

Gastrointestinal Issues and Diet in Parkinson's Disease



Padma R. Mahant, MD

Movement Disorder Specialist, Foothills Neurology

Clinical Assistant Professor, Neurology, University of Arizona, Phoenix

Director, Medical Affairs, CND Life Sciences

Objectives

Understand common GI symptoms in PD

Learn about the Gut-Brain Axis in PD

Understand how GI issues can influence symptoms in PD

Diet & Practical strategies for GI issues in PD

GI symptoms in PD

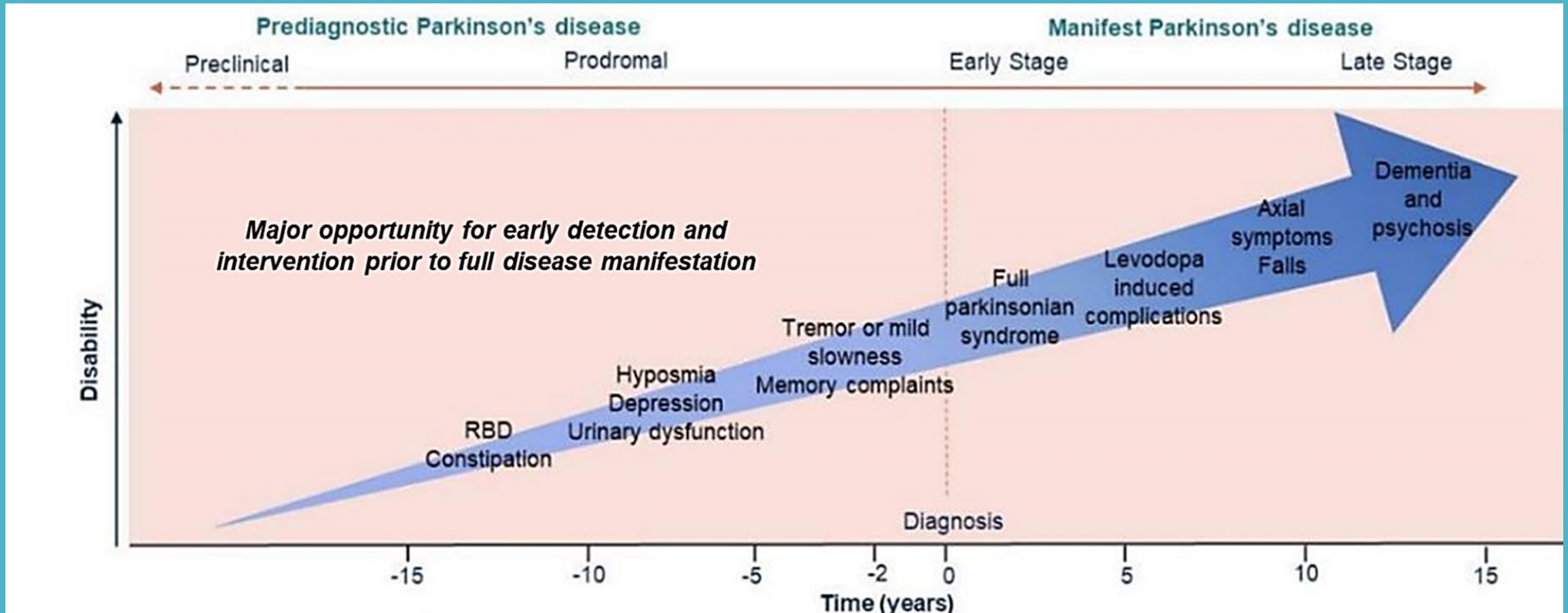
GI symptoms are common Non-Motor symptoms of PD

Motor symptoms of PD are the Tip of the Iceberg...



GI dysfunction: A Non-Motor and Prodromal Feature of PD

Symptoms May Start Years Before the Onset of Motor Symptoms



MAJOR GI SYMPTOMS IN PD



Drooling – reduced swallowing, not excess saliva.



Swallowing problems – risk of choking or aspiration.



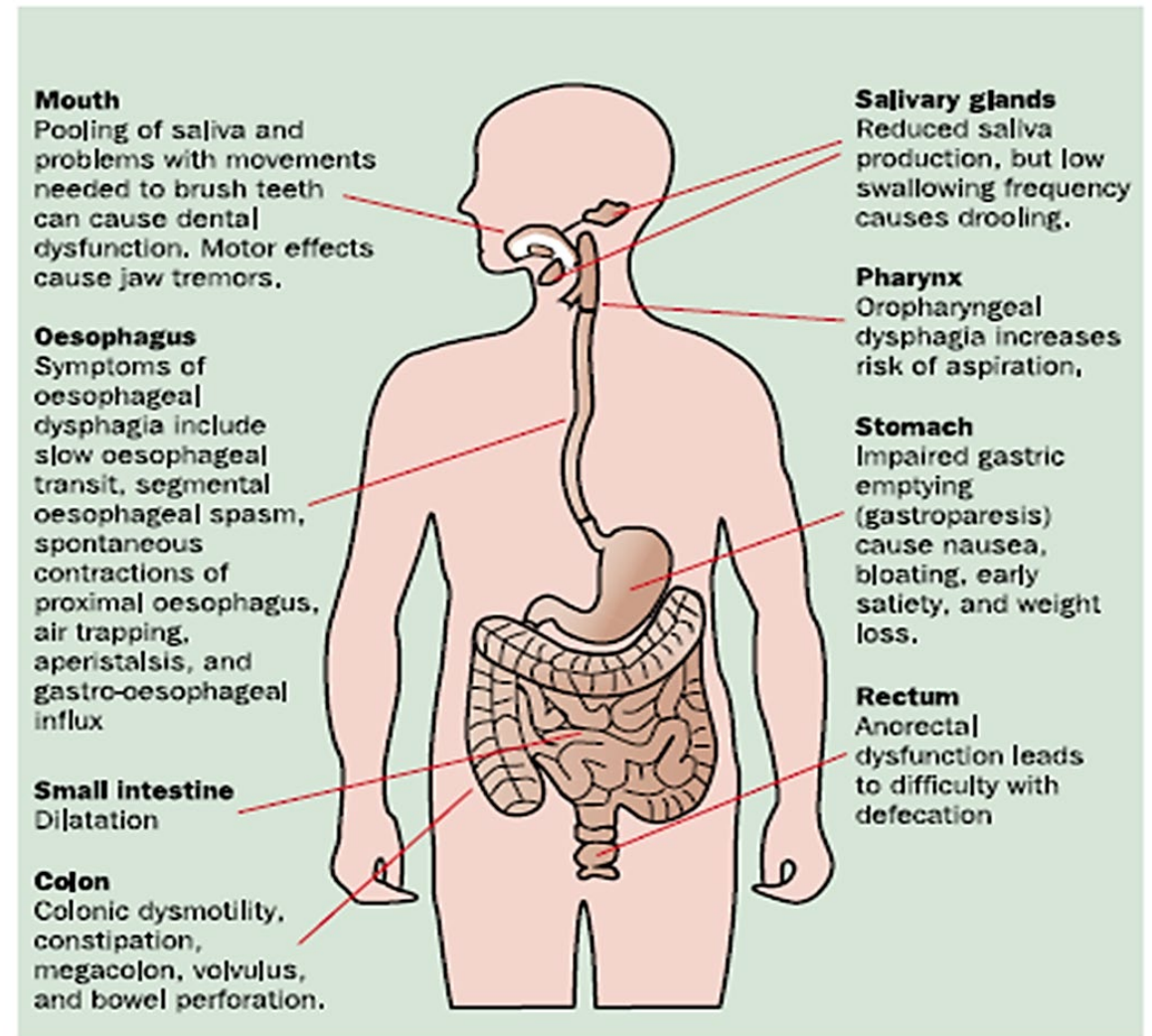
Gastroparesis – delayed emptying causes nausea, bloating.



Constipation – infrequent or hard stools.



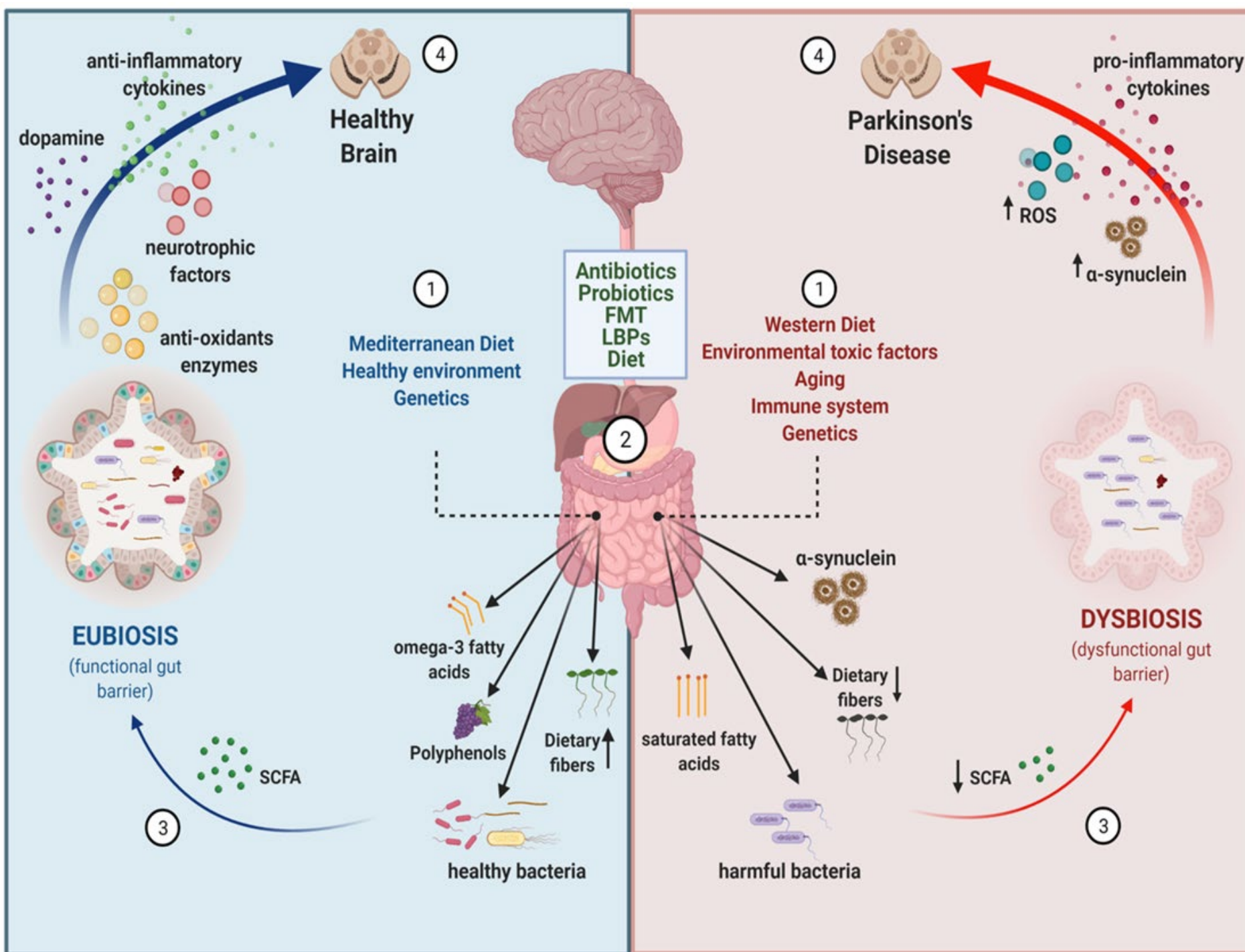
GI symptoms can affect medication effectiveness, comfort, nutrition, weight.



What is the Gut-Brain Axis in PD?

Why and How is the GI system involved in Parkinson's Disease?

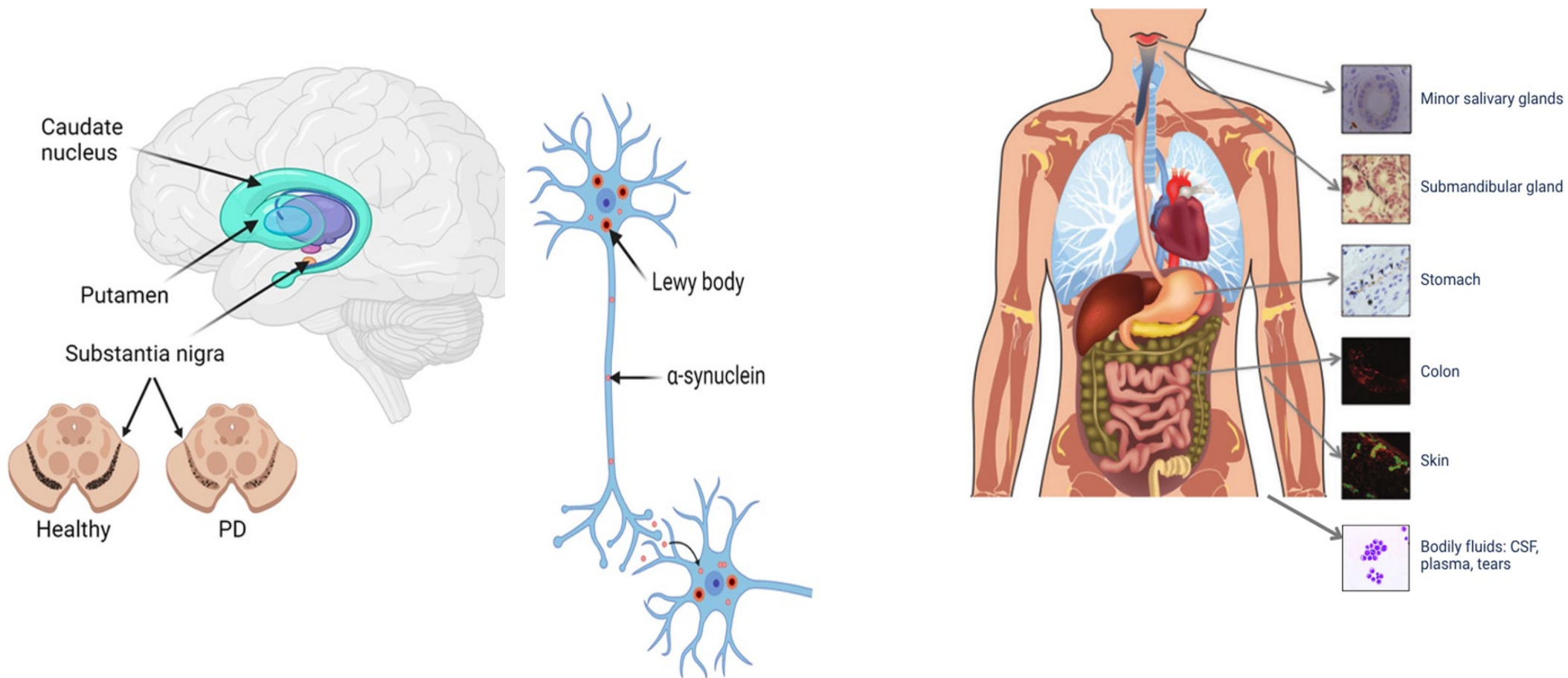
The Gut-Brain Axis in PD



Lorente-Picón et al. New Avenues for Parkinson's Disease Therapeutics: Disease-Modifying Strategies Based on the Gut Microbiota.

Biomolecules. 2021; 11(3):433.
<https://doi.org/10.3390/biom11030433>

Synuclein Deposition and Neurodegeneration is Widespread in the Brain and Beyond



Alpha-Synuclein in the Colon

FEATURED ARTICLE

Is Alpha-Synuclein in the Colon a Biomarker for Premotor Parkinson's Disease? Evidence from 3 Cases

Kathleen M. Shannon, MD,^{1*} Ali Keshavarzian, MD,² Hemraj B. Dodiya, MS,³ Shriram Jakate, MD,⁴ and Jeffrey H. Kordower, PhD³

¹Department of Neurological Sciences, Rush Medical College, Chicago, Illinois, USA

²Department of Gastroenterology and Nutrition, Rush Medical College, Chicago, Illinois, USA

³Department of Center for Brain Repair, Rush Medical College, Chicago, Illinois, USA

⁴Department of Pathology, Rush Medical College, Chicago, Illinois, USA

ABSTRACT: Background: Despite clinicopathological evidence that Parkinson's disease (PD) may begin in peripheral tissues, identification of premotor Parkinson's disease is not yet possible. Alpha-synuclein aggregation underlies Parkinson's disease pathology, and its presence in peripheral tissues may be a reliable disease biomarker.

Objective: We sought evidence of alpha-synuclein pathology in colonic tissues before the development of characteristic Parkinson's disease motor symptoms.

Methods: Old colon biopsy samples were available for three subjects with PD. Biopsies were obtained 2-5 years before PD onset. We performed immunohistochemistry studies for the presence of alpha-synuclein and Substance P in these samples.

Results: All subjects showed immunostaining for alpha-synuclein (two, five and two years before first motor Parkinson's disease symptom). No similar alpha-synuclein immunostaining was seen in 23 healthy controls. Staining of samples for substance P suggested colocalization of alpha-synuclein and substance P in perikarya and neurites.

Conclusions: This is the first demonstration of alpha-synuclein in colon tissue prior to onset of PD. Additional study is required to determine whether colonic mucosal biopsy may be a biomarker of premotor PD. © 2012 Movement Disorder Society

Key Words: Parkinson's disease; alpha-synuclein; biomarker; colon; substance P

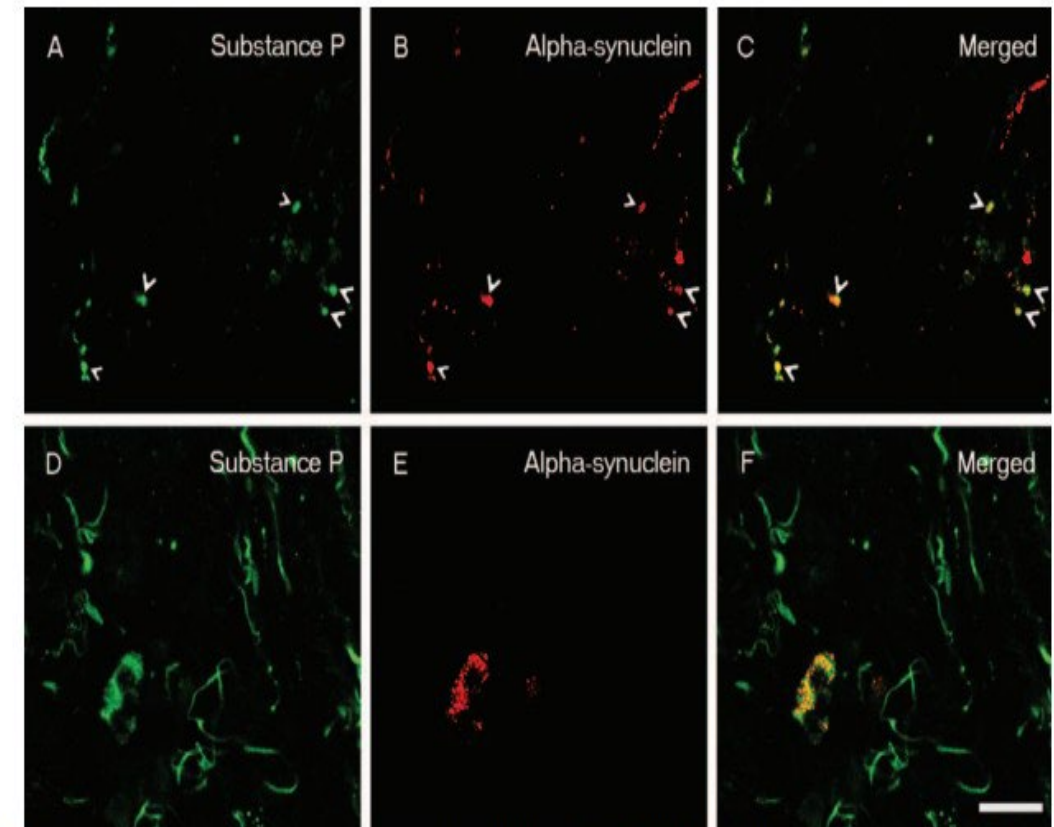
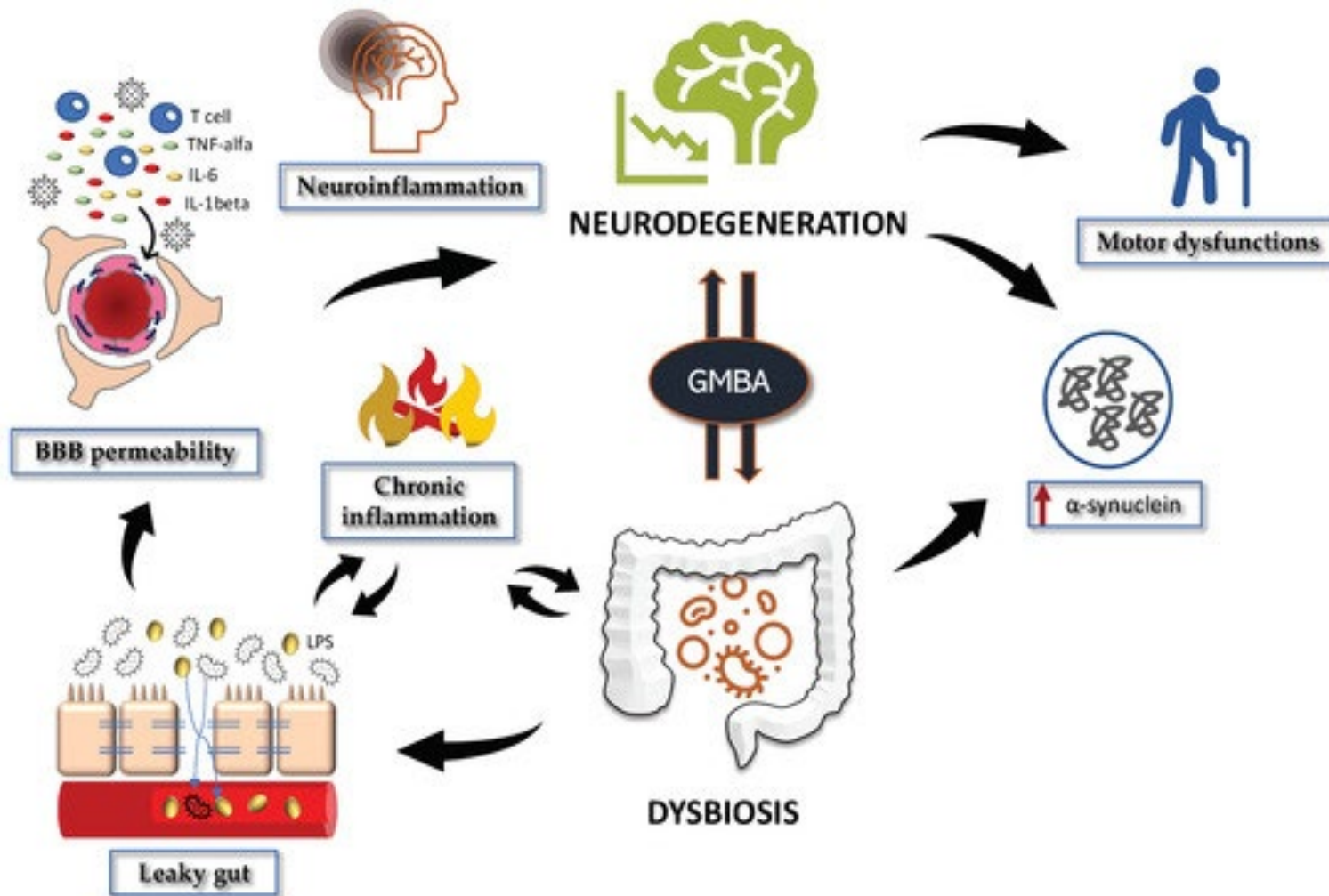


FIG. 2. Photomicrographs show fluorescence images for substance P (A and D) and α -SYN (B and E) staining. For cases 2 (A-C) and 3 (D-F). Note in the merged panels (C and F), the yellow color represents the colocalization of substance P-positive fibers and puncta (arrow heads) and perikaryon (arrow) with α -SYN. Scale bar in (F) represents 20 μ m and applies to all panels (A-F).

Gut Microbiome Axis (GMBA) in PD



PD patients may have different gut bacteria composition compared to healthy individuals

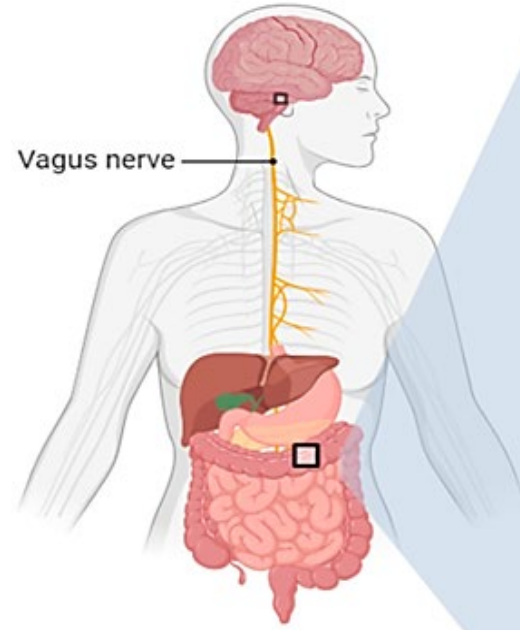
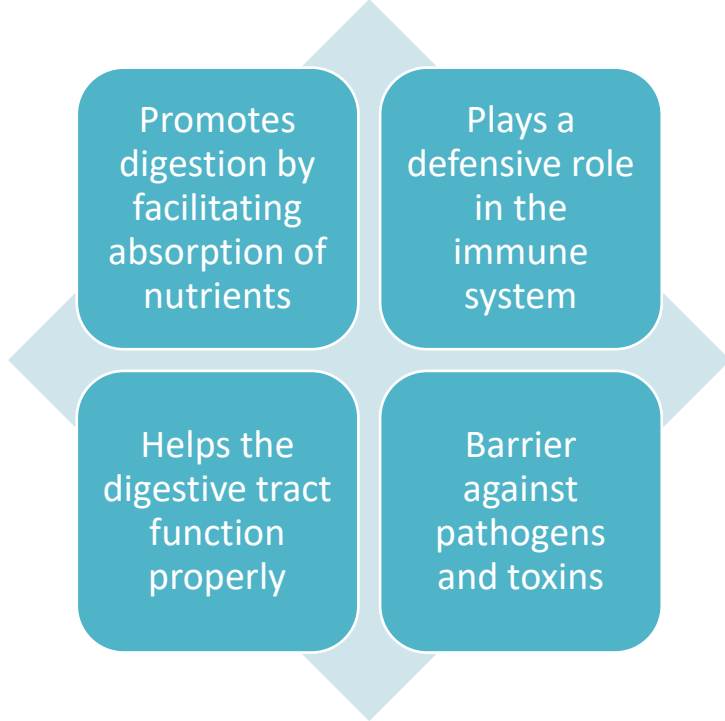
Reduced diversity
Fewer anti-inflammatory bacteria

Increased pro-inflammatory bacteria
Opportunistic bacteria

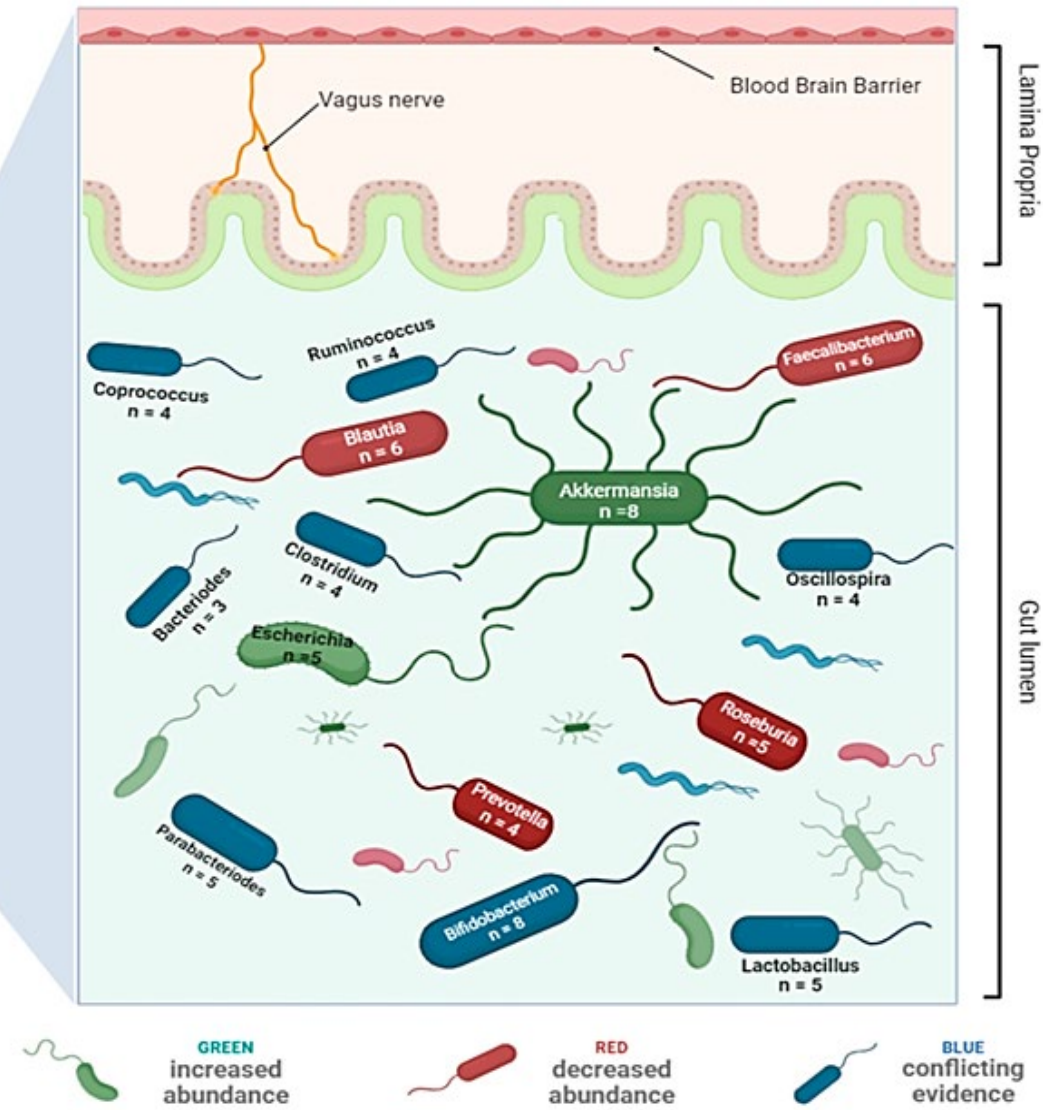
Gut inflammation
Oxidative stress
Hyperpermeability "leaky gut"

**Protein aggregation
and neuronal damage**

Gut microbiome



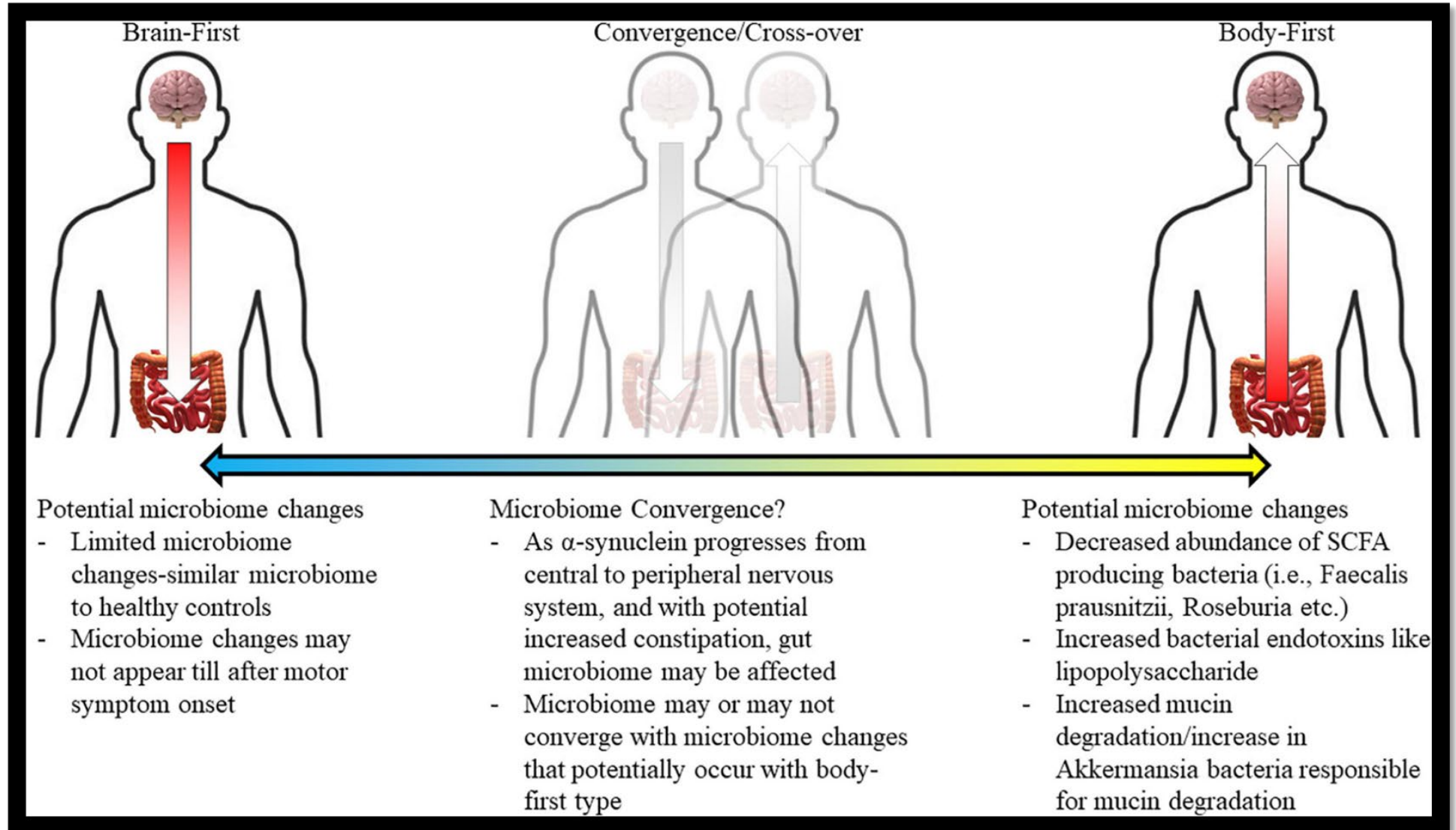
Microbial signatures of Parkinson's Disease



<https://www.genome.gov/genetics-glossary/Microbiome>

Kerstens R, Joyce P. The Gut Microbiome as a Catalyst and Emerging Therapeutic Target for Parkinson's Disease: A Comprehensive Update. Biomedicines. 2024; 12(8):1738. <https://doi.org/10.3390/biomedicines12081738>

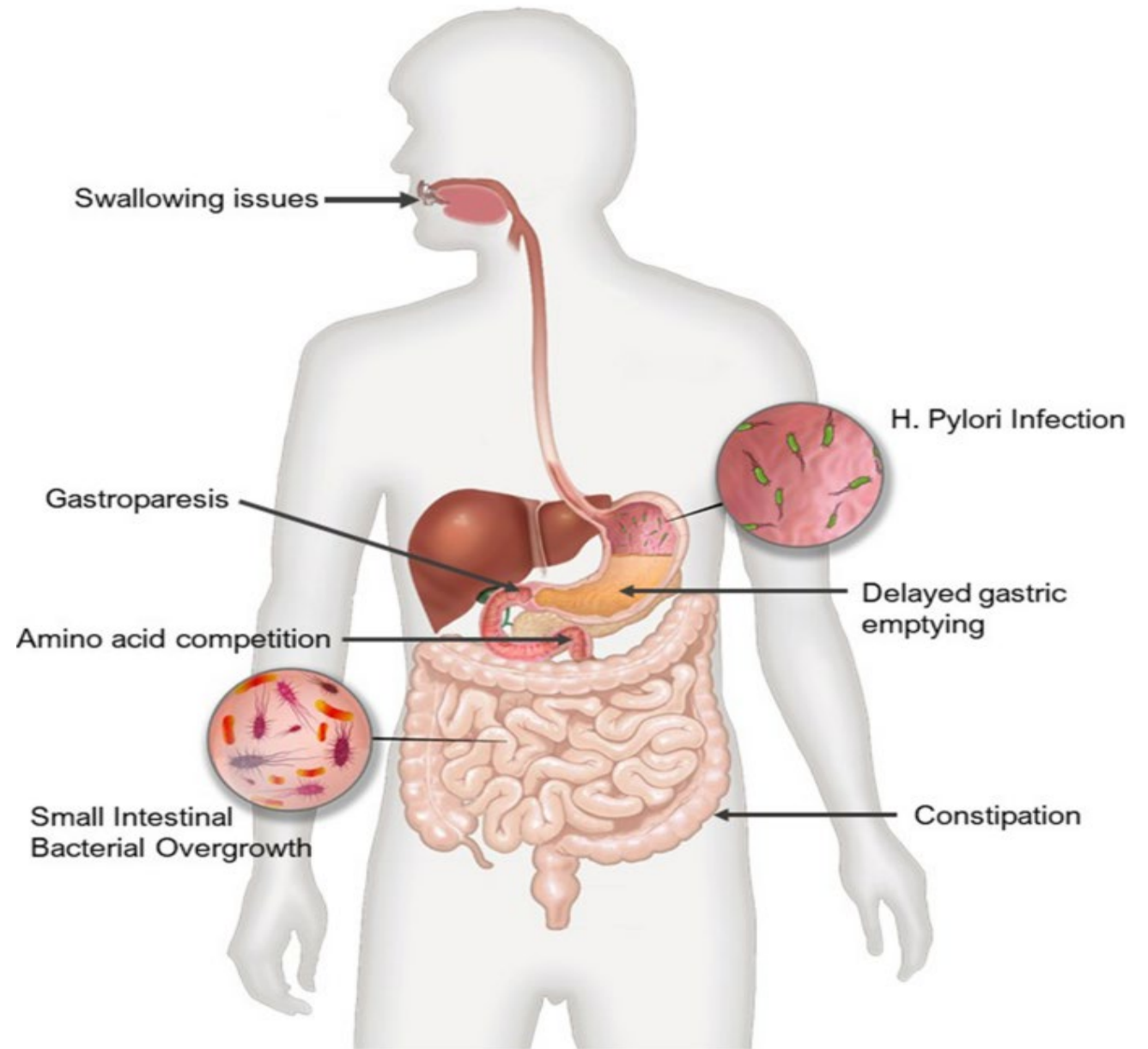
Brain-First vs. Body-First



How does the GI tract influence PD symptoms?

What are some specific syndromes to be aware of?

Medication Absorption and Efficacy Implications



Urso, D., *et al.* Improving the Delivery of Levodopa in Parkinson's Disease: A Review of Approved and Emerging Therapies. *CNS Drugs* 34, 1149–1163 (2020). <https://doi.org/10.1007/s40263-020-00769-7>

Small Intestinal Bacterial Overgrowth (SIBO)

Hydrogen SIBO

Overproduction of hydrogen gas

Bloating, pain, diarrhea, gas and belching, malabsorption

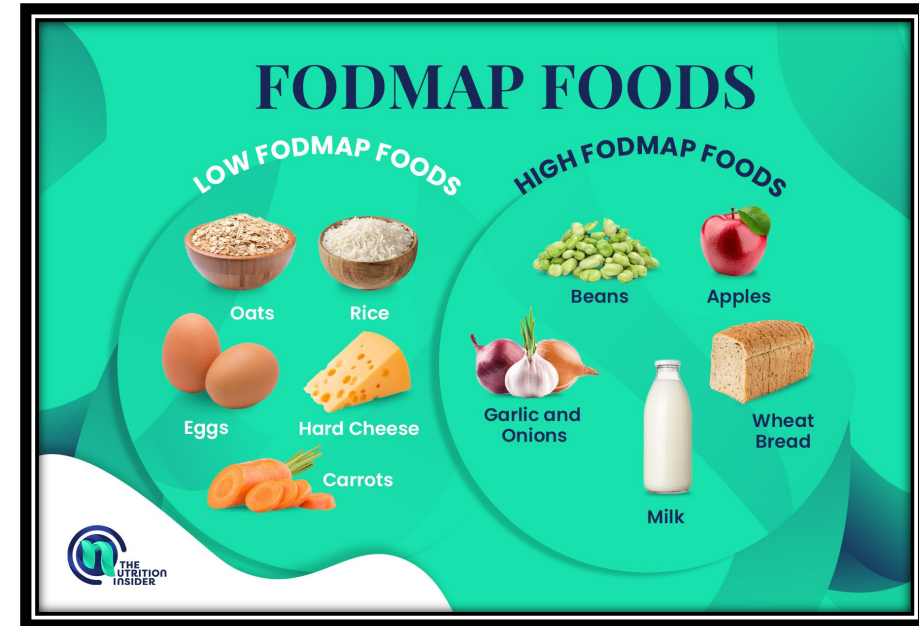
Treatment:
Rifaximin and Diet:
Low-FODMAP

Methane SIBO

Overproduction of methane gas

Constipation, bloating, hard stools, incomplete evacuation

Treatment:
Rifaximin, Neomycin
and Address
Motility issues



<https://thenutritioninsider.com/learn/low-fodmap-meal-plan/>

- Excessive bacteria leads to fermentation of food, digestive symptoms, nutrient malabsorption
- Clinical assessment of GI symptoms
- Hydrogen/methane breath testing
- Treatment may include low-FODMAP Diet (*Fermentable Oligosaccharides, Disaccharides, Monosaccharides and Polyols*)
 - Reduced dietary intake of carbohydrates poorly absorbed in small intestine)

H. Pylori Infection

Symptoms

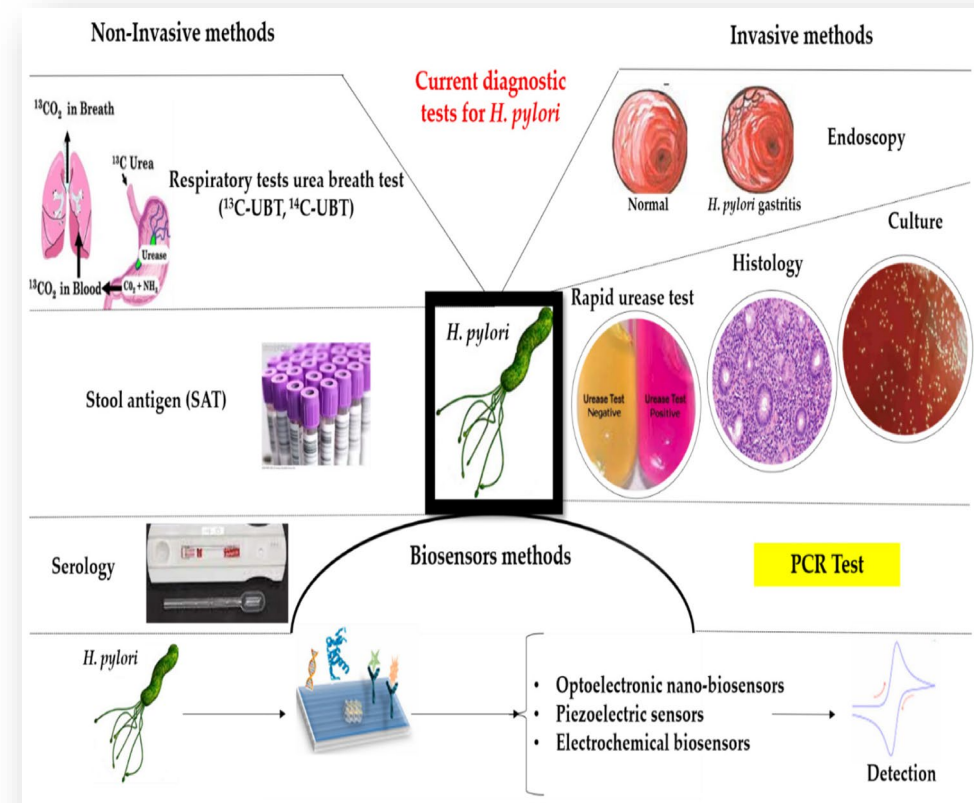
- Dull or burning stomach pain
- Nausea or vomiting
- Bloating
- Feeling full quickly
- Loss of appetite
- Frequent burping
- Increased motor fluctuations

Diagnosis

- **Urea breath test-** Urea solution is swallowed, machine measures gas released from breath sample after bacteria break down urea
- **Stool antigen test-** Checks for H. pylori antigen
- **Upper endoscopy-** Assess for ulcers, tissue samples from gastric mucosa

Treatment

- **Antibiotics:** At least two different antibiotics: (e.g. *amoxicillin*, *clarithromycin*, *metronidazole*)
- **Proton pump inhibitors (PPIs):** (e.g. *omeprazole*, *lansoprazole*, and *pantoprazole*)
- **Antibiotic resistance:** 14 day bismuth quadruple therapy



Cardos AI, Maghiar A, Zaha DC, Pop O, Fritea L, Miere F, Cavalu S. Evolution of Diagnostic Methods for *Helicobacter pylori* Infections: From Traditional Tests to High Technology, Advanced Sensitivity and Discrimination Tools. *Diagnostics*. 2022; 12(2):508.

Practical Strategies

Consult your physician for
specific recommendations
pertinent to your care

Dietary Considerations

Mediterranean Diet

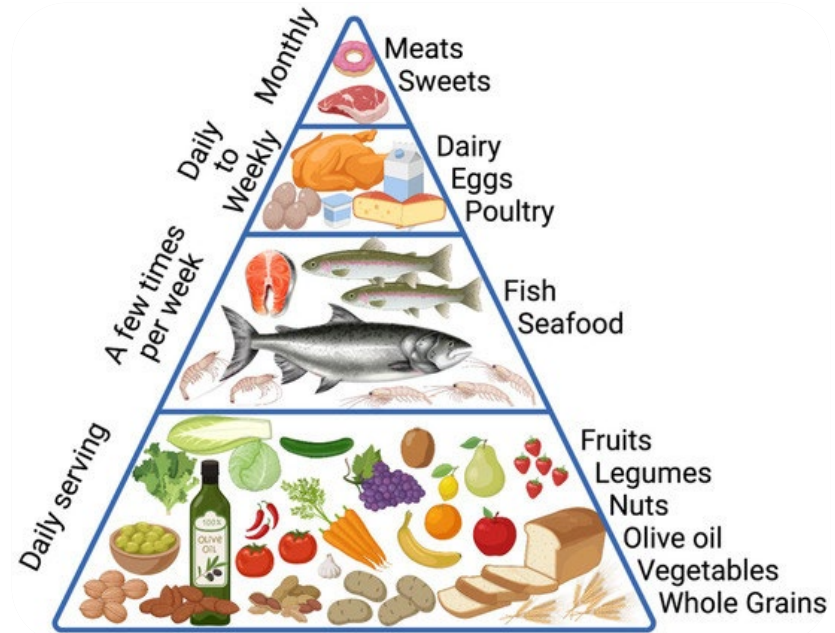
- Wide Variety of Fruits, Vegetables, Whole Grains, Legumes, Nuts and Seeds
- Olive Oil in place of unhealthy fats
- Moderate Fish and Seafood
- Less Poultry, Dairy
- Limited: Meats, added sugars; processed, fast, or fried foods

MIND Diet

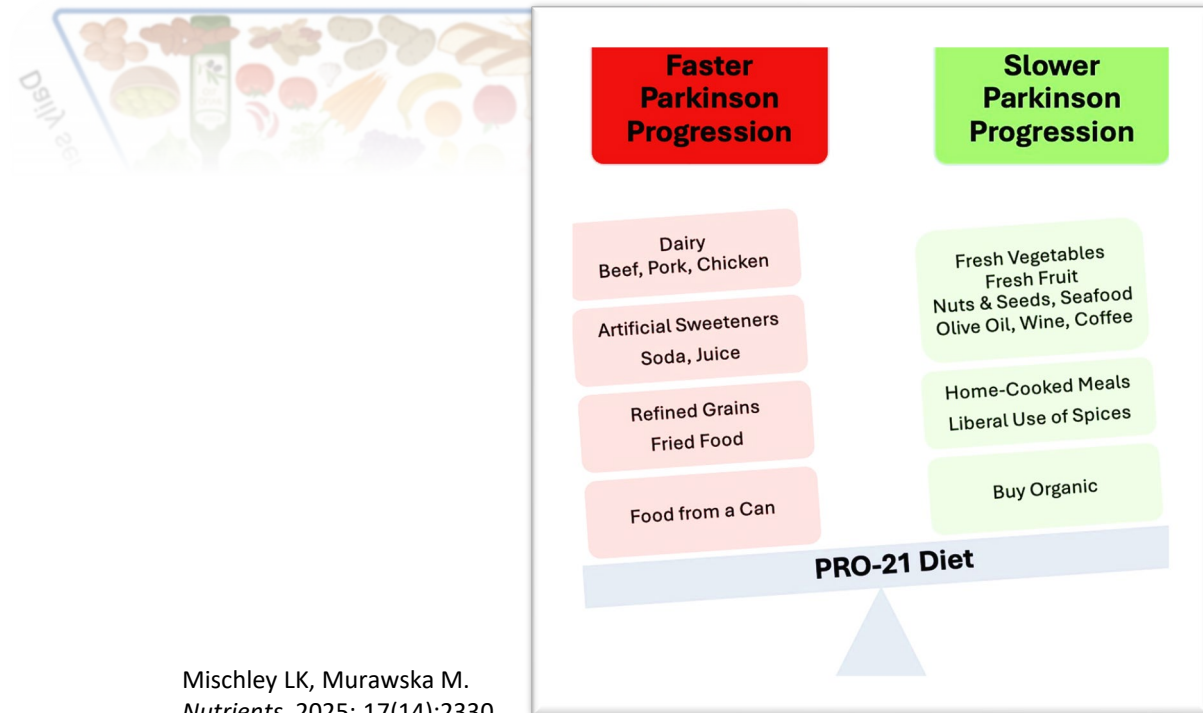
- Combination of Mediterranean and DASH diets
- Focus: Leafy greens, berries, low salt
- Limited: Red meat, butter, cheese

PRO-21

- Combination of above
- Focus: Plant-based, organic, home cooking, spices
- Limited: Dairy, artificial sweeteners, sodas, fried & canned food



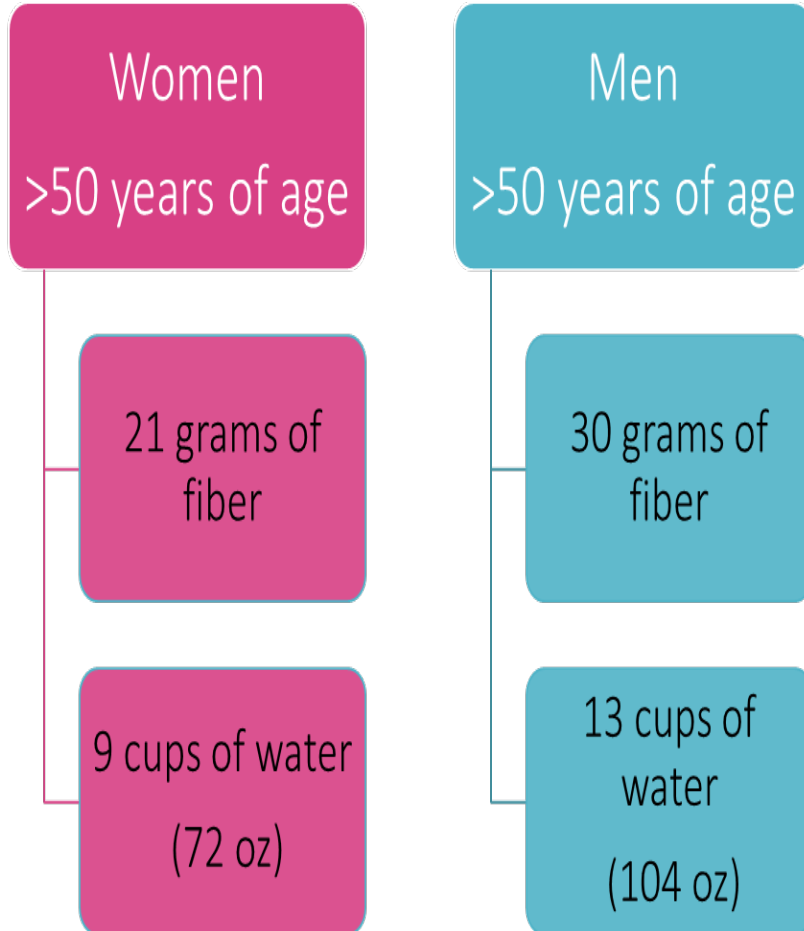
Bisaglia M. International Journal of Molecular Sciences. 2023; 24(1):42.



Mischley LK, Murawska M. *Nutrients*. 2025; 17(14):2330

Fiber and Water!

90% of Americans do not consume enough water or fiber



<https://hydropal.org/>



<https://www.news-medical.net/health/Sources-of-Dietary-Fiber.aspx>

Recommendations from the National Academy of Medicine and the National Council on Aging:
<https://nap.nationalacademies.org/read/11537/chapter/11>
<https://www.ncoa.org/article/how-to-stay-hydrated-for-better-health/>

PROBIOTICS

PREBIOTICS

What are they?

Live, beneficial microorganisms
e.g. Lactobacillus, Bifidobacterium

Non-digestible dietary fibers

What do they do?

Improve levels of good bacteria to help balance gut flora

Act as a food source to increase levels of beneficial bacteria. Produce SCFA's

Food Sources

Yogurt, kefir, sauerkraut, kimchi, miso, tempeh, kombucha

Asparagus, garlic, onions, bananas, oats, beans/lentils, nuts/seeds, high quality chocolate

Role in PD

Improve constipation; anti-inflammatory and neuroprotective effects


Improve constipation and gut barrier integrity; anti-inflammatory benefits

Medication Strategies

Take levodopa 30–60 minutes before a meal or 1.5-2 hours after large meals.

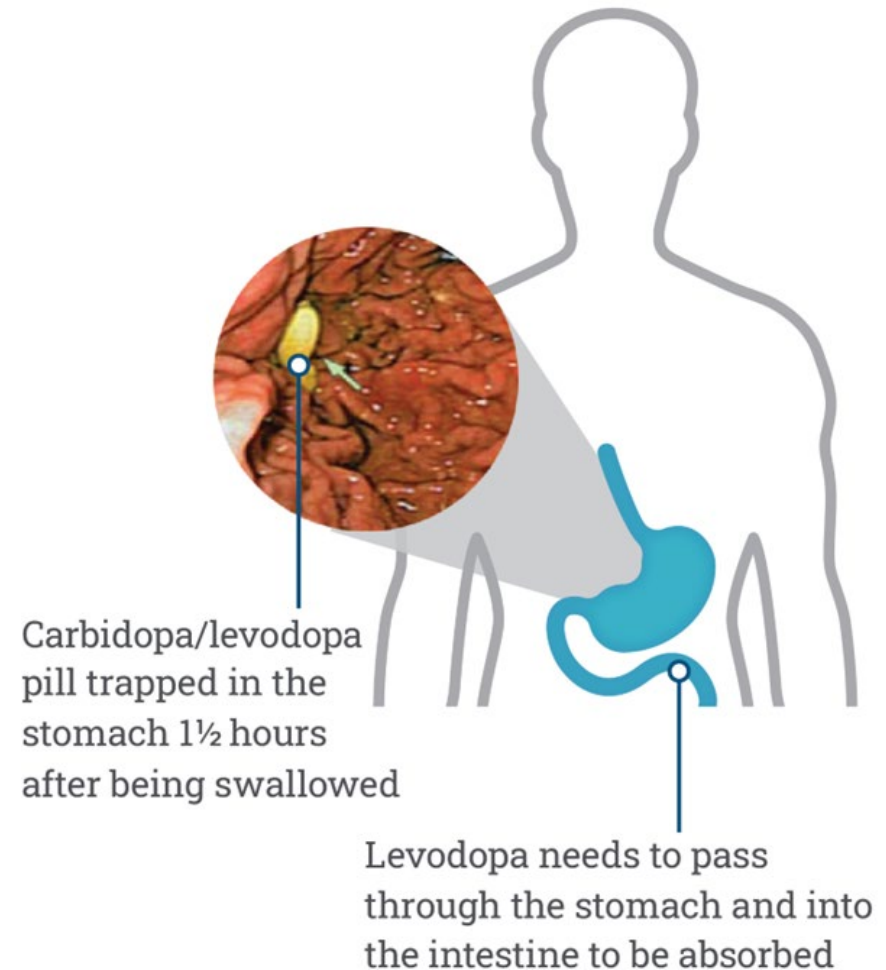
Avoid high protein, high fat foods along with levodopa.

Nausea, Loss of Appetite, and Early Satiety

- **Gastroparesis**
 - small, frequent low-fat meals
 - remain upright 2h after meals
- **Intolerance to PD medications**
 - supplemental carbidopa
 - switch from IR to ER
 - Selective 5-HT3 antagonists (e.g. ondansetron)
 - Consideration of therapies that bypass the GI tract
- **Red flags** 

GI bleeding, swallow difficulty, weight loss, family history of cancer, anemia, persistent symptoms

 - GI consultation is recommended for endoscopy and further workup



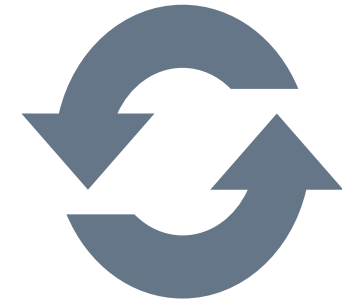
Nutrition & Weight Maintenance



Eat small nutrient-dense meals.



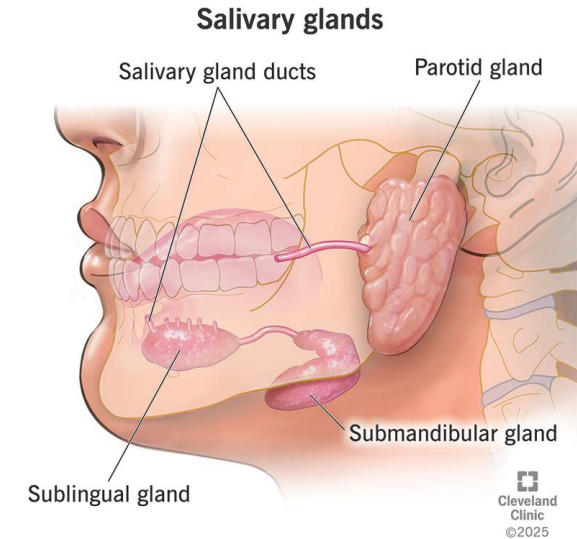
Consider calorie-dense drinks if appetite low.



Work with dietitian for ongoing support.

Excessive Saliva

- Optimize dopaminergic medications
- Sugar-free candy or gum
- Speech therapy to improve oral motor control
- Consider additional treatment if quality of life is impaired
- Sublingual or oral anticholinergics
 - Atropine, ipratropium
 - Glycopyrrolate, amantadine
- Botulinum toxin injections into salivary glands (every 3-4 months)



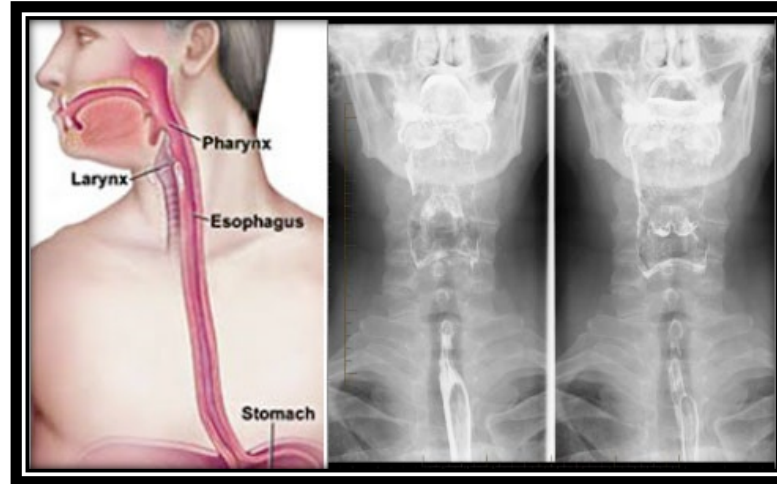
<https://my.clevelandclinic.org/health/body/23462-salivary-glands>



<https://pn.bmj.com/content/17/2/96>

Swallowing Difficulty

- Risk factor for:
 - Aspiration pneumonia
 - Malnutrition
 - Hospitalization
- Dietary modifications
- Optimize dopaminergic medications
- Swallow therapy referral for oropharyngeal dysphagia
- Modified Barium swallow
- Gastroenterology consultation for esophageal dysphagia
 - Barium esophagogram or Upper endoscopy



<https://journeywithparkinsons.com/2016/05/19/post-1-journey-to-parkinsons-and-barium-swallow/>

Speech Therapy For Parkinson's Disease

01 SWALLOWING DISORDERS IN PD
Dysphagia is very common in PD. Evidence-based treatments include: oral care, compensatory strategies, swallowing exercises, intensive voice treatments, RMST, and more. It's best to do an instrumental assessment first.

02 COGNITIVE DEFICITS IN PD
Most people with PD will develop cognitive deficits. Treat mild cognitive impairment with cognitive rehab. Treat dementia with spaced retrieval, compensations, group therapy, etc.

03 DYSARTHRIA IN PD
Patients with PD often present with hypokinetic dysarthria. Treat the affected subsystem (phonation, articulation, respiration, resonance, and/or prosody).

04 VOICE DISORDERS IN PD
Evidence-based voice treatment options for PD include SPEAK OUT!, LSVT LOUD, AAC, environmental modifications, and respiratory training.

05 DROOLING IN PD
Know what's causing the drooling. Treatment options include: cueing, upright/head neutral posture, PT referral, lip strengthening if weak, chew gum!

adultspeechtherapy.co

<https://theadultspeechtherapyworkbook.com/speech-therapy-for-parkinsons-disease/>

Managing Constipation



1

Increase fluids and dietary fiber gradually.

Optimize dopaminergics.

2

Stay active and establish toilet routine.

3

OTC agents:
polyethylene glycol, (Miralax®) stool softeners (Colace®), laxatives (senna tea®), magnesium

4

Prokinetics:
lubiprostone (Amitiza®) linaclotide (Linzess®). prucalopride (Motegrity®)

5

Abdominal massage, acupuncture, Botulinum toxin (puborectalis m.)

Practical Daily Checklist

Track

- Track bowel movements and swallowing changes.

Keep

- Keep a medication diary.

Use

- Diet / lifestyle modifications for gut health.

Report

- Report sudden changes to your care team.



When to Contact Your Care Team



New swallowing problems or coughing during meals.

Severe constipation or sudden bowel changes.

Unexplained weight loss or appetite changes.

Medication no longer working as expected.

Bypassing the GI Tract: Medication Strategies



Transdermal Approaches

Rotigotine patch
(Neupro®)

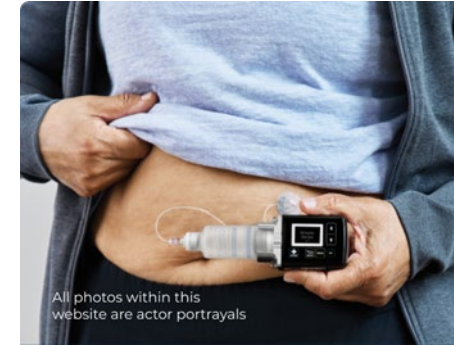
Inhaled Therapies

Levodopa inhalation
(Inbrija®)



Intrajejunal Delivery

Duopa®



Subcutaneous Therapies

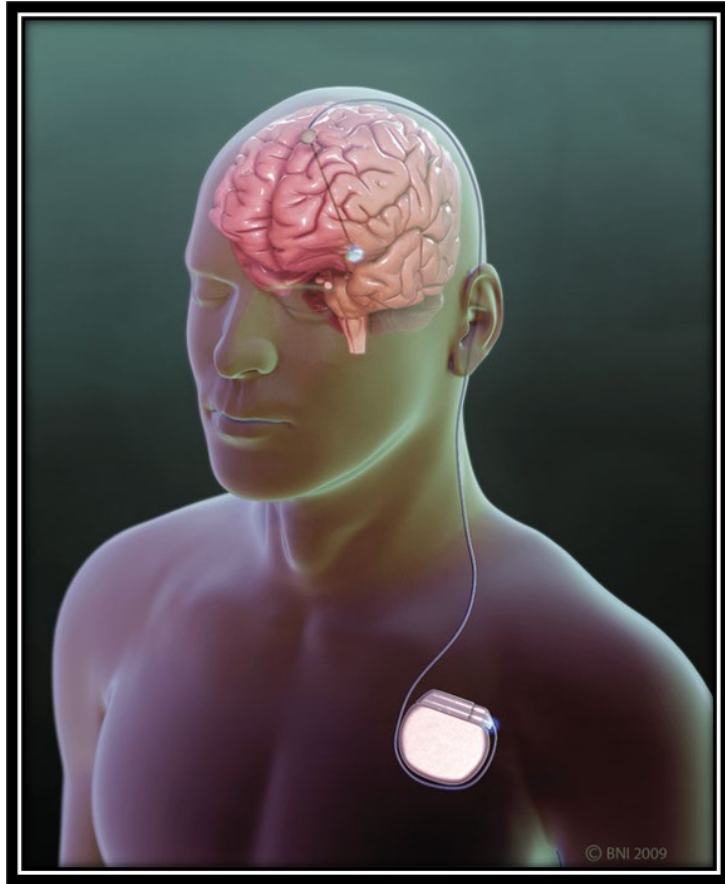
Apomorphine (Apokyn®, Onapgo®)



Foscarbidopa/foslevodopa
(Vyalev®)



Bypassing the GI Tract: Deep Brain Stimulation and Focused Ultrasound



<https://my.clevelandclinic.org/health/treatments/16541-hifu-high-intensity-focused-ultrasound>

<https://www.barrowneuro.org/treatment/deep-brain-stimulation-dbs/>

Current Research & What's Ahead

Currently, most
treatments for
GI issues are
symptomatic

Studies are underway:

gut-brain axis gut microbiome
alpha-synuclein biopsies of the GI tract

Future Directions include:

Microbiome-targeted therapies: pre- and probiotics,
fecal microbiota transplants, antibiotics

Disease-Modifying Treatments to slow underlying
degenerative process

Resources & Support



Thank you, Dave Koch, PT and
PD Care Connection!

Gastrointestinal Issues and Diet in Parkinson's Disease

Padma R. Mahant, MD

REFERENCES:

- Safarpour D, et al. Consensus practice recommendations for management of gastrointestinal dysfunction in Parkinson disease. *Parkinsonism Relat Disord.* 2024;124:106982.
- Knight, E., et al. (2022). The Role of Diet and Dietary Patterns in Parkinson's Disease. *Nutrients*, 14(21), 4472.
- Nuzum ND, et al. To the Gut Microbiome and Beyond: The Brain-First or Body-First Hypothesis in Parkinson's Disease. *Front Microbiol.* 2022 Mar 30;13:791213. doi: 10.3389/fmicb.2022.791213.
- Varesi A, et al. The Interplay between Gut Microbiota and Parkinson's Disease: Implications on Diagnosis and Treatment. *International Journal of Molecular Sciences.* 2022; 23(20):12289.
- Shandilya S, et al J. Interplay of gut microbiota and oxidative stress: Perspective on neurodegeneration and neuroprotection. *J Adv Res.* 2021 Sep 17;38:223-244. doi: 10.1016/j.jare.2021.09.005
- Justich MB, et al. The Role of Helicobacter pylori and Small Intestinal Bacterial Overgrowth in Parkinson's Disease. *Semin Neurol.* 2023;43(4):553-561. doi:10.1055/s-0043-1771468
- Shin C, et al. Diagnostic accuracy and predictors of alpha-synuclein accumulation in the gastrointestinal tract of Parkinson's disease. *NPJ Parkinsons Dis.* 2024;10(1):155. Published 2024 Aug 15.

