IL-17RA and IL-17RB complexes, as a crucial neuromodulator mitigating neuronal hyperactivity and abnormal social behavior. Our findings reveal a novel IL-17 signaling within the cortex that utilizes IL-17A through the IL-17E to IL-17RA/IL-17RB pathway to alleviate social deficits in autistic animals, illustrating the pivotal role of cytokines in bridging the immune and central nervous systems.

Building on our findings of how peripheral signals influence the brain, my future research aims to unravel how neural activity, triggered by social interaction, in turn regulates peripheral organ function, including the immune system. Specifically, I will investigate how sensory information from social interaction activates brain circuits that subsequently modulate immune functions, potentially optimizing the body's defense mechanisms against infections. This bidirectional neuroimmune communication is crucial for a comprehensive understanding of health and disease.

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