



Plasticity and Flexibility: How the Brain Updates Threat Memories Across the Lifespan

SEMINAR & VISITING SPEAKER SERIES

DATE Thursday, May 29th, 2025

TIME 12:00 PM to 1:00 PM

LOCATION APOTEX THEATRE 050

SPEAKER

Qi Yuan, PhD

Professor, Memorial University of Newfoundland, Faculty of Medicine.

BIO

Dr. Qi Yuan is a Professor of Neuroscience at the Faculty of Medicine, Memorial University of Newfoundland. She completed her Ph.D. at Memorial University and pursued research training at RIKEN Brain Science Institute, the Marine Biological Laboratory at Woods Hole, and HHMI/UCSD. Her research centers on the molecular and circuit mechanisms underlying learning and memory, with a particular focus on experience-dependent plasticity, neuromodulation, and the formation of memory-encoding neuronal ensembles. Dr. Yuan's work has advanced the understanding of associative learning and memory extinction across the lifespan, integrating behavioral, electrophysiological, and single-nucleus multiomic approaches. Her recent publications highlight novel insights into synaptic, molecular and gene regulatory processes supporting memory formation. In parallel, her research explores how early neurodegenerative changes, particularly in the locus coeruleus, alter cognitive function and resilience. Dr. Yuan currently holds a CIHR Project Grant and an NSERC discovery grant, and has contributed over 60 peer-reviewed publications. She has been recognized with the CIHR New Investigator Award, the Dean's Excellence in Research Award, and a JSPS Invitational Fellowship. She also serves as Associate Editor for Frontiers in Cellular Neuroscience and Editor for Scientific Reports, contributing broadly to the neuroscience community through editorial and grant review activities.

ABSTRACT

Learning when to let go of fear is important for adapting to a changing world. One way to measure this flexibility is through extinction learning, where old fear memories lose their power. In this talk, I will explore how aging and complex learning affect the brain's ability to update fear memories, focusing on two important areas: the basolateral amygdala (BLA) and the posterior piriform cortex (pPC), a part of the sensory system. Our research in rats shows that aging weakens a key brain process called NMDA receptor-dependent synaptic plasticity in the pPC, making it harder to extinguish old fears, but boosting this process can help restore flexibility. We also found that creating new, layered fear memories (through second-order conditioning) depends on coordinated changes between the amygdala and sensory cortex. Together, these studies highlight how brain plasticity supports memory updating throughout life, and how strengthening these pathways could help maintain mental resilience during aging.

OBJECTIVES

- Explore how the brain adapts and let go of fear, and why this becomes harder with age.
- Reveal how memory networks in the brain link experiences to create complex associations.
- Highlight how understanding memory flexibility could lead to

Dr. Qi Yuan's Website:

<https://www.mun.ca/medicine/faculty-and-staff-resources/faculty-a-z/yuan-qi.php>

Zoom Meeting: <https://umanitoba.zoom.us/j/64606619001?pwd=Vxx6CpsMW6pPQuDOhqdjKiSWrYxbGk.1&from=addon>

Meeting ID: 646 0661 9001

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