

Nutrition and Parkinson's Disease: What's the connection?



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PARKINSON FOUNDATION
OF THE NATIONAL CAPITAL AREA

Outline

- Gut Microbiome
- Bottom Up Hypothesis
- Healthy and unhealthy food choices
- PD Medications and diet

Disclaimer

This presentation is educational only.

Information is not intended to be applied to specific individuals or patients.

Consult with your physician or nutritionist/dietician to make any changes in your diet and/or medication management

Memorable quotes

“Let food be thy medicine and let medicine be thy food”

Hippocrates

“We are what we eat”

Ludwig Feuerbach

100 trillion of our closest friends

10x more than all cells in our body

“Second human genome”

Direct influence of hormones,
immune system, levels of
neurotransmitters



Astounding Facts

Obese people have different mix of microbes than those with healthy weight

People in Industrialized countries have less diverse mix of bacteria

Herbicides and pesticides also kill “our pests” and are linked to disease, especially Parkinson’s

Our microbiome weighs almost 5 pounds

Fecal transplant can cure (or cause) disease by rebalancing GI microbiome

Certain bacteria produce chemicals that can promote arterial plaques or promote feelings of satiety

Serotonin that is low in depression is largely produced in the gut

Changing your palate

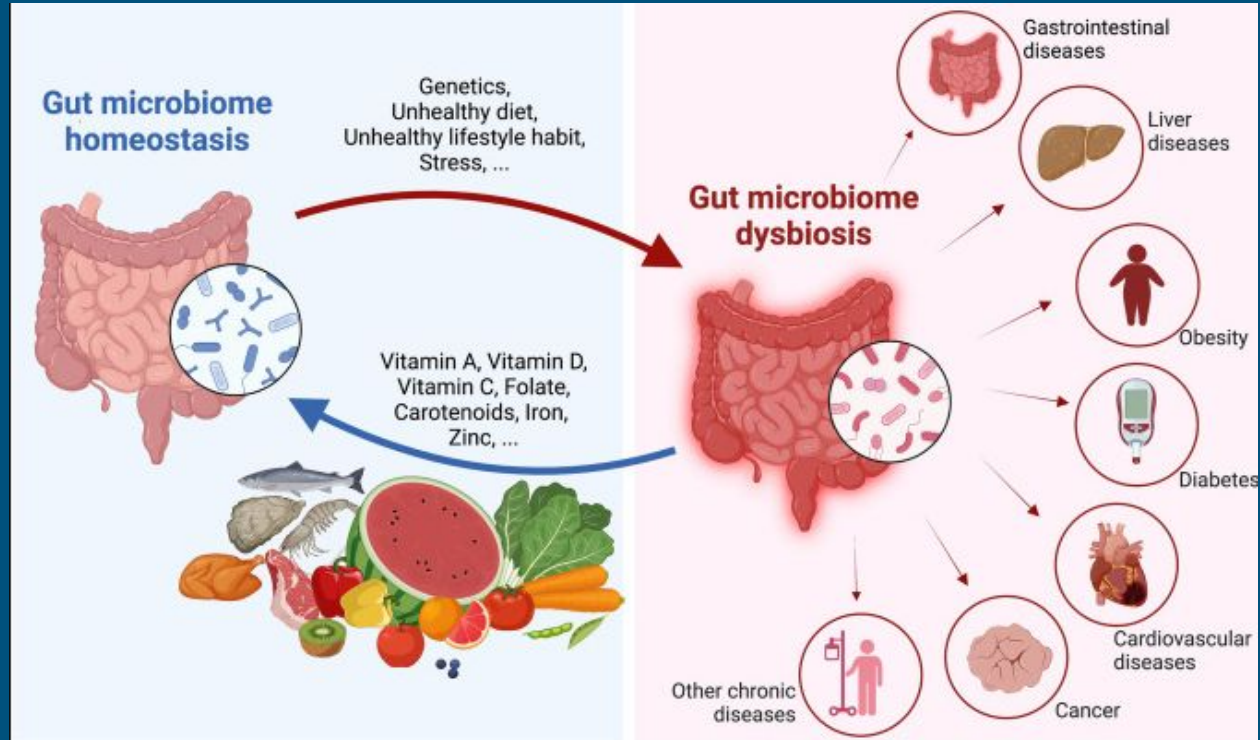
Food ingestion changes the composition of our gut bacteria

Meats, cheeses, dairy, processed sugars= pro inflammatory bacteria that promotes “leaky gut”

Vegetables, legumes, nuts, fiber= anti-inflammatory bacteria that strengthen the gut barrier to reduce infiltration of toxic substances

A plate of fresh leafy greens without dressing may be more appetizing if you eat it more!

What we ingest is their fuel



Enteric Nervous System

Largest collection of nerves
anywhere in the body

Highway between the brain and the
gut

Vagus nerve is main connection

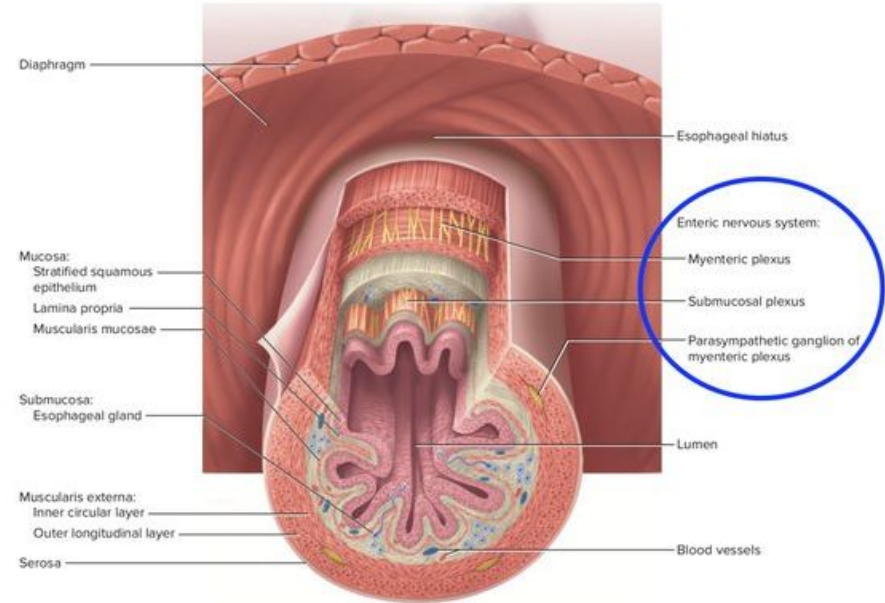
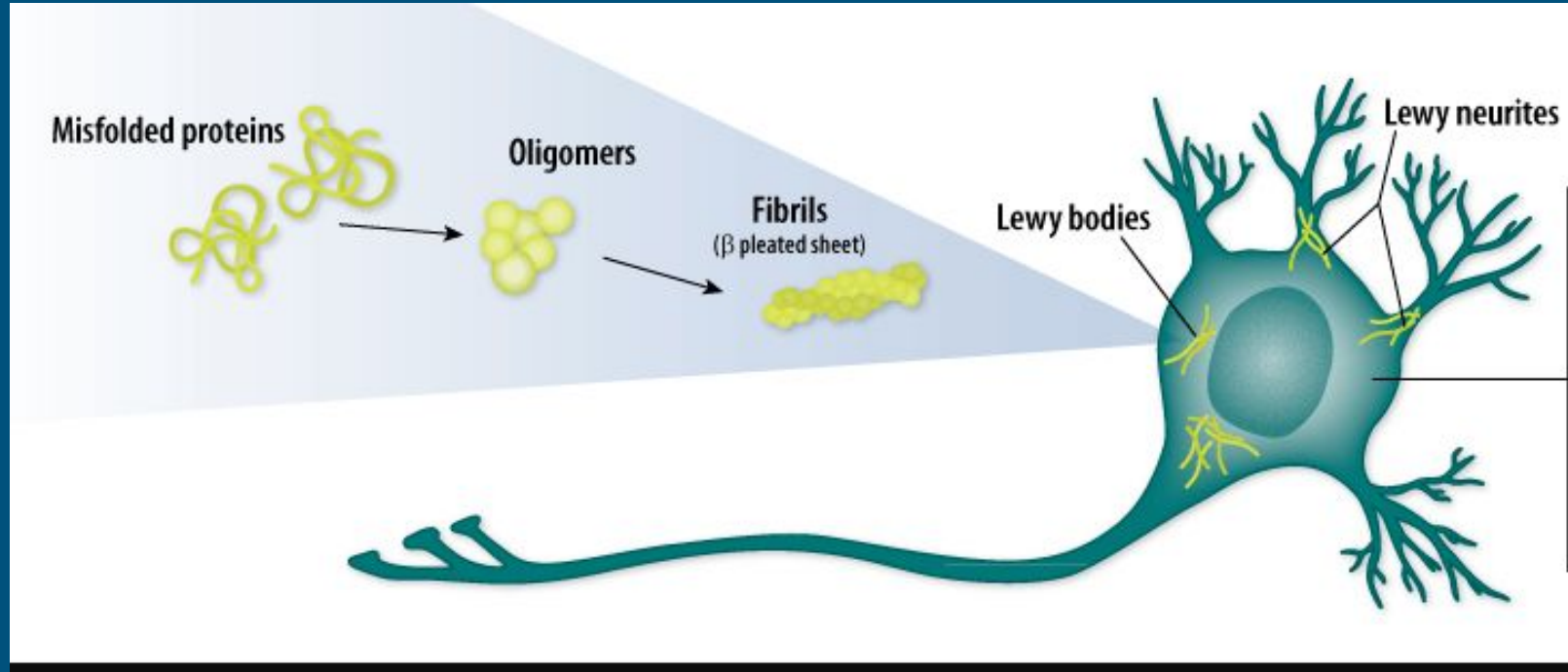
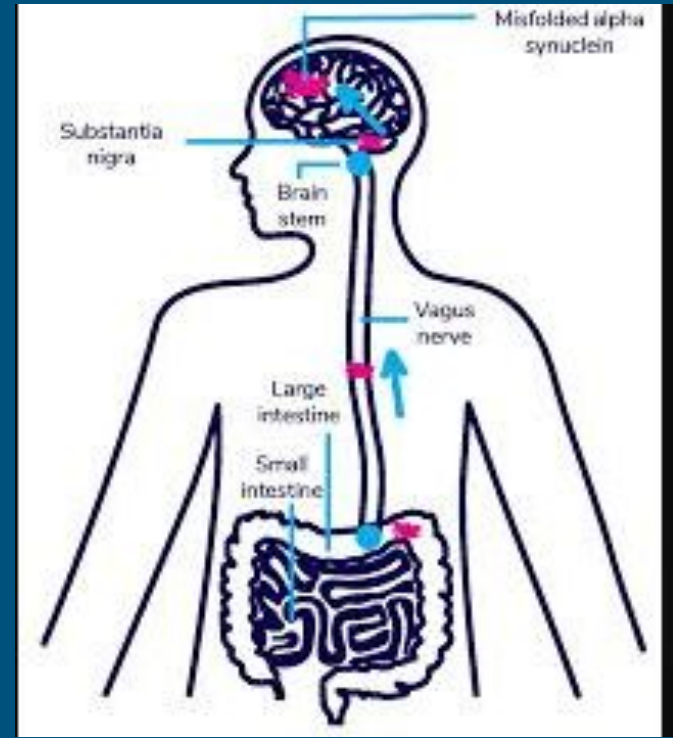
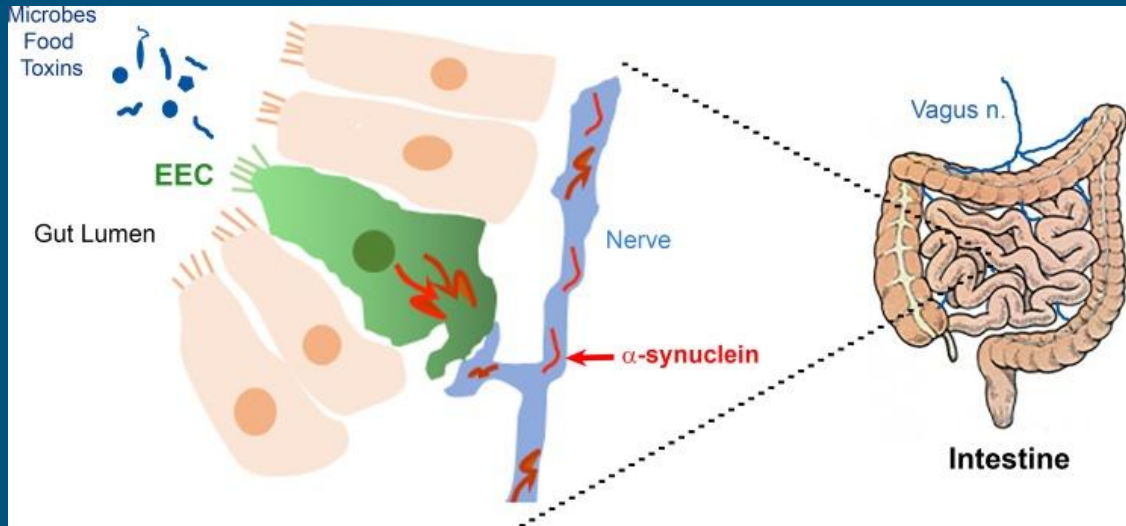


FIGURE 25.2 Tissue Layers of the Digestive Tract. Cross section of the esophagus just below the diaphragm where it meets the stomach.

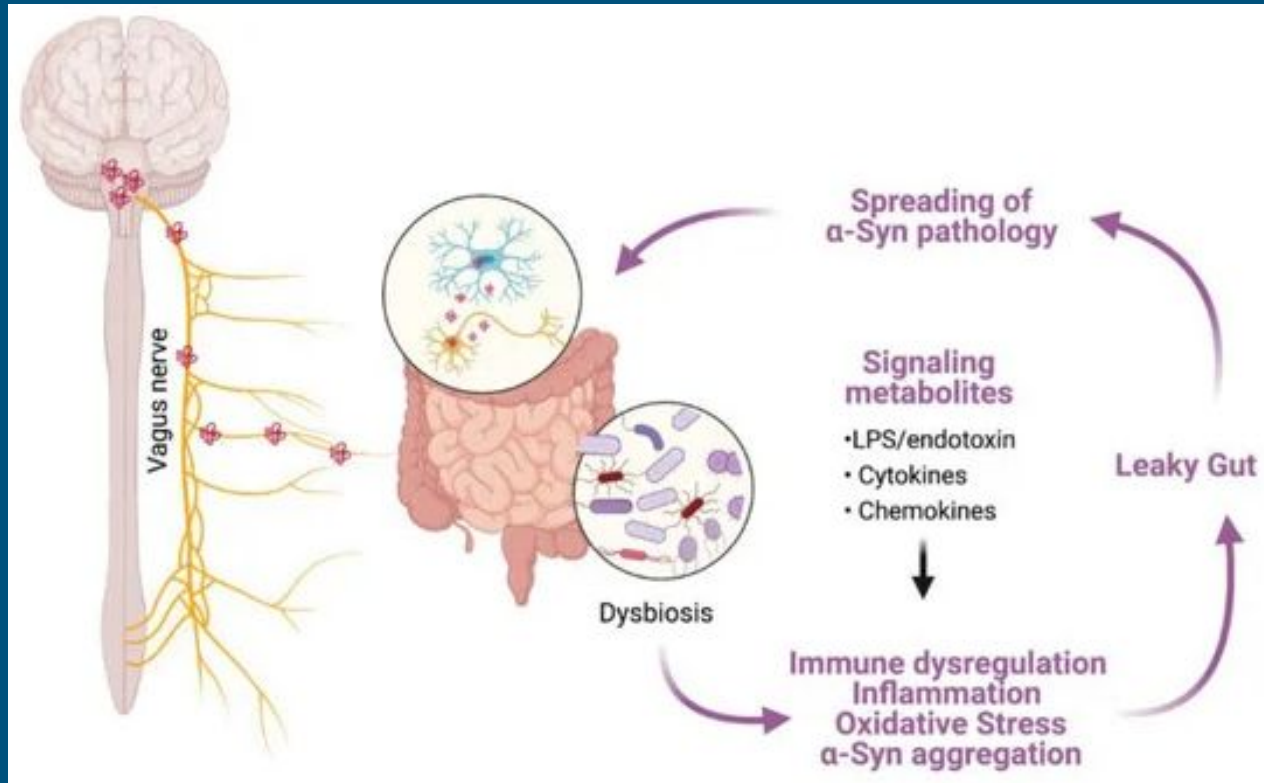
Alpha Synuclein misfolding forms Lewy Bodies



“Bottom Up” Hypothesis

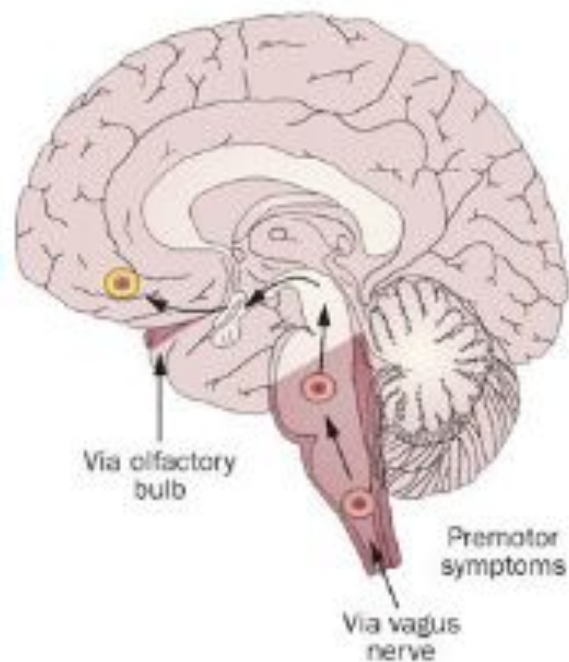


Vagotomy reduces transmission !



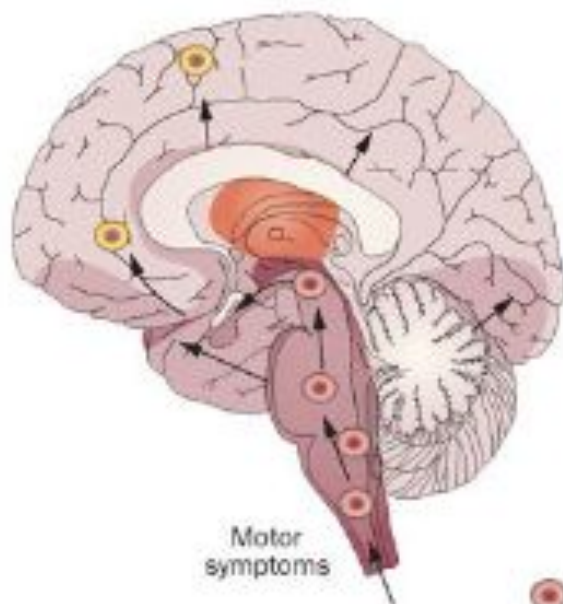
Braak stages 1 and 2

Autonomic and olfactory disturbances



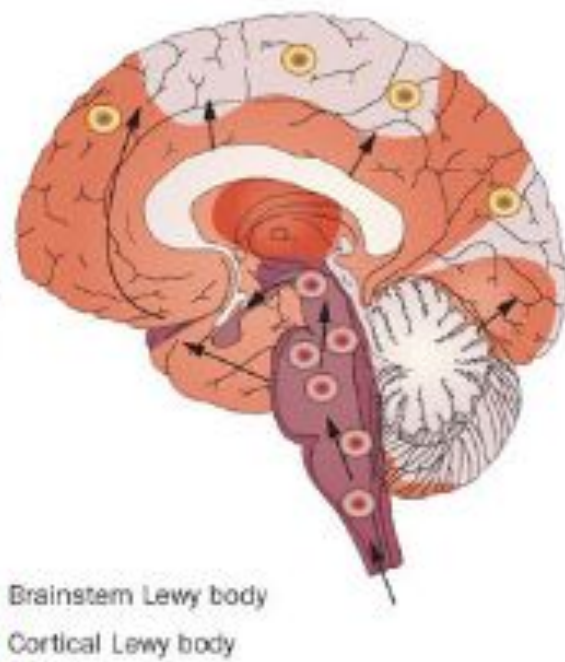
Braak stages 3 and 4

Sleep and motor disturbances



Braak stages 5 and 6

Emotional and cognitive disturbances

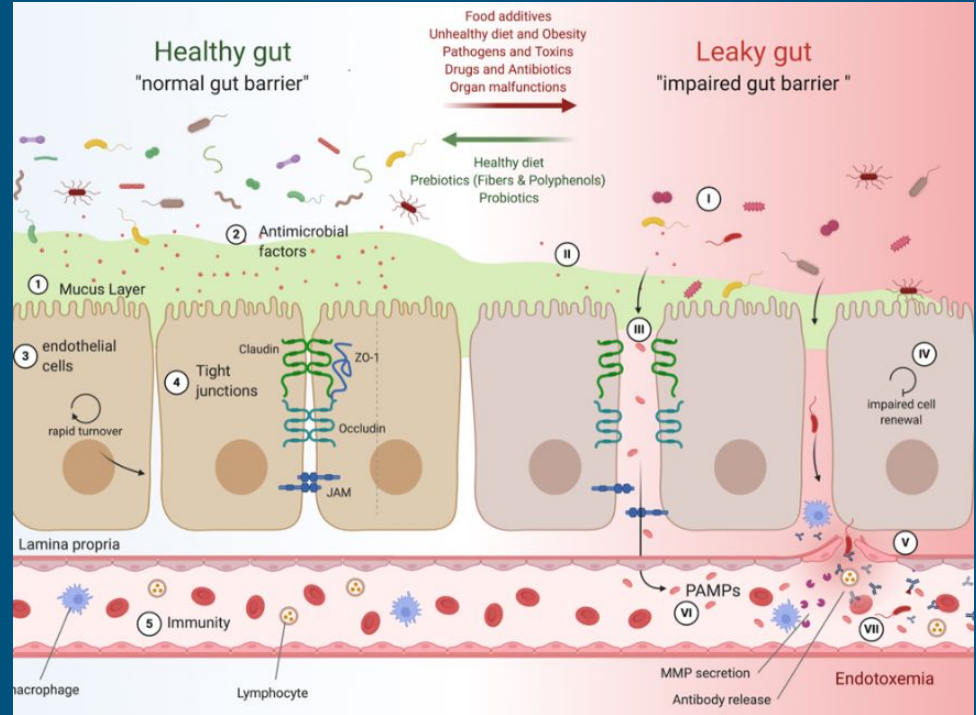


GI system implicated

Lewy bodies found in neurons inside the GI system

Mice that received fecal transplants from PD subjects developed Lewy Bodies

Prior Colonoscopies of Parkinson's Disease individuals before diagnosis had evidence of Lewy Bodies in the gut!



Foods that increase risk for Parkinson's

(and many other chronic diseases)

PD plausibly starts with our dietary choices

Dairy Consumption

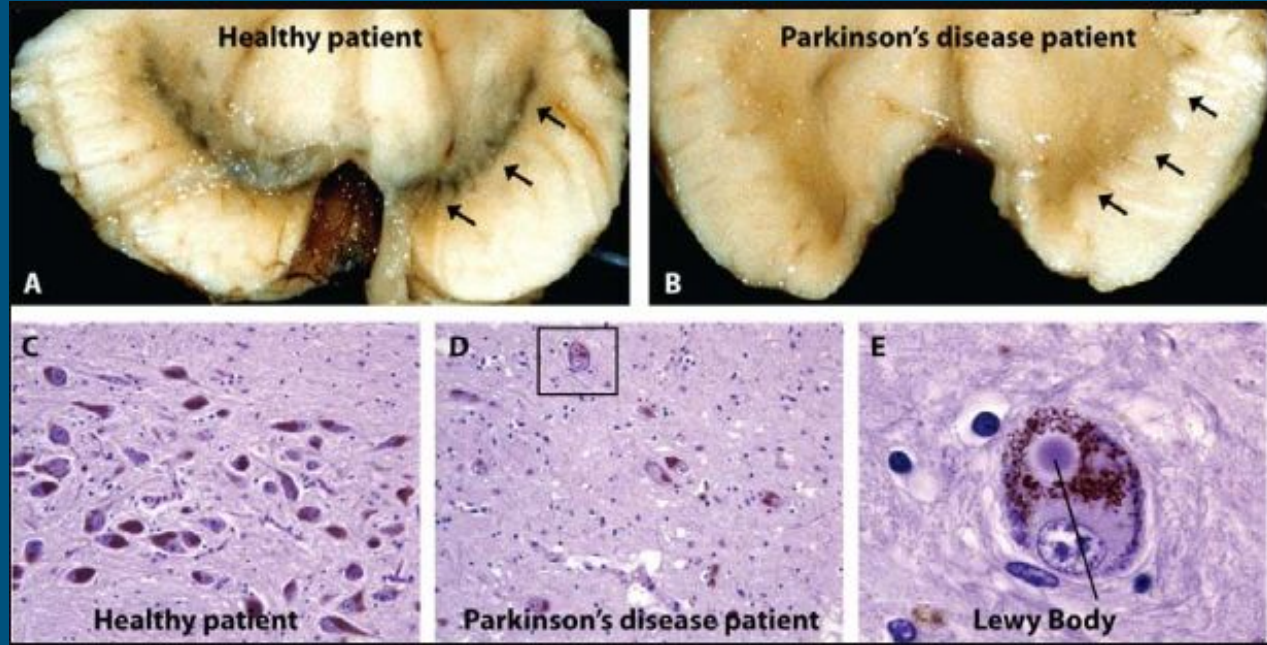
5 separate prospective studies (Over 100,000 people)

1,000 New PD Cases occurred

Milk correlated with increased risk up to 50%

More dairy= more cell death

Lewy Bodies
formation higher in
individuals who
consume more milk



Why Milk?

Pesticides Heptachlor Epoxide found in 90% of these patient's brains!

Pesticides from Cow consumption of food mix (grains, grass) sprayed with chemicals

Galactose (type of sugar) comes from Lactose breakdown
Neurotoxic due to oxidative stress and free radical formation
>1 glass daily associated with more cognitive decline!



**Not
Galactose
Free!**

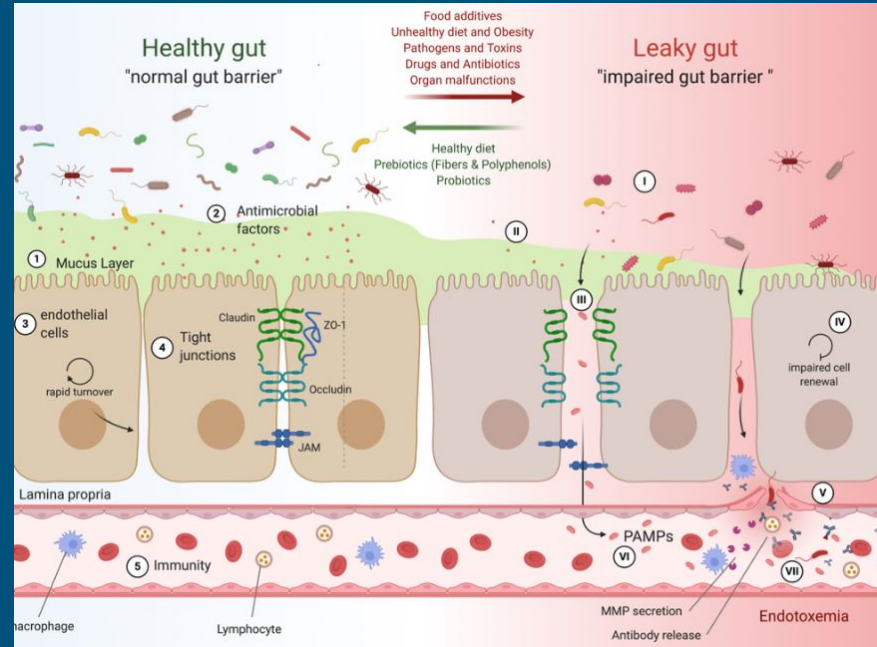
Meat “Infecting” Our GI cells?

Damaged Alpha-Synuclein infiltration?

Meat has no fiber

Less fiber= less fiber consuming bacteria
(*Prevotella*)

Less fiber= leaky gut



Limit Food contaminants

Plant based foods have lower levels of pesticides, environmental toxins

Animals are reservoirs for environmental toxins because they consume high quantities of plants and accumulation of the toxins occurs and gets trapped inside their fat

Farmed fish have high levels of antibiotics

Protective foods for a healthy living

Fiber

Type of carbohydrate without the increase in blood glucose or insulin levels!

Nourishes our Gut Microbiome

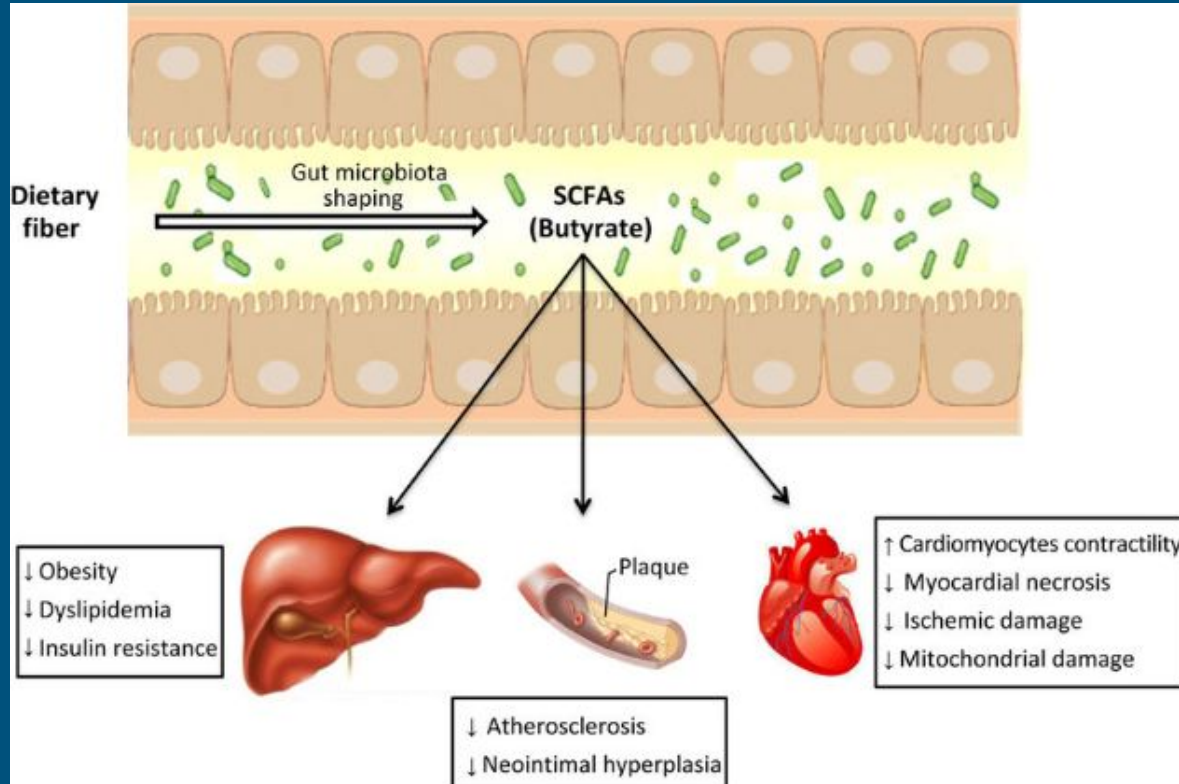
Promotes more healthy flora and less harmful flora



Nutrition Facts	
8 servings per container	
Serving size	2/3 cup (55g)
Amount per serving	
Calories	230
% Daily Value*	
Total Fat 8g	10%
Saturated Fat 1g	5%
Trans Fat 0g	
Cholesterol 0mg	0%
Sodium 160mg	7%
Total Carbohydrate 37g	13%
Dietary Fiber 4g	14%
Total Sugars 12g	
Includes 10g Added Sugars	20%
Protein 3g	
Vitamin D 2mcg	10%
Calcium 260mg	20%
Iron 8mg	45%
Potassium 240mg	6%

* The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.

Fiber is food for our microbiome



Fiber is from nature, not processed foods

Minimal FDA recommended daily value (28 grams) could save around \$80 billion

Lower risk of heart disease, stroke, diabetes, obesity, certain cancers

9% reduction in heart attack per every 7g/fiber

1 cup blueberries (6) + 1 apple with skin (4) + 1 cup black beans (15) + 1 cup Raisin Bran (8 g)= 32 grams of fiber!

Fiber improves PD symptoms

Study of 19 patients with parkinson's (average age 67)

28 grams/day x 3 months

Increased Levodopa concentration by 33%

Improved motor scores, gait and coordination

PD Gut

Increase pro-inflammatory bacteria (Enterobacteriaceae) and lower anti-inflammatory (Faecalibacterium)

Short Chain Fatty Acids are a byproduct of fiber consumption by bacteria

More SCFAs= stronger intestinal barrier= reduced inflammation

Nature Article 2023 Study

10 day consumption of fiber: reduced levels of neuroinflammation (NfL), lowered inflammation markers, increased SCFAs

Doesn't take long...

Reduction of insulin levels and improved blood sugar by 25% after eating an extra 30 grams of fiber for 3 days!

Fiber alone is not enough

Healthy eating includes avoiding excessive consumption of processed foods

Adding more fiber to the diet without changing other eating behavior will not allow “good” GI flora (*Prevotella*) from repopulating

MEDICATIONS AND NUTRITION

Carbidopa-Levodopa (*Sinemet*)

Carbidopa= inhibits the breakdown of Levodopa

Levodopa= Precursor to dopamine

Levodopa is an amino acid (building block of a protein)

They must be transported across the Intestinal wall and the doorway must be opened!

More dependent on medication over time

Early PD

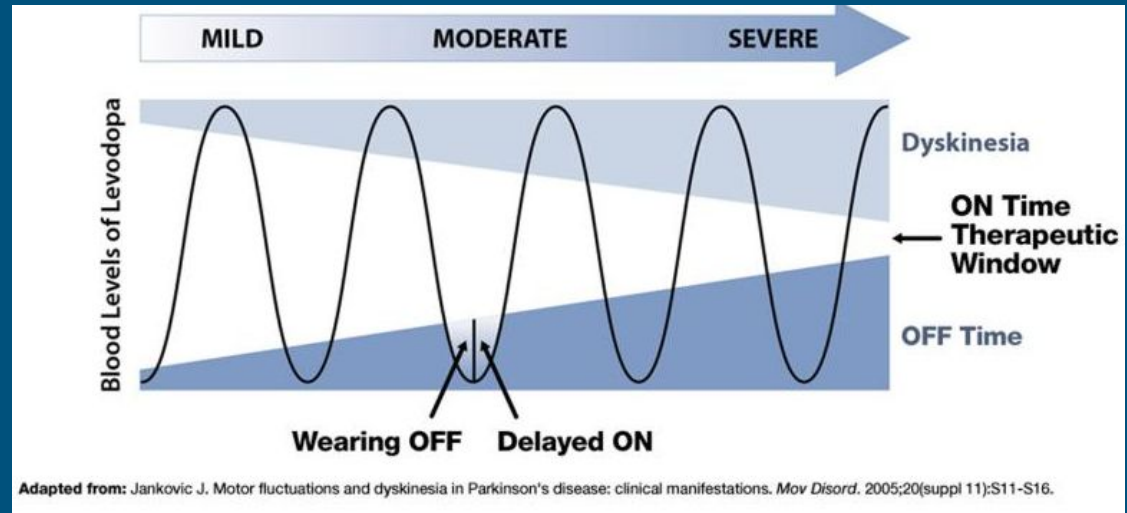
Honeymoon period

Motor Fluctuations

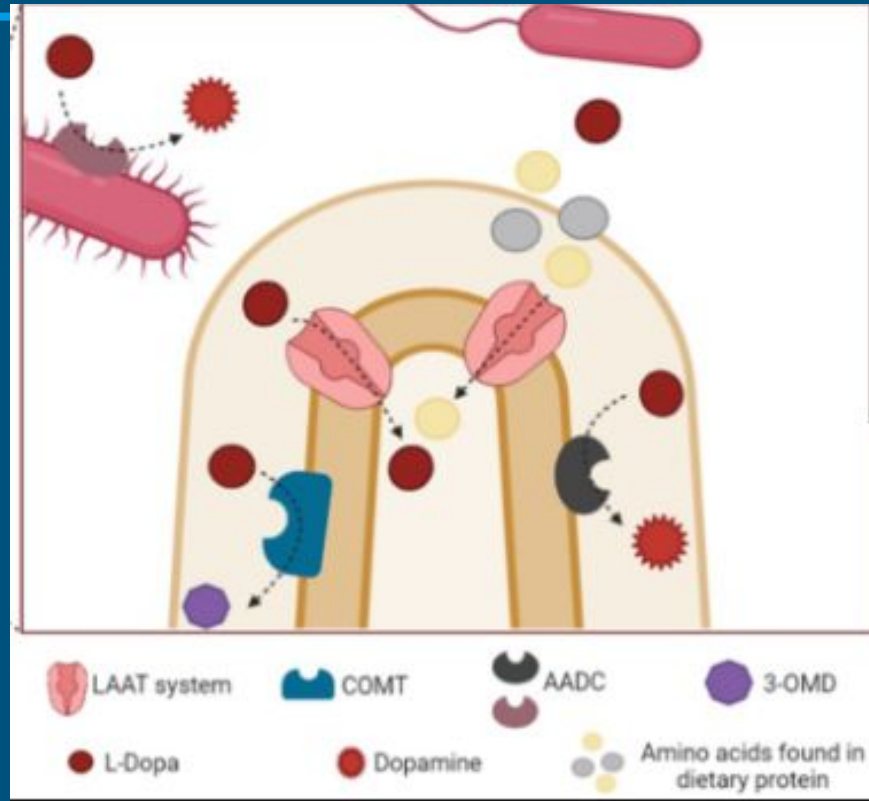
Kicks in, wears off

More Advanced PD

Unpredictable (uber dependent on medication)

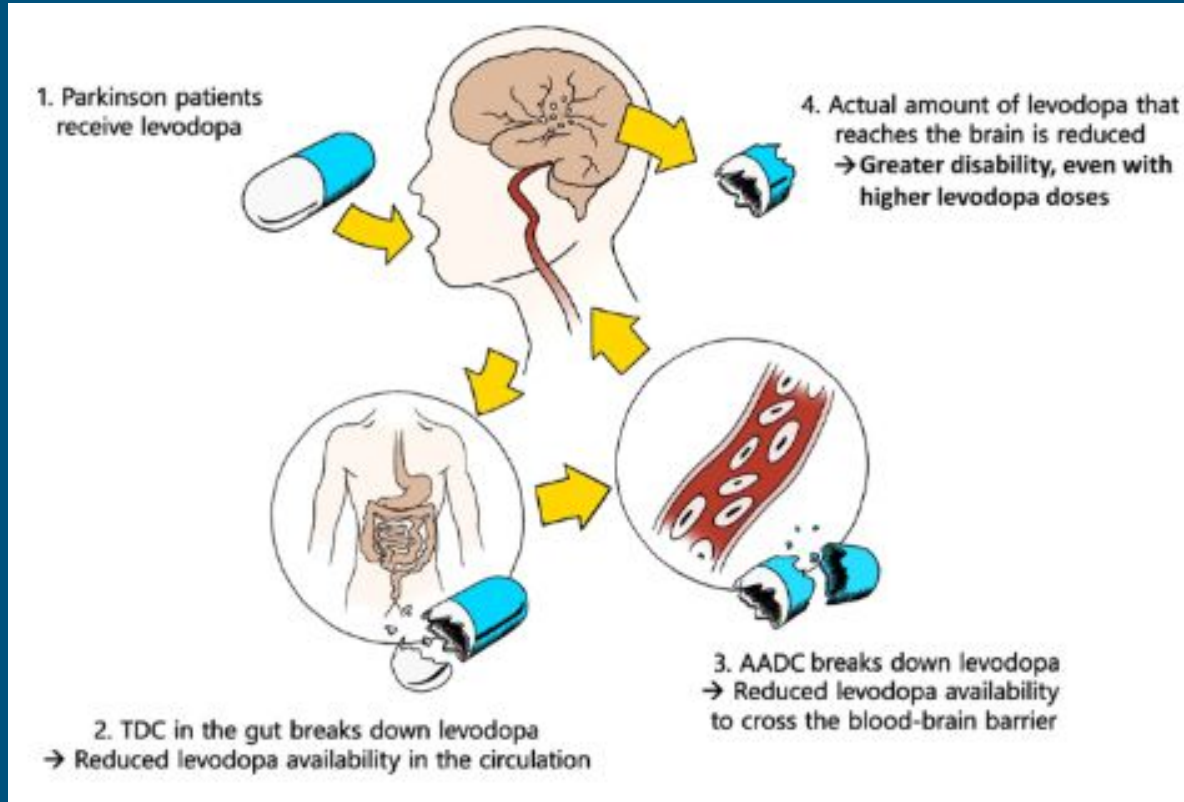


Protein and Levodopa



Competition for entry through the GI system and into the brain!

The Many Barriers to feel ON



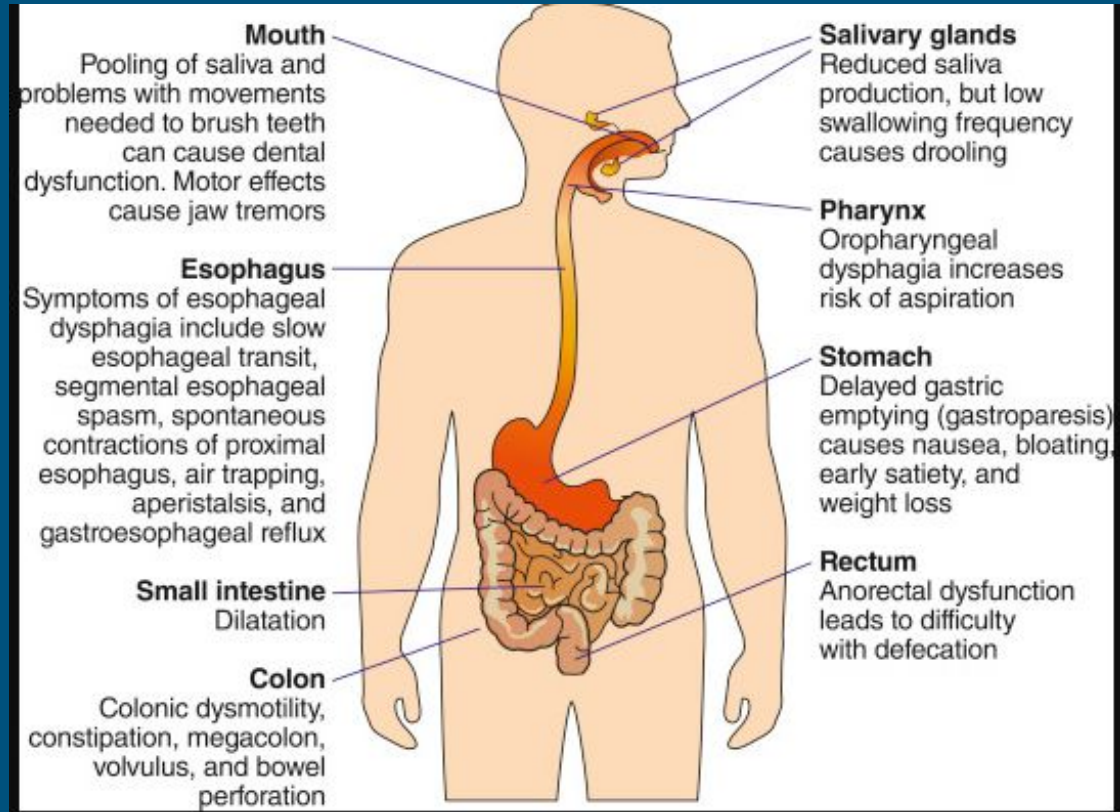
Other factors

Difficulty swallowing

Reduced motility

Stomach Acidity

Constipation



Delayed Gastric Emptying (Gastroparesis)

Food takes longer to pass through stomach (early satiety, bloating, nausea, abdominal pain)

Stomach acid has more time to break down medication

Constipation

HUGE Impact on quality of life and medication effect

Over 60% in PD, can occur many years before symptoms onset

Risk factors

- Low fluid intake
- reduced physical activity
- **lack of fiber**
- certain medications

Natural Remedy for constipation

- 1 cup applesauce
- 1 cup bran or oatmeal
- Around $\frac{3}{4}$ cup of Prune Juice

Blend together and add cinnamon or other spices if desired

1-2 tablespoons a day

Can store in freezer and eat as ice cubes

How to take Levodopa

Take Levodopa around 30 minutes BEFORE OR 2 hours AFTER a meal

Nausea? Small carb snack (crackers, applesauce, toast)

Protein Redistribution Diet PRD

10 clinical studies (only 2 were randomized), small number of participants

All except a single study lasted <1 month

Benefits were seen in each study

30% drop in levodopa absorption with protein consumption

Conclusions: More ON, Less OFF, Less fluctuations, lower disability scores

Warning: Longest study (2 years), 30 subjects adhered to PRD and developed more severe Dyskinesias and weight loss

Suggestions-Eat Most Protein at Dinner

Around 1.0 mg/kg/day of protein intake***

~70 grams per day (70 kg person)

Breakfast **limit protein**

Lunch **limit protein**

Dinner (unlimited protein)

**consult your physician and dietician/nutritionist

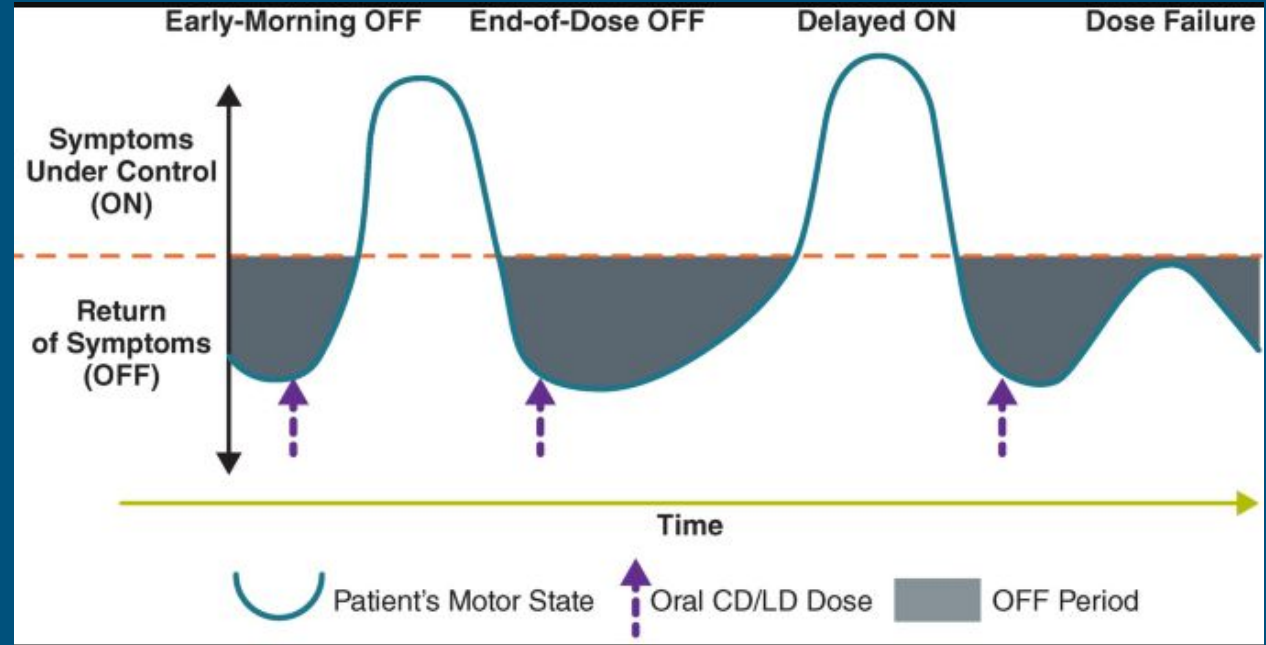
More Advanced PD: Unpredictable Effect

Motor fluctuations

Delayed ON

Early OFF

Dose Failure





Evidence-Based Eating

MIND

Mediterranean-DASH Intervention for Neurodegenerative Delay



- Delayed onset of parkinsonism
- Slower progression of PD!
- Lower risk of getting PD!

MIND

Whole food, plant based

Nuts, seeds, legumes (bean, lentils), vegetables, whole grains, salmon

Limited beef, pork, dairy, cheese

WHOLE GRAINS: 21



Packed with fiber to fuel a productive brain. Aim for 3 servings a day.

BERRIES: 2



Thanks to their flavonols, they're the only fruit that can slow brain decline.

BEANS: 3



Plenty of fiber, plus low-fat protein for growing brain cells.

LEAFY GREENS: 6



Full of antioxidants and carotenoids to protect gray matter.

POULTRY: 2



Delivering dementia-preventing B vitamins and low-fat protein.

NUTS: 5



Rich in vitamin E, which has been shown to lower risk of Alzheimer's.

OTHER VEG: 7



Packed with plant-based antioxidant power.

FISH: 1



Rich in brain-cell-fortifying omega-3 fatty acids.

WINE: 7



Alcohol reduces dementia risk. Stick to 1 glass a day.

**And use olive oil for cooking and dressings, for its memory-protecting polyphenols.*

KEEP THESE
FOODS TO A
MINIMUM

Red meat: 4 times a week or less
Fast food, fried food, and cheese: less than once a week
Butter or margarine: fewer than 7 tablespoons a week
Pastries or sweets: less than 5 times a week



SUPPLEMENTS

Vitamin B12

Lower levels found in PD

Associated with worse motor symptoms,
correlated with worse cognitive impairment

Can increase level of Homocysteine that can
potentially increase risk of osteoporosis

Increase risk of peripheral neuropathy

Blood B12 levels does not correlate with actual
B12 body stores



Active Form

Vitamin B1 (Thiamine)

Lower levels found in dopamine producing cells in brain

Lower intake associated with increased risk of Parkinson's disease and reduced sense of smell

2013 small study: 30-70% improvement in PD symptoms with B1 (patients not on any PD medications)

Others

Low levels of Vitamin B6, C, D , E linked to increase risk of PD

Correlation not causation

Real Food is superior to vitamins

Nutraceutical industry generates billions from supplement sales

Vitamins can be costly but in comparison whole food is cheap.

Whole foods are more than just Protein, Fat, Carbohydrates

They contain thousands of phytonutrients that reduce inflammation, prevent disease, improve blood sugar levels, reduce levels of cancer and reduce the risk and slow progression of Parkinson's !

Thank you!



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