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The Gut Microbiome and Parkinson's Disease

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Microbiome

- Collection of microorganisms living in/on us: bacteria, viruses, fungi, archaea
- Bacterial cells outnumber human cells by 10:1 *
- Bacterial genes outnumber human genes by 1000:1
- Human microbiome project (2008 – 2013)
 - \$115M, 242 healthy adults, 5 body sites
 - Goals: characterize the microbiome and analyze its role in human health and disease

Microbiome Function

- produce certain vitamins that we do not have the genes to make
- break down our food to extract nutrients necessary for survival
- teach our immune systems how to recognize dangerous invaders
- produce helpful anti-inflammatory compounds
- bug on bug warfare; beneficial microbes fight off other disease-causing microbes

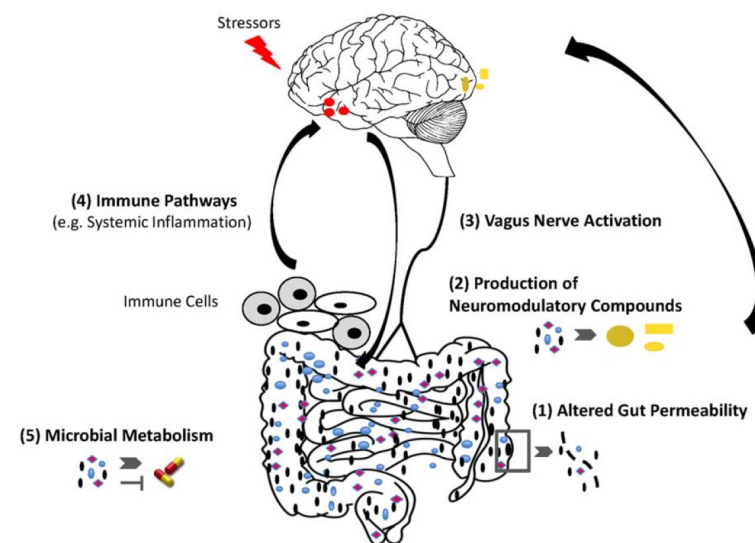


Microbiome and Disease

- Changes in gut microbiome composition is associated with **numerous** disease states
- Perturbations in gut microbiome is linked to
 - Risk for disease
 - Disease activity
 - Disease progression
 - Disease phenotype

The Gut and Parkinson's Disease

- 60-80% of PD patients experience GI symptoms years before motor symptoms start
- Alpha synuclein can be seen in the nervous system of the gut in early stages of disease
- When animals have alpha synuclein injected into the intestinal wall, it travels to the brain via the vagus nerve
- Vagotomy decreases the risk for developing PD



Tremlett et al., 2017

The Microbiome and Parkinson's Disease

- The microbiota **composition** of PD patients is different than non-PD patients
- The microbiota of PD patients **functions** differently, impacting human host physiology
 - Reduced synthesis of short chain fatty acids
 - Colonocytes, microglia cells
 - Increased production of inflammatory metabolites
 - Curli protein produced by e.coli induces aggregation of alpha synuclein → insoluble tangles that are toxic to neurons



Stanford Microbiome and PD Study

Who

1. People with PD

Ineligible if diagnosed with:
inflammatory bowel disease (IBD)
Currently being treated for cancer

2. People without PD

Ineligible if diagnosed with:
Alzheimer's disease
Parkinson's disease
Amyotrophic Lateral Sclerosis (ALS)
Frontotemporal dementia
Multiple Sclerosis
Inflammatory Bowel disease (IBD)
Currently being treated for cancer

What

- 1 visit for blood collection
- At home stool collection
- 20 question survey

Why

- This is the only study to include stool and blood
- You get \$40



To Learn More:

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Thank you!



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