



SFB 1315

Mechanisms and Disturbances in Memory Consolidation:
From synapses to systems

Tuesday

JULY 7, 2020
4:00 pm CET

ZOOM ID: 7754910236

Register at:

SFB1315.ifb@hu-berlin.de

SFB 1315 LECTURE SERIES 2019-2020

DECODING MEMORY IN HEALTH AND ALZHEIMER'S DISEASE

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Photo Jerry Grillo



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DECODING MEMORY IN HEALTH AND ALZHEIMER'S DISEASE

In this talk I will discuss deficits in neural activity in Alzheimer's disease (AD), the effects of driving neural activity on immune cells and immune signals in the brain, and new methods to drive rhythmic activity non-invasively.

Spatial navigation deficits are one of the earliest symptoms of AD and the hippocampus is one of the areas first affected by the disease. First, I will describe how neural codes underlying memory-based spatial decisions fail in animal models Alzheimer's disease (AD). Using a virtual reality behavior paradigm to record and manipulate neural activity in transgenic mice, the primary animal model of AD, we found deficits in synaptic efficacy during behavior and in patterns of activity that we have previously shown inform memory-guided decisions in spatial navigation. Next, I will discuss the effects of driving specific frequencies of activity that are lacking in

AD model mice. I will describe new non-invasive methods we developed to drive rhythmic neural activity non-invasively. We found that driving gamma frequency activity non-invasively mobilized the immune system and reduced pathogenic proteins. Furthermore, driving gamma rapidly initiated a unique immune signaling cascade.

These discoveries could lead to new therapies for Alzheimer's disease by driving specific patterns of neural activity to impact the disease at the cognitive, cellular, and molecular levels.

SPEAKER BIO Annabelle Singer is an Assistant Professor in the Coulter Department of Biomedical Engineering at Georgia Tech and Emory University.

The central goal of Dr. Singer's research program is to understand how neural activity produces memories and spurs the brain's immune

system.

Dr. Singer's research has shown how coordinated electrical activity across many neurons in the hippocampus represents memories of experiences and fails in animal models of Alzheimer's disease.

Dr. Singer has found that driving particular frequencies of neural activity reduce Alzheimer's pathology and alter brain immune function.

Using non-invasive approaches, she is translating her discoveries from rodents to develop radically new ways to treat diseases that affect memory in humans. Dr. Singer completed a post-doctoral fellowship in Ed Boyden's Synthetic Neurobiology Group at MIT and she received her Ph.D. in Neuroscience from UCSF, performing research in the laboratory of Loren Frank.



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