How nutrition & diet can help you live better with Parkinson's

Richelle Flanagan, RD, BA, MSc PD Advocate, WPC Ambassador Alumni, Eupati Fellow Co-Founder, Women's Parkinson's Project Co – Founder, My Moves Matter







**Richelle Flanagan** 

# **Parkinson's disease:** The case for greater nutritional care

KNOWLEDGE

Those with Parkinson's disease would benefit from better nutritional care and access to a multidisciplinary care team that includes a dietitian

#### MENTAL AND NEUROLOGICAL HEALTH

is recognised as the fifth most common non-communicable disease (NCD) by the United Nations and as such should receive the majority of PD occurs in those older than 65, up to 10% develop the disease in their 40s and younger. Diagnosis under 50 is classed as early-onset PD, those aged non-motor symptoms and ultimately improve quality of life.

Through my own journey, that of my PD friends, and my research, I have come

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Ó Breasail, M., Smith, M., Tenison, E., Henderson, E., & Lithander, F. (2022). Parkinson's disease: The nutrition perspective. Proceedings of the Nutrition Society, 81(1), 12-26. doi:10.1017/S0029665121003645

# How PD impacts how you eat and drink

- Non- Motor Symptoms the biggest effect in terms of fatigue, apathy, concentration, cognition, planning, constipation, chewing, dry mouth, smell and taste, swallowing, weight loss, impulse control
- Symptom fluctuations make preparing and eating meals difficult need to plan around fluctuations
- Constipation, chewing, dry mouth, smell and taste, swallowing all influence food and drink choice
- $\circ$  Medication interaction with meals big issue
- Social embarrassment of eating in front of others
- $_{\odot}$  Living alone means people are even worse off



# What would you like to know more about diet, nutrition and PD?

- Personalized approach to diet for people with PD
- □ Supplements
- Prebiotics probiotics
- Advice beyond just protein & medication interactions
- Different diets keto, Mediterranean/MIND,
  - dairy free gluten free, vegan, GI
- □ Culturally specific
- Digestive & bowel issues
- Menopause, PD & diet
- □ Anything scientifically proven to improve symptoms
- Consistent advice from different dietitians



# What diet?

	Western Diet	Mediterranean Style Diet	Vegan Vegetarian	Gluten Free	Low Gl	Keto	Fasting
Anti- inflammatory	888	000	000	<b>©</b>	000		0
Healthier Microbiome	888	000	000	888	000	0	0
Symptom Modulating	888	000	00		000	00	00
Potentially slow Progression	888	000					
Potentially Reduce Dementia	888	000	000			٢	٢
Weight loss		© Intentional	☺ Intentional		© Intenti onal	888	888
Weight Gain	888			8			
Nutrient Deficiency	888		⊗ Vegan	88		88	88







MIND and Mediterranean diets, have attracted attention in potentially reducing clinical progression of PD, preserving cognitive health & protecting against depression<sup>.</sup>

Up to 17 years later age of onset **associated** with **MIND** diet in women. Up to 8.4 years in men following **Greek Mediterranean diet.** 

MIND diet created for brain health **may be associated** with **decreased** risk and **slower** progression of parkinsonism in older adults.

MIND and MEDI scores are **associated** with **fewer** patient-reported symptoms over time, with each **MIND point being twice as strong** as a MEDI point in reducing symptom severity

RCT 35 PD patients (59.3  $\pm$  8.3 yo) showed that adherence to the Mediterranean diet over 10 weeks remarkably increased

- Executive function
- Language
- □ Attention
- Concentration
- □ Active memory
- □ Total cognitive score

70 PD patients (58.96 ± 8.7) Mediterranean diet
❑ Significantly increased Total antioxidant capacity(P < 0.001).</li>
❑ UPDRS score lowered (P < 0.05).</li>

5-week Mediterranean diet intervention study was conducted in 8 people with PD improved constipation, altered microbiome and was associated with some weight loss



- Rusch et al reported average Medi Score of 4.4/14 ¥
- Survey showed an average Medi Score of 6/14\*
- Weak adherence, ≤5; moderate to fair
   6–9; good or very good ≥10

# Considerations

Meta-Analysis

#### Association between animal protein sources and risk of neurodegenerative diseases: a systematic review and dose-response meta-analysis

Sepide Talebi, Farzaneh Asoudeh (), Fatemeh Naeini, Erfan Sadeghi (), Nikolaj Travica, and Hamed Mohammadi ()



Each 200-g increase in total daily dairy intake was associated with an

11% 👉 risk of Parkinson's disease

#### **Potential reasons include:**

- Pesticides
- Uric acid
- Bacteria
- Galactose content

- 12% risk of cognitive impairment
- Lot of variability in dairy research
- None in progression of PD
- Association is not causation
- Cannot ignore associated benefit of dairy to cognition

# **Considerations**

#### Grape juice or wine: which is the best option?



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3. Phenolic compounds found in red wine and in grape juice.

#### **D** BEANS & LENTILS

Food	Serving (g)	Calcium (mg)
Lentils	80 raw 200 cooked	40
Chick Peas	80 raw 200 cooked	99
White Beans	80 raw 200 cooked	132
Red Beans	80 raw 200 cooked	93
Green/French Beans	900 Cooked	50

#### STARCHY FOODS

Food	Serving (g)	Calcium (mg)
Pasta (cooked)	180	26
Rice, White (boiled)	180	4
Potatoes (boiled)	240	14
White Bread	40 (slice)	6
Wholemeal Bread	40 (slice)	12
Muesli (cereals)	50	21
Naan	60	48

#### 

Food	Serving (g)	Calcium (mg)
Lettuce	50	19
Kale, Collard Greens	50 (raw)	32
Bok Choy/Pak Choi	50 (raw)	20
Gombo/Okra	120 (raw)	77
Cress	120 (raw)	188
Rhubarb	120 (raw)	103
Carrots	120 (raw)	36
Tomatoes	120 (raw)	11
Broccoli	120 (raw)	112

#### NUTS & SEEDS

Food	Serving (g)	Calcium (mg)
Almonds	30	75
Walnuts	30	28
Hazelnuts	30	56
Brazil Nuts	30	28
Sesame Seeds (hulled)	15	6
Tahini Paste	30	42

CALCIUM





 Low B12 status was common in early PD.
 Low B12 at baseline predicted greater worsening of mobility.

Elevated homocysteine predicted greater cognitive decline & worse cognitive performance in females & greater motor impairment in men

Neuropathy is very common in advanced IPD patients treated with high doses of (>2000mg) levodopa/carbidopa irrespective of the formulation due to low Vitamin B6.

B12
Folate
B6
Homocysteine
MMA

- Risk of vitamin B12 & B6 deficiencies.
- Levodopa metabolism requires adequate levels of vitamins B12 and B6.
- Lifetime monitoring of B-vitamin levels could address this problem if the practice were sustained.
- A more reliable strategy is to prescribe oral B12, B6, folic acid

- Clinical picture is the most important factor in assessing the significance of results of blood tests assessing cobalamin (B12) status because there is no "gold standard" test to define deficiency.
- Measuring serum biomarkers such as B12 or MMA is neither helpful nor indicated in assessing or monitoring clinical improvement, neither is titration of injection frequency based on biomarker assessment.
- Clinical & patient experience strongly suggests that up to 50% of individuals require individualized injection regimens with more frequent administration, ranging from daily or twice weekly to every 2-4 weeks, to remain symptomfree and maintain a normal quality of life.
- There is currently no evidence to support that oral/sublingual supplementation can safely and effectively replace injections.
- Neurological symptoms resulting from B12 deficiency may take several months or even years to resolve completely.

Vitamin	•	ŧ	UL	Negative affects
B6	1.7mg	1.5mg	100mg	Pyroxidine can cause severe <u>nerve</u> damage, leading people to lose <u>control</u> of their bodily movements
B12	2.4mcg	2.4mcg	None	Vitamin B12 has not been shown to cause any harm, even at high doses.
B9	400mcg	400mcg	Folate 1000mcg	High Folate can hide a <u>vitamin B12</u> deficiency leading to <u>nerve</u> damage Large doses of folate supplements might also worsen the <u>symptoms</u> of vitamin B12 deficiency.
B 1	None	None	None	Thiamin has not been shown to cause any harm.
B3	16mg	14mg	Niacin 35mg	30 mg or more of nicotinic acid can make the skin on your face, arms, and chest turn red and burn, tingle, and itch. These <u>symptoms</u> can also lead to headaches, rashes, and dizziness.

#### Coenzyme Q10

Only a few trials have been conducted on coenzyme Q10 for Parkinson's disease, so there aren't enough data to determine whether coenzyme Q10 has any effect on symptoms.

#### What Does the Research Show?

- The American Academy of Neurology's <u>practice parameter</u> I on neuroprotective strategies and alternative therapies for Parkinson's disease concluded that there is insufficient evidence to support or refute the use of coenzyme Q10 for neuroprotection.
- A <u>2014 randomized clinical trial</u> of 600 participants with Parkinson's disease concluded that coenzyme Q10 was safe and well tolerated in this population, but showed no evidence of clinical benefit.
- A <u>2002 randomized controlled trial</u> of 80 participants with early Parkinson's disease found that less disability developed in subjects assigned to coenzyme Q10 than in those assigned to placebo; however, the results did not reach statistical significance.

#### Safety

- Studies have not reported serious side effects related to CoQ10 use. The most common side effects of CoQ10 include insomnia, increased liver enzymes, rashes, nausea, upper abdominal pain, dizziness, sensitivity to light, irritability, headaches, heartburn, and fatigue.
- CoQ10 may make warfarin less effective.

https://www.nccih.nih.gov/health/providers/digest/parkinsons-disease-and-complementary-health-approaches-science

#### Mucuna pruriens (Velvet bean)

There is some limited evidence that *Mucuna pruriens* may have beneficial effects on some symptoms of Parkinson's disease such as motor function. The seeds of the plant contain L-DOPA.

#### What Does the Research Show?

- A <u>2018 non-inferiority, randomized, crossover, pilot study</u> with 14 Parkinson's disease patients received *Mucuna pruriens* powder and levodopa/carbidopa (LD/CD). Daily intake of *Mucuna pruriens* resulted in 50% of patients discontinuing uses due to either gastrointestinal side-effects (n?=?4) or worsening of motor performance (n?=?3). During the LD/CD phase no one discontinued use. For patients who tolerated *Mucuna pruriens*, clinical response was similar to LD/CD.
- A <u>2017 randomized controlled trial</u> of 18 patients with advanced Parkinson's disease found that *Mucuna pruriens* powder, at both high and low doses, is as effective and safe as levodopa/benserazide.
- A <u>2004 preliminary pilot study</u> of eight participants with Parkinson's disease with a short duration L-dopa response and disabling peak dose dyskinesias found that the seed powder formulation of *Mucuna pruriens* contains a considerable quantity of L-dopa and has a rapid onset of action with a slightly longer duration of therapeutic response compared with standard L-dopa. *Mucuna pruriens's* long-term efficacy and safety has not yet been established.

#### Safety

The long-term safety of Mucuna pruriens has not yet been established.

https://www.nccih.nih.gov/health/providers/digest/parkinsons-disease-and-complementary-health-approaches-science

"Brittle Parkinson's disease is when very small doses of carbidopa/levodopa (1/4 or 1/2 tablets) precipitate dyskinesia. Could "light" or small doses of mucuna be useful for this and other indications? My own experience has been YES. It is however, really frustrating, as the available mucuna products are not regulated and do not contain consistent amounts of levodopa."

#### **Professor Michael Okun**

#### Is it safe?

• Maybe.

- It actually depends on the formulation and/or way it is prepared.
- Most preparations lack the information to make a safety decision.
- Please be cautious using mucuna as studies have been in general small and the types of mucuna can be far different from each other.

- IV of NAC (50 mg/kg) plus oral doses (500 mg twice per day) for 3 months.
- □ Significantly improved PD symptoms.
- Suggests NAC might be useful in the pharmacological management of PD.
- □ Need larger RCTs to further evaluate potential effect.
- Side effects can include nausea, vomiting, stomach pain, diarrhoea, indigestion, and heartburn.
- □ NAC might disrupt blood clotting & lower blood pressure.

### How does my diet affect my medicine?

#### **Meal composition**

Large meal high in fat & protein can slow down digestion in stomach



Carbidopa/levodopa pill trapped in the stomach 1½ hours after being swallowed

Levodopa needs to pass through the stomach and into the intestine to be absorbed

### **Protein timing and medicine**

- Protein can interfere with Levodopa absorption in the gut/brain
- Take Levodopa 30-60 mins before meals OR 60-120 mins after meals
- Avoid drinking milk with levodopa meds
- Avoid large protein heavy meals



### **Protein timing and medicine**

- Eat protein requirements across 3 meals
- Eat more protein at time(s) of day when one is less affected by 'off' periods
- Protein re-distribution diet



Protein at evening/supper time only may lead to reduction in mobility during the night-time, with some people having difficulty turning in bed, or getting up at night

#### **Microbiome impact**

	Interferes with levodopa absorption	Vit B12 Deficiency	Iron Deficiency	Vit D Deficiency
H Pylori	$\checkmark$	û <b>Risk</b>	û <b>Risk</b>	☆ Risk
SIBO	$\checkmark$	$\checkmark$		Possible risk



- Eating a healthier diet associated with reduced risk of H pylori
- Eating a diet rich in plantbased foods is associated with healthier gut bacteria in PwP.



#### **Prebiotics & Probiotics**

- 2 RCTs to date have provided Class I evidence in support of the use of multistrain probiotics to treat constipation in PwP.
- Probiotic supplements may be suitable for improving the motor & non-motor symptoms of PD & reducing depression.
- Further research is warranted to determine the mechanism of action of probiotics & to determine the optimal treatment protocol.
- While pre-clinical & clinical evidence suggest promising benefits of probiotics & prebiotics in PD, careful consideration of indications and safety issues, adherence to regulatory guidelines, & individualized risk assessment are essential to ensure their safe and effective use.





~30% PwP Lost weight unintentionally since diagnosis<sup>¥</sup>



Weight loss appears to be associated with a more rapid decline in motor function, cognitive impairment, disability & mortality\*

The identification of PD patients according to the nonmotor phenotype of **"Park-olfactionweight-phenotype**" and the **"olfaction-weightdyskinesia**" triad should help to develop strategies to prevent weight reduction and improve general health and complications of PD patients.

Weight monitoring and weight orientated approach to management of PD patients should help to improve their outcome.

# **Weight Matters**

# Mechanisms of body weight fluctuations in Parkinson's disease

#### Andrea Kistner<sup>1,2</sup>\*, Eugénie Lhommée<sup>1,2</sup> and Paul Krack<sup>1,2,3</sup>

<sup>1</sup> Movement Disorder Unit, Department of Psychiatry and Neurology, University Hospital Grenoble, Grenoble, France

Premotor PD	Symptomatic PD	Advanced PD
alteration of	dopamin, orexin, ghrelin, leptin signalling	
loss of ta	ste & smell	
c	lepression, apathy, anxiety	
í	astroparesis, constipation	
	nalisea	
	hyperactivity,	dyskinesia
	rigidity, tre	emor
	dysphagia,	impaired mastication
	pain	
		* 0

**FIGURE 2 | Mechanisms of body weight loss in PD**. Mechanisms of body weight loss in Parkinson's disease according to the stage of the disease. Factors with important contribution to weight loss are dark grey.

- As orexin is involved both in appetite and spontaneous physical activity its decrease may contribute to a decrease in food intake & physical activity.
- Weight loss could be promoted by impaired bioenergetics due to mitochondrial dysfunction, as shown in a mouse model of PD.
- Ghrelin, the gastric "hunger hormone" is reduced in PD & has even been considered as a potential biomarker of the disease

### **Weight Matters**

#### Dyskinesia

- Lower BMI higher risk of dyskinesias
- Women might require a 25% reduction in LD dose
- □25-30 % Lower COMT enzyme
- Responses to drugs maybe affected by physiological changes during the menstrual cycle

#### **Slow Stomach Emptying**

Feel full earlier
Nausea
Up to 3 times more prevalent in women



Figure 2. Frequency of dyskinesia in weight losers and non-weight losers. Data taken from [37].



# Weight Matters



FIGURE 3 | Mechanisms of body weight gain in PD. Body weight gain may occur with treatment by agonist or DBS. Both agonist and DBS treatment may lead to modifications of eating behavior leading to increased food intake. In addition, with successful DBS treatment, energy expenditure decreases by improvement of symptoms leading to body weight gain even in the absence of eating disorders. In DBS patients, nutritional intervention has been shown to be effective and should be performed routinely.

As weight gain occurs essentially in the first months after surgery, information and dietetic guidance of the patient should start before surgery

Kistner, A., Lhommée, E., & Krack, P. (2014).

#### **Sugar Matters**



# Risks of excess consumption of added sugars:

□ Impulse control disorders,

□ REM sleep behaviour disorder (RBD)

- Depression,
- Cognitive impairment,
- Chronic pain
- □ Motor fluctuations
- □ Poor sleep, fatigue

MicrobiomeHormonal fluctuations

#### **Sugar Matters**









#### What to eat for exercise?

timing

Medication & Exercise are complementary & lead to better improvements in muscle force, UPDRS motor scores, and mobility than exercise or medication alone



# Importance of diet to PwP

82% PwP Rate Diet as important in PD care



PwP Knowledge Self- Rating 35% average 25% poor/very poor

PwP consider diet important for standard of care but knowledge is lacking

#### What has been your experience of getting advice on diet and nutrition from the health services?

Complete lack of information provided by neurologists

- $_{\odot}$  Lack of understanding of importance of diet & PD by neurologists
- Complete lack of resources
- $_{\odot}$  Lack of knowledge by dietitians of PD specific needs
- o Lack of referral to dietitians



#### **Dietitian Survey**

Barriers to provision of PD related care:

- Lack of education training
   Lack of MDT inclusion
- Lack of referrals

Need for more PD-specific training & education amongst dietitians & all health care professionals to

- bridge the gap in access to dietetic service's
- & enhance quality of care for people with PD.



#### What PwP had to say..

Conflicting answers between dieticians; each giving different versions of advice; need one message so no confusion

RDs not knowing about PD is off putting

Neurologists don't have a clue don't see the relevance of diet

I asked for referral

to dietitian & was

told by doctor that I

didn't need to speak to a dietitian

No talk of diet by doctors; info never provided

neurologist response was 'move more eat well'

> Level of confusion on information available – a lot of contradiction between different sources, would be useful for RDs to separate out what we know from what we don't know

Focus Groups x 3 N= 19; unpublished data, June 2023

## Lack of Referral to Dietetic Service

84% PwP Were never referred to Dietitian



87% PwP Never asked to be referred to Dietitian

#### PwP consider diet important for care but referral to Dietetic service is lacking

# Lack of Referral to Dietetic Service

#### Belgian study of 82 PwP

11% of patients had ever seen a Dietitian.3% seeing a dietitian on an ongoing basis.

#### □ Nationwide Irish survey of 1504 PwP

□15% had access to a dietitian.



## **Role of Dietitian in PD care**

The missing piece of the puzzle - The key role of the dietitian in the management of Parkinson's disease

Richelle Flanagan <sup>1</sup>, Carley Rusch <sup>2</sup>, Fiona E Lithander <sup>3</sup>, Indu Subramanian <sup>4</sup>



# **Does Nutrition Therapy Work**

#### Does nutritional status affect Parkinson's Disease features and quality of life?

<u>Nedim Ongun</u>, Data curation, Formal analysis, Investigation, Methodology, Software, Supervision, Validation, Writing – original draft, Writing – review & editing<sup>\*</sup>

John Duda, Editor

- 6 week nutrition intervention with dietitian & nutrition nurse
- ONS for malnourished
- Fibre 30-35g/day
- Vitamin B12, vitamin D and folic acid
- 0.8-1g/kg BW Protein redistribution diet

- 60-68 y.o.
- 67.7% abnormal nutritional status
- 25% malnourished; 42% at risk
- Poor nutritional status affected depression & anxiety

Those with malnutrition/risk of malnutrition had more severe symptoms in all subgroups of the UPDRS scale including mental, motor, ADL and complications.

# **Joes Nutrition Therapy Work**

- □ A significant improvement in malnutrition score.
- A significant improvement was achieved in disease severity, QoL and nutritional status.
- A significant improvement in self perception of nutritional and health status was associated with a decrease in depression and anxiety scores.

"Nutritional status assessment should be a standard approach in PD... Although further research is still needed on the role of nutrition in the progression of neurodegenerative diseases, disregarding the nutritional features in PD theoretically worsens the disease process and QoL."

#### To restrict or not to restrict? Practical considerations for optimizing dietary protein interactions on levodopa absorption in Parkinson's disease

#### <u>C. Rusch</u> <sup>⊡</sup>, <u>R. Flanagan</u>, <u>H. Suh</u> & <u>I. Subramanian</u>

- □ Take levodopa on an empty stomach 30 min before or 2 h after a meal.
- Assess possible food-drug interactions, by recording at least a 1-day dietary recall that includes amount/type of foods and drinks consumed, timing of meals, medications, and motor fluctuations.
- □ If motor fluctuations present, consider appropriateness of PRD with protein intake at least 0.8 g/kg/body weight. Monitor body weight and dyskinesias.
- Avoid use of low-protein diets ( < 0.8 g/kg/day) to prevent loss of lean body mass.</p>
- Administer levodopa with a small carbohydrate snack (i.e., crackers, toast, applesauce, etc.) to reduce nausea after administration.
- High fiber diet and adequate hydration for constipation management to improve levodopa bioavailability.
- Low-fat diet for gastroparesis management to improve levodopa bioavailability.
- □ Consider dietitian referral for diet assessment and education for PwP.

### **Protein Redistribution Diet**

- Keeping to max 0.8g/1g protein/kg body weight per day.
- Protein redistribution diet daytime protein <10-15g & rest of protein requirement in evening time.
- Protein at evening & supper time only may lead to reduction in mobility during the night-time. May need rescue levodopa.
- For some, it may worsen dyskinesia so may need to reduce levodopa dosage
- Consult a Dietitian to ensure you do not lose weight/muscle mass.



## **Protein Redistribution Diet**

	55kg woman	70kg man
Total protein/day	44-55g/day	56-70g/day
Protein during day	10g	10g
Protein evening meal & across the evening	33g-44g	46-60g



10g 20g 60g

- **Combats fatigue**
- Good for immune function
- **Retention of muscle mass**
- Makes Neurotransmitters
  - (e.g. Dopamine)

#### **Protein Quantity & Quality**







	Contain 10g protein		
Food		Approx amount	
Chicken	35g	2 small slices	
Fish, white	50g	½ small fillet	
Salmon, grilled	45g	½ small fillet	
Milk (all types)	300mls	½ pint	
Eggs (whole)	100g	2 eggs	
Nuts	25g	1 small packet	
Baked beans	200g	5 tablespoons	
Lentils, cooked	150g	3 tablespoons	
Hummus	80g	2 tablespoons	
Soya milk	350mls	⅔ pint	

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  - (e.g. Dopamine)

#### **Nutrition Therapy – Central to Health of PwP**



#### Nutrition Therapy – Central to Health of PwP



#### Empowering PwP with a generally low-risk but potentially crucial self-management tool

# Functional Food Study for PwP in Northern Ireland



#### CURRENTLY RECRUITING

c.hughes@ulster.ac.uk

![](_page_52_Picture_4.jpeg)

![](_page_53_Picture_0.jpeg)

![](_page_53_Picture_1.jpeg)