Weill Cornell Medicine

Microbiome Therapy for the Treatment of Neurological or Behavioral Disorders

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Background & Unmet Need

- The microbiota has been shown to influence our development, metabolism, and immunity
- Alterations in the microbiota have been shown to modulate host behaviors, but the mechanisms by which this occurs remain poorly understood
- **Unmet Need:** Identification of mechanisms involved in the “gut-brain axis” may improve our understanding of behavioral disorders and support therapeutic development

Technology Overview

- **The Technology:** Microbiome-based therapies with the potential to prevent and treat numerous neurological and behavioral disorders
- **Discovery:** Germ-free mice develop significantly altered neuronal activity and behaviors, particularly in fear extinction learning
- Selective reintroduction of the microbiota restored behavioral deficits in adult mice
- Several microbiome-derived metabolites were shown to be significantly down-regulated in germ-free mice
- May be particularly relevant for individuals at risk of developing altered microbiota

Inventors:
David Artis

Patents:
US Application Filed

Publications:
Chu et al. *Nature.* 2019.

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Technology Applications

- Prevention of ASD and other neuropsychiatric disorders in newborns with altered microbiota exposure (e.g., pre-term birth, C-section)
- Treatment of ASD, schizophrenia, and related disorders in children and adults
- Reintroduction of beneficial bacteria after antibiotic treatment or radiation therapy

Technology Advantages

- Targets the gut-brain axis to ensure normal neurological development
- May be administered as either probiotic compositions or small molecule metabolites

Supporting Data / Figures

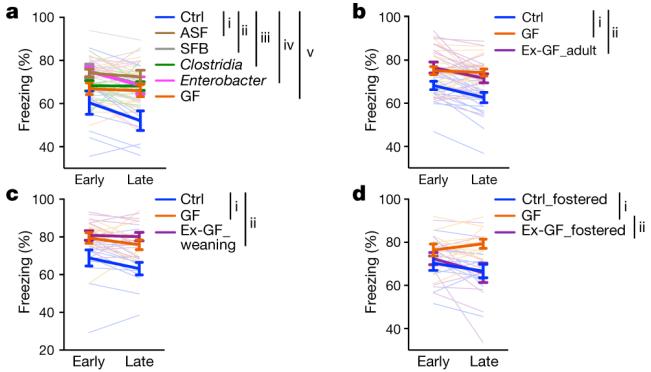

Figure 1: A: Germ-free mice and those colonized with a single strain exhibit a significant extinction learning deficit compared to control mice. **B-D:** Lack of a diverse microbiota in the neonatal period, even if microbially colonized after weaning, leads to lasting deficits in fear extinction learning in adult mice.

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