

2023 Annual Research Day – Oral session
April 19th, 2023, 2:00 p.m. – 4:30 p.m., PHAB 2A

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Antibiotic-induced gut microbiota depletion targets the ability to solve spatial tasks of different cognitive loads

Trillions of microbes 'comprising communities of bacteria, virus, fungi, and other microorganisms' inhabit the gastrointestinal tract. Known as gut microbiota, these microorganisms are central to human health. Growing evidence connects imbalances of microbial communities with several neurological and psychiatric conditions, and signals to the modulating role of gut bacteria on brain function, including learning and memory. Gut microbes impact synaptic plasticity as well as cognitive behavior. Yet, a comprehensive theory to explain microbiome impact on learning and memory is underdeveloped. Here, we investigated whether antibiotic-induced microbiota depletion (AIMD) disrupts the capacity to associate memory experiences. To test the hypothesis, we depleted gut bacteria in mice by giving a cocktail of antibiotics and studied memory transfer from a low to a high cognitive demand tasks (from passive to active place avoidance). We also investigated the effect of AIMD individually on a low (passive place avoidance) and a high cognitive demand spatial memory task (active place avoidance). Our experiments unveiled a previously unclear effect of AIMD on memory tasks: it depends on cognitive demand. Moreover, it reveals a surprisingly unexpected finding; it enhances memory transfer. While the effect of gut dysbiosis on brain function and its connection with psychiatric disorders is heavily supported by evidence, our work will provide an understanding of how gut dysbiosis does so by explaining how it impacts the processing of spatial memory information.