The Gut Microbiome and Parkinson’s Disease

December 14, 2022

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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
- Vagotommy 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:

Please contact gzmg1@stanford.edu
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Thank you!

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