

# Patient-Engagement Informs Research Exploring Gut Microbiota and Social and Sensory Behaviors in Autism

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## Introduction

- Gastrointestinal symptoms are common amongst individuals with autism, suggesting a possible link between the disorder and gut microbiota<sup>1</sup>.
- Recent studies have provided evidence that gut microbiota have the capability of influencing the brain and behavior through multiple physiologic pathways<sup>1,2</sup>.
- **Purpose:** *Communicate theorized pathways between the gut and behavior, and the research being conducted to explore relationships among the gut microbiota and social and sensory behaviors in autism.*

## Driving Force

**Families with autism identified dietary concerns as an area of research meaningful to them.**

Families were engaged with researchers through a 3-year PCORI engagement project.

### What is PCORI?

- The Patient Centered Outcomes Research Institute (PCORI) is a non-profit, non-governmental organization designed to improve the quality of research evidence available for making informed health decisions<sup>3</sup>.
- PCORI focuses on addressing concerns most relevant to the patients by involving various stakeholders:
  - Families of individuals with ASD
  - University healthcare
  - ASD service providers
  - Researchers

### What topics were identified as important?

- Modified & restricted diets
- Modifying gut microbiota via probiotics
- GI symptomology
- Sensory symptomology
- Social functioning

## Bidirectional Gut and Brain Interactions

### Endocrine Pathways

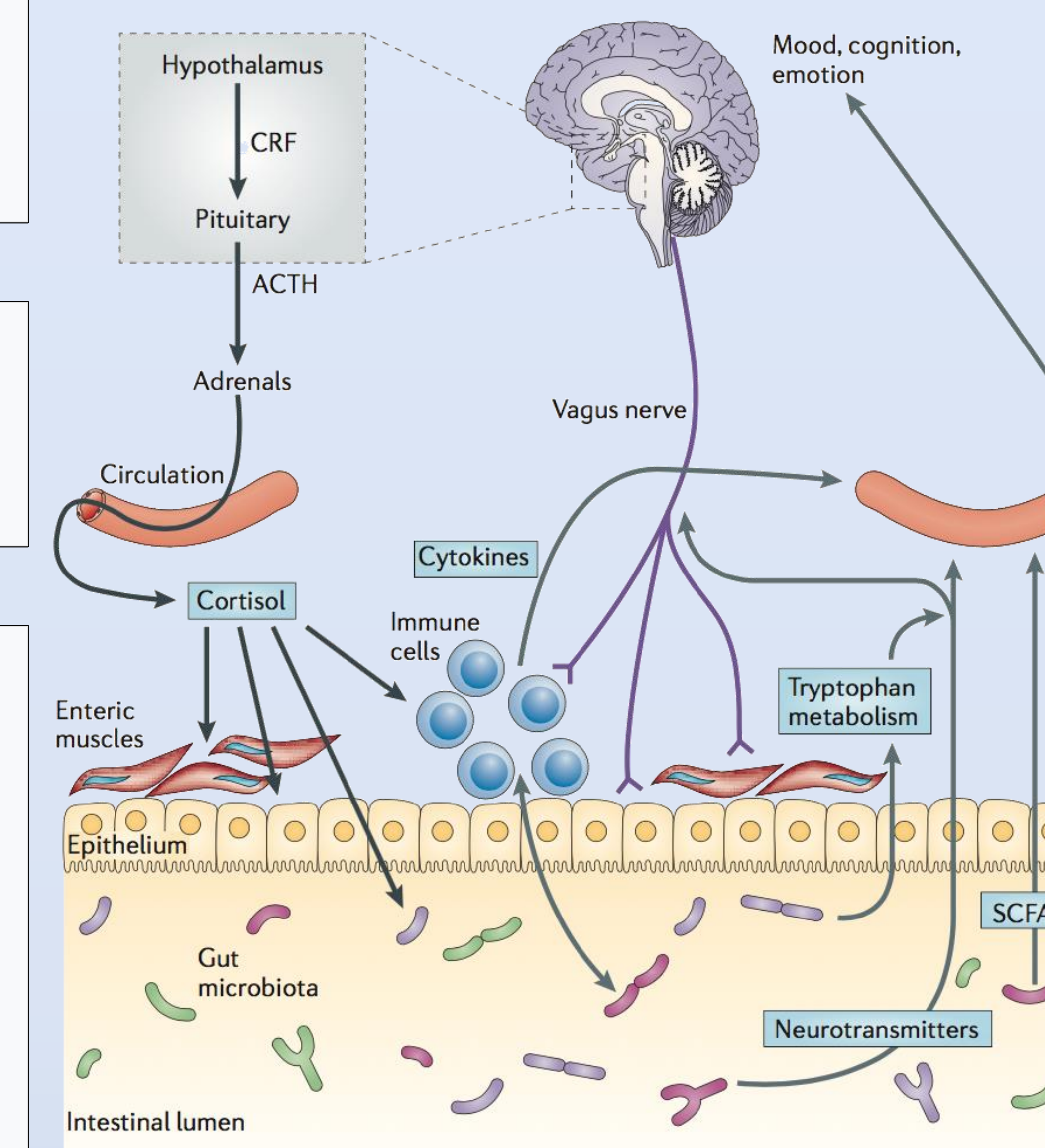
- The hypothalamus-pituitary-adrenal axis regulates cortisol secretion.
- Cortisol can alter gut permeability, change the gut microbiota composition, and affect immune cells.

### Immune Pathways

- Maintain homeostasis at the luminal surface.
- Microbiota and probiotics can affect circulating levels of cytokines which can affect brain function.

### Autonomic Nervous System (ANS) Pathways

- Vagus nerve contains afferent and efferent pathways vital to the multidirectional communication between the brain and gut.
- Enteric nervous system (governs the gastrointestinal tract)
  - Bacterial metabolites from dietary fibers (e.g., short chain fatty acids) can affect brain and behavior.
  - Tryptophan, a precursor for serotonin, is produced by the gut.
  - Other neurotransmitters (e.g., GABA, serotonin, dopamine, and acetylcholine) are produced and metabolized in the gut.



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## Behavioral Data Collection Tools

### Sensory Responsiveness Scale - 2<sup>nd</sup> Edition:

- 65-item rating scale measuring deficits in social behavior with ASD<sup>4</sup>.
- Results reported as T-scores for the treatment subscales: social awareness, social cognition, social communication, social motivation, restricted interests & repetitive behavior, and overall score

### Child Sensory Profile 2:

- 86-item scale measuring child's sensory processing abilities and its effect on functional performance in every day life
- Results reported as a standard deviators for sensory system, behavioral, and sensory pattern subscales.

### Questionnaire items inquiring as to presence of:

- Typical diet, typical bowel movements, GI pain symptoms

## Discussion

- Current research is being conducted on the concerns that arose from the PCORI group and the current literature on gut microbiota.
 

**Hypothesis:** *Gut microbiota is related to autism symptomology, specifically, social and sensory behaviors.*
- Occupational therapists can encourage the development of healthy daily habits and routines that can support gut health and may modify sensory and social behaviors.

## References

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