

# UAB Clinical Trials For Parkinson's Disease

Alexandra Evancho, PT, DPT

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# Table of contents

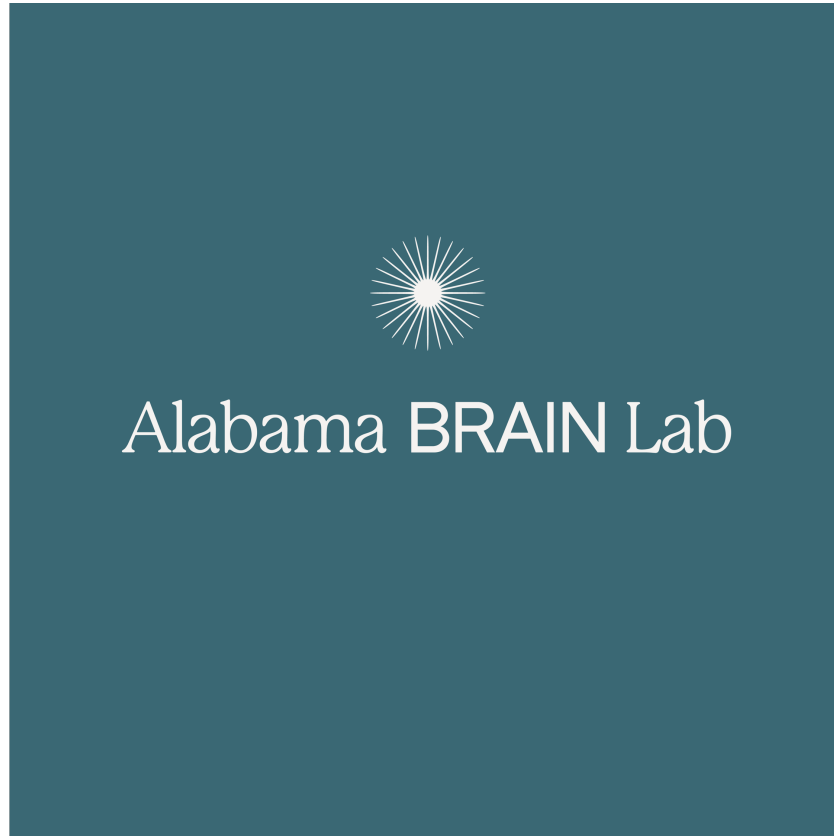
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- 1. Combining transauricular Vagus Nerve Stimulation with Physical Therapy for individuals with Parkinson's Disease – Alex Evancho**
- 2. Optimizing protein patterns for skeletal muscle preservation and sleep in the medical management of Parkinson's Disease – Christine Ferguson**

# Combining taVNS with PT for individuals with PD

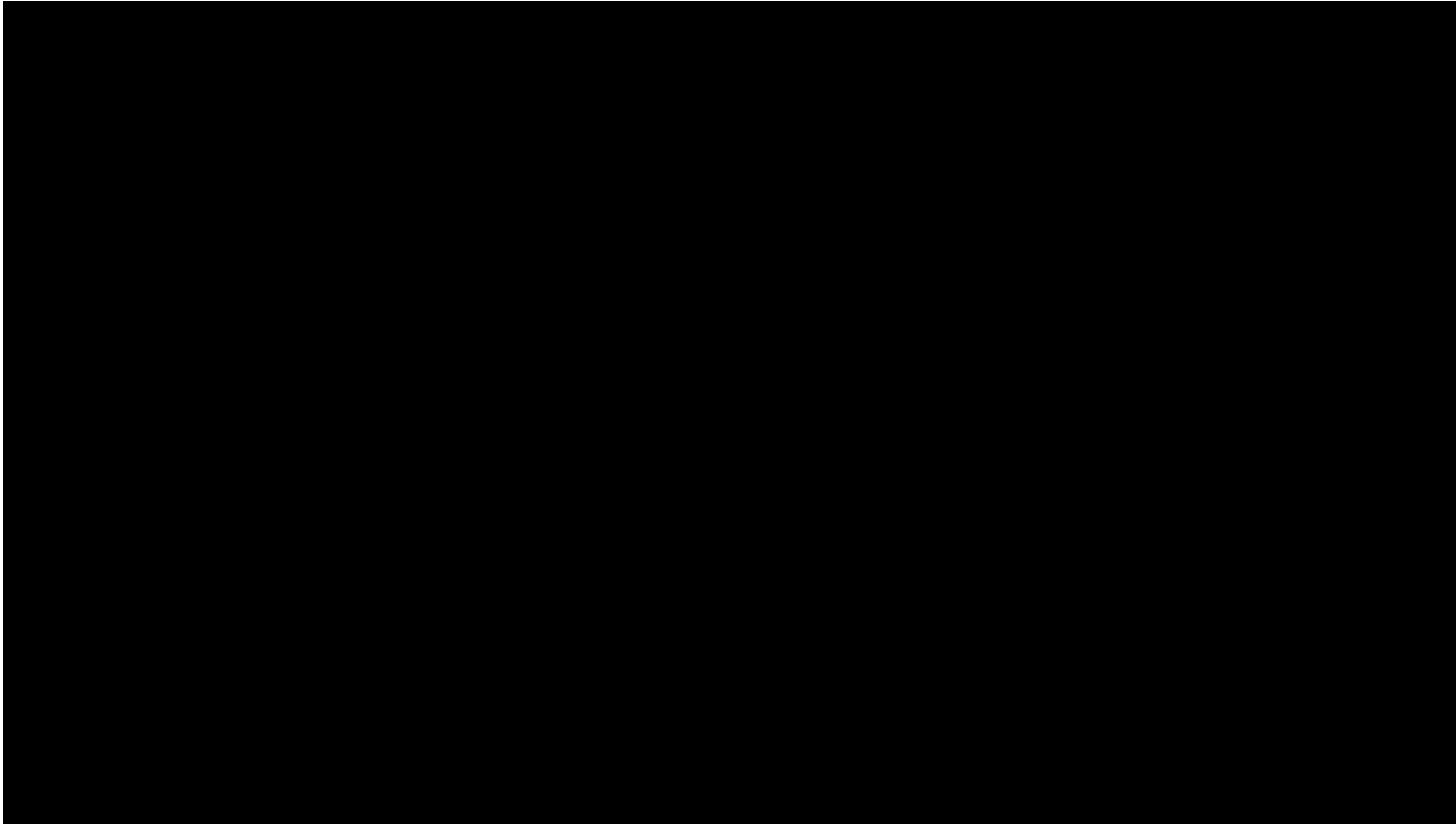
Alexandra Evancho, PT, DPT

# Alabama BRAIN Lab @ UAB



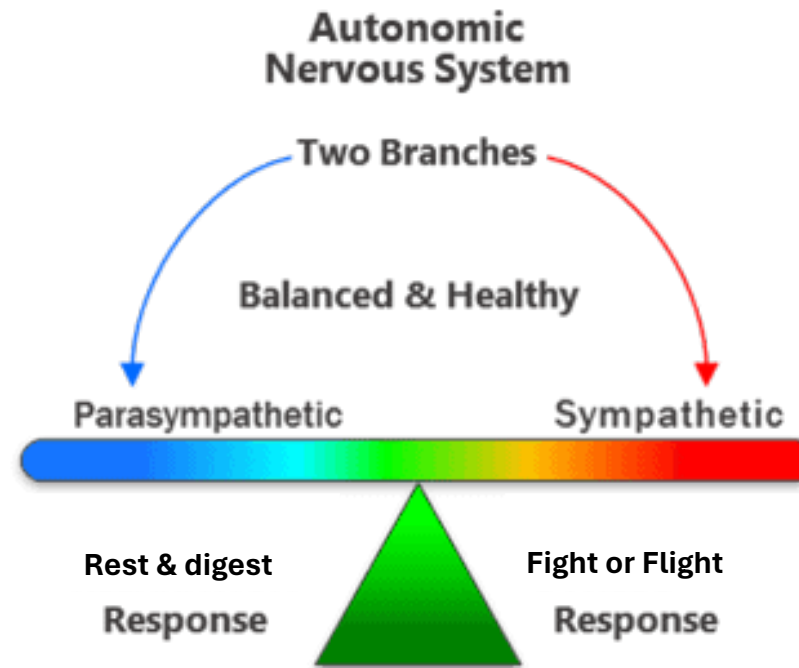
- Group of engineers, clinicians, and researchers at UAB focused on reducing the average 17-year gap between basic research and clinical practice
- Led by Dr. Jamie Tyler, PhD – Professor in Biomedical Engineering, PM&R, and Occupational Therapy at UAB
- Executive leadership – Dr. Keith McGregor, PhD – Associate Professor in Clinical and Diagnostic Sciences at UAB

# ABL Video



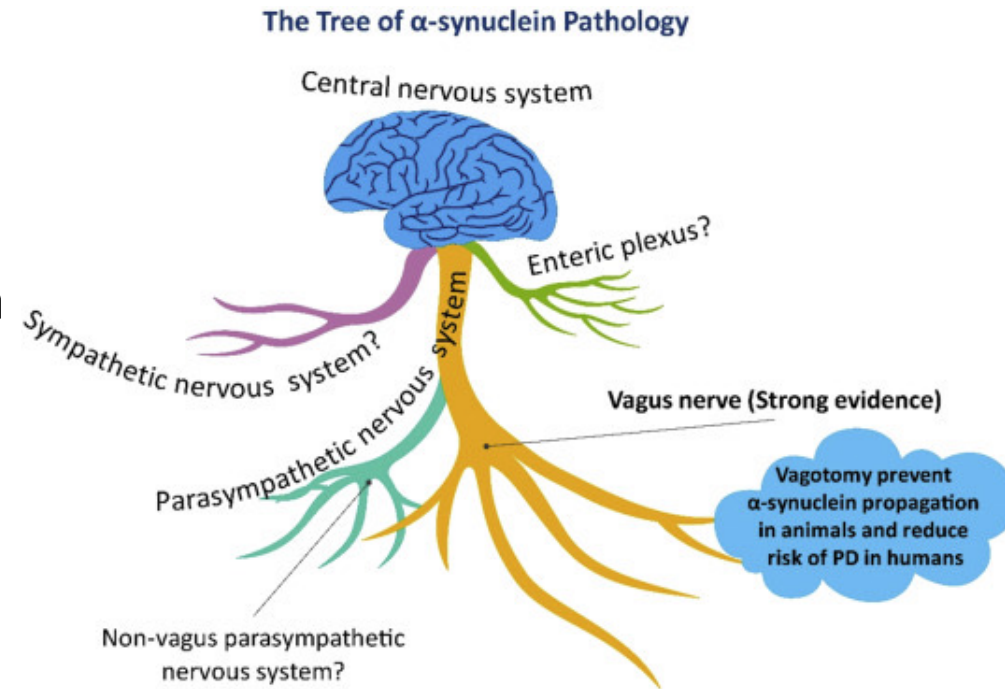
# The Autonomic Nervous System (ANS)

- Controls body's AUTOMATIC functions
  - Sympathetic Nervous System (SNS) – “fight or flight”
  - Parasympathetic Nervous System (PNS) – “rest & digest”
- Balancing act between the SNS and PNS
- Regulates heart rate, blood pressure, digestion, breathing



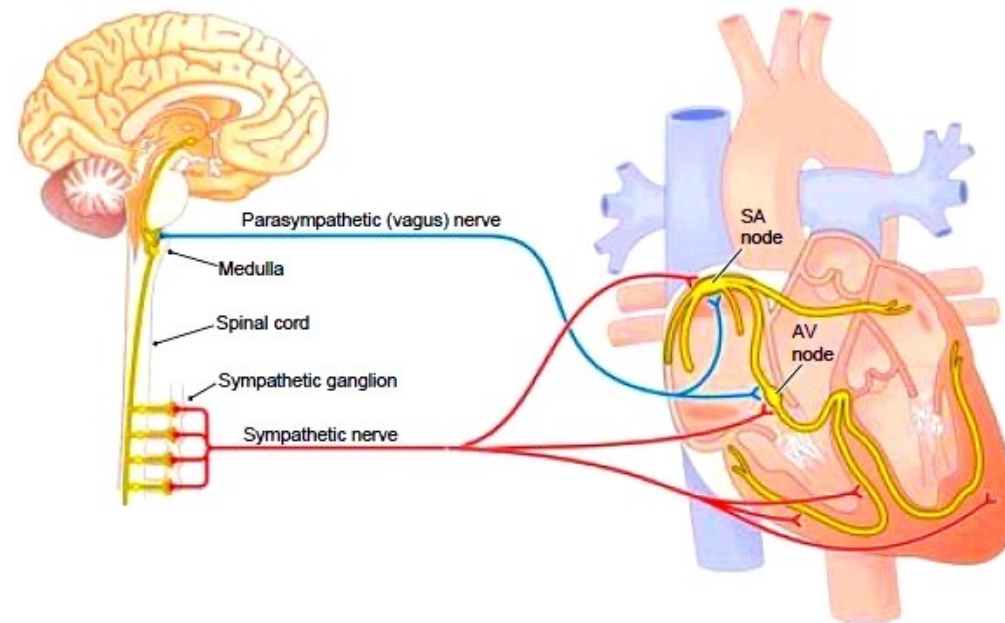
# Dysautonomia in PD

- Dysautonomia (dysfunction of ANS) common in PD (Goldstein 2014)
- Problems with both branches of the ANS (SNS and PNS) identified (Goldstein 2014, Chen 2020)
- Leads to an imbalance of the ANS, causing dysautonomia
  - Orthostatic hypotension
  - GI dysfunction
  - Sleep disturbance



# Exercise in PD

- Strong evidence to show that exercise can slow disease progression (Feng 2020)
- Exercise increases heart rate, leads to increased blood flow to the brain (Petzinger 2015)
  - Increase of HR with exercise under control of the ANS
- BUT – individuals with PD have a blunted HR response to exercise (Werner 2006)
  - Caused by problems with the ANS





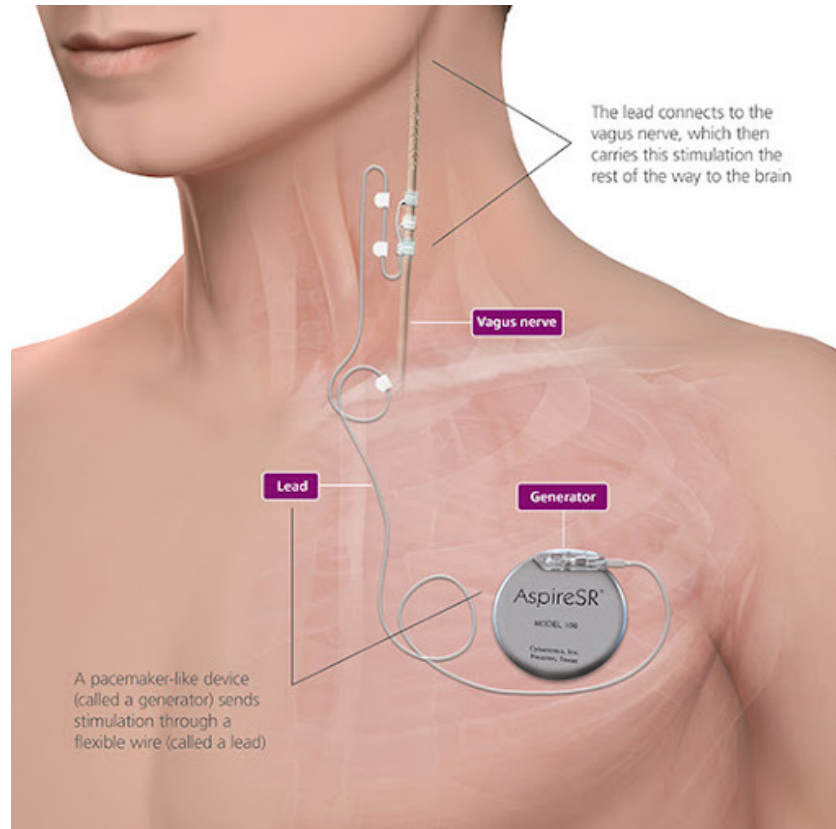
# The Vagus Nerve (VN)

Vagus Nerve – 10<sup>th</sup> cranial nerve

- Regulates PNS branch of the ANS
- Degradation has been found in PD (Hoppner 2023)
- Touches lungs, liver, small and large intestine, and **heart**
- Contributes to the regulation of heart rate during exercise (Gourine 2019)



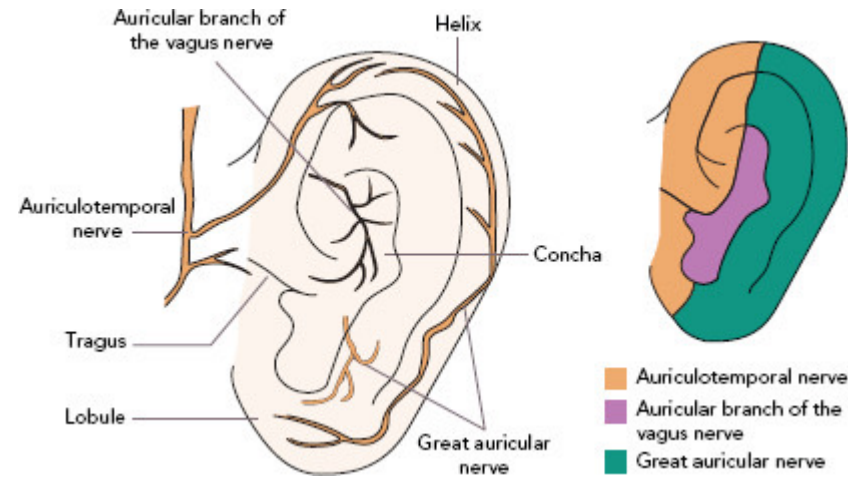
# Vagus Nerve Stimulation



- Implanted VNS is FDA approved for treatment of epilepsy & treatment-resistant depression
- Requires surgical procedure
- VNS + rehabilitation for individuals post stroke = improved outcomes (Dawson 2021)

# Transcutaneous Auricular Vagus Nerve Stimulation (taVNS)

- Non-invasive version of Vagus Nerve Stimulation
- Targets a branch of your Vagus Nerve that is in the ear (auricular branch of the vagus nerve)
- Similar mechanism of action of implanted VNS (Yap 2020)
- Dr. Tyler developed hydrogel electrodes that go in your ear like earbuds



# Can combining taVNS with exercise improve outcomes for individuals with PD?

- Hypothesis: taVNS will restore autonomic balance, leading to improved cardiovascular response to exercise
- Improved exercise response = improved outcomes?
- Initial assessment – measure cognitive and physical function
- Treatment – 3x/week for 4 weeks
- Post-test assessment – re-measure cognitive and physical function after treatment, again at 4 weeks



# Treatment sessions

- 15 minutes of taVNS prior to exercise (active vs. sham)
- HR monitor worn during taVNS treatment to monitor PNS and SNS activity
- Blood pressure taken before and after stimulation
- 45 minutes of Large-amplitude movements
  - Exercise program specifically developed for individuals with PD
  - Addresses bradykinesia, spasticity, tremor
- HR monitor worn during exercise to monitor PNS and SNS activity
- Blood pressure taken after exercise

# Large-amplitude movements



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**Enrolling now! See Alex for  
details 😊**

Thank you!

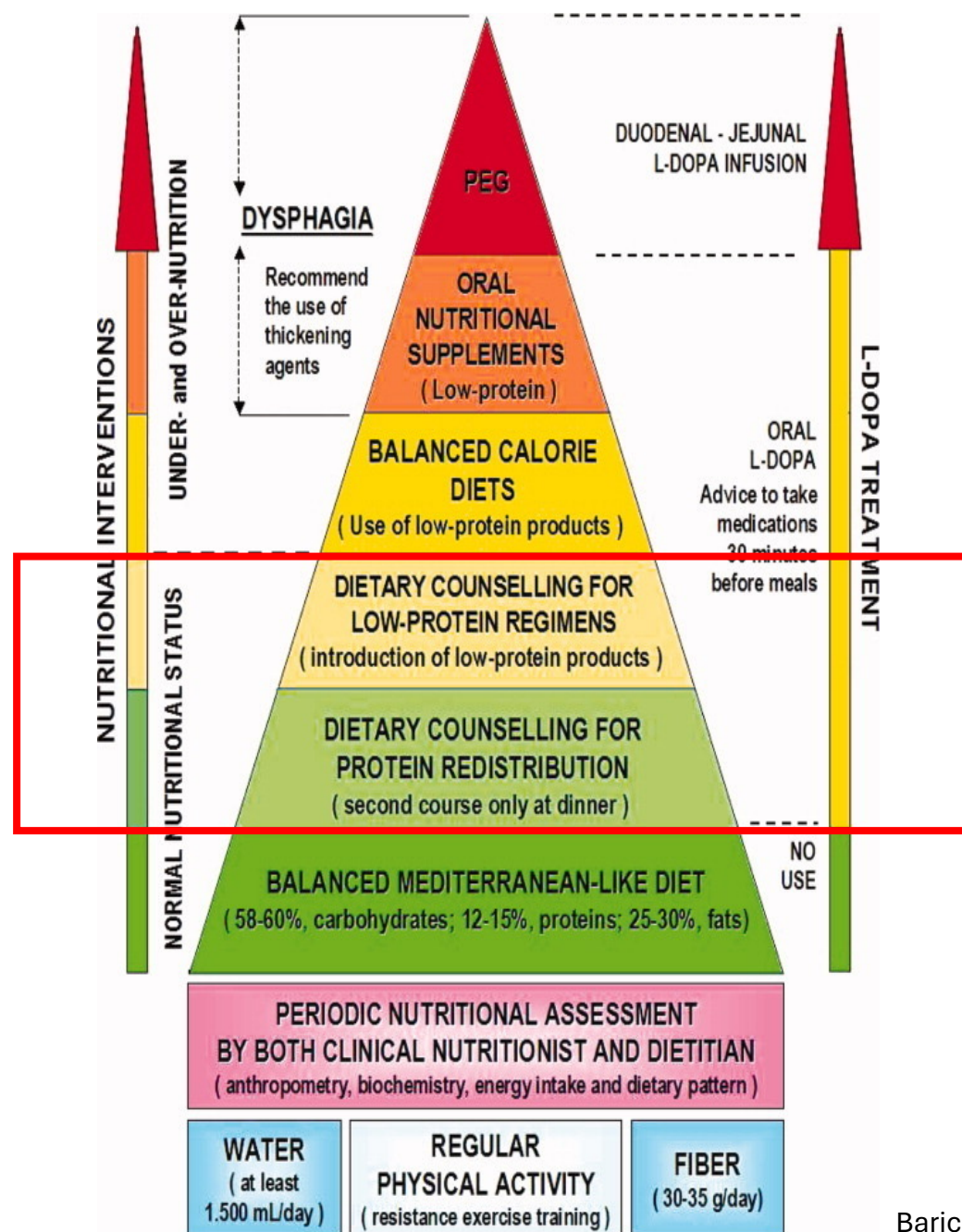
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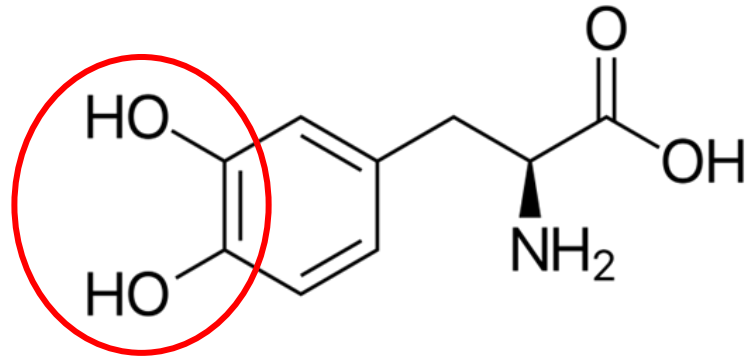
# Does protein from food matter for symptoms, sleep and muscle health in PD?

Christine Ferguson, PhD, RD, CSG

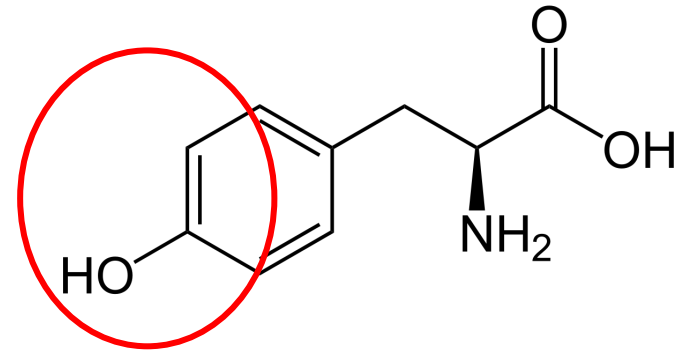


Barichella et al. (2009) *Mov Disord.*

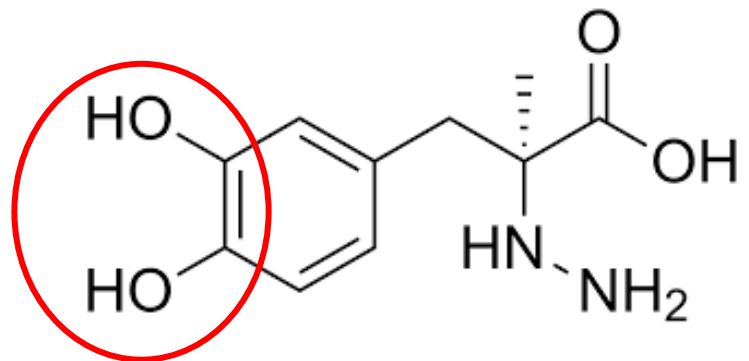
# Spot the difference



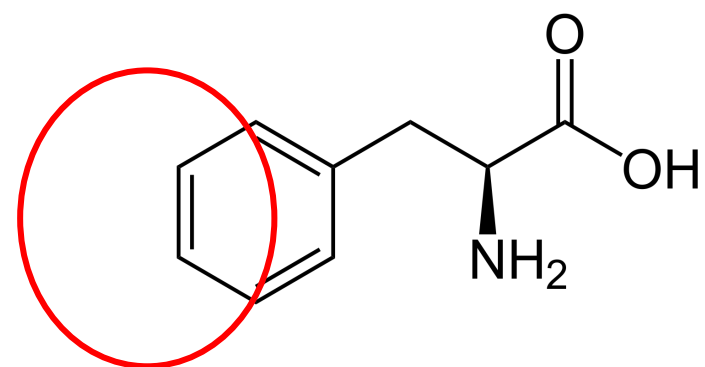
**Levodopa**



**Tyrosine**



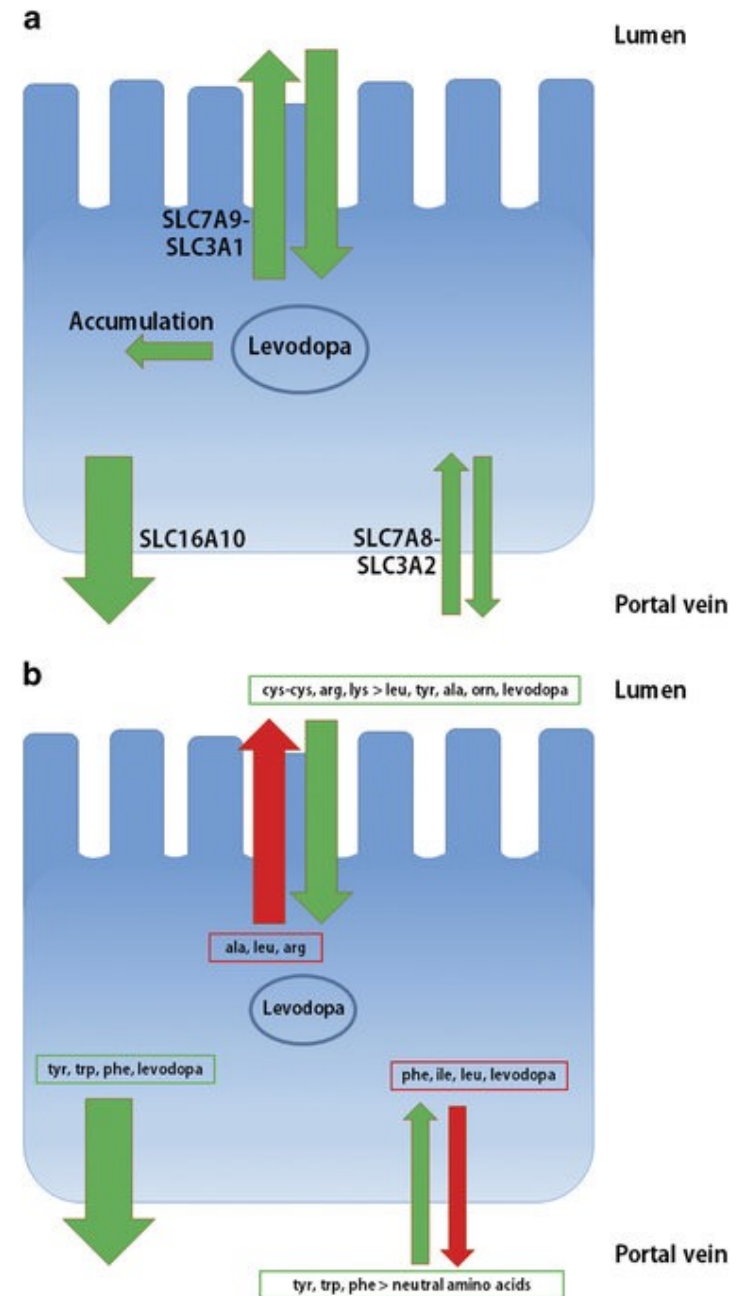
**Carbidopa**



**Phenylalanine**

# Food-Drug Interaction

- Absorbed via saturable L-neutral amino acid transport system



Guebila MB and Thiele I (2016) *NPJ Syst Biol Appl*

# Protein and Sleep in PD

- 74-98% of people with PD experience sleep disorders (Lees et al. (1988) *Clin Neuropharmacol*; Nausieda et al. (1982) *Clin Neuropharmacol*)
  - Sleep fragmentation, REM sleep behavior disorder, daytime sleepiness, and insomnia
- Digestion of protein may worsen sleep quality, but specific amino acids (e.g., tryptophan) may improve time to fall asleep (sleep latency) (Lees et al. (1988) *Clin Neuropharmacol*;

**No dietary interventions to address sleep disorders in PD**

# Aging, Skeletal Muscle, and Protein Timing

*Am J Physiol Endocrinol Metab* 286: E321–E328, 2004.  
First published October 28, 2003; 10.1152/ajpendo.00368.2003.

Amino acid ingestion improves muscle protein synthesis in the young and elderly

Douglas Paddon-Jones,<sup>1,2</sup> Melinda Sheffield-Moore,<sup>1,2</sup> Xiao-Jun Zhang,<sup>1,2</sup> Elena Volpi<sup>1,2</sup>  
Steven E. Wolf,<sup>1,2</sup> Asle Aarland,<sup>1-3</sup> Army A. Ferrando,<sup>1,2</sup> and Robert R. Wolfe<sup>1-3</sup>  
Departments of <sup>1</sup>Surgery and <sup>3</sup>Anesthesiology, The University of Texas Medical Branch, and <sup>2</sup>Shriners Hospitals for Children, Galveston, Texas 77550

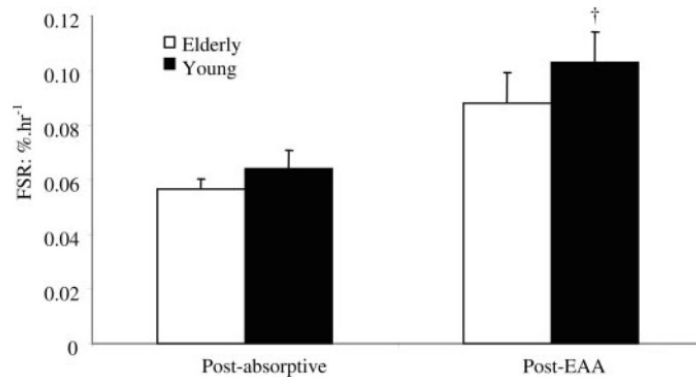
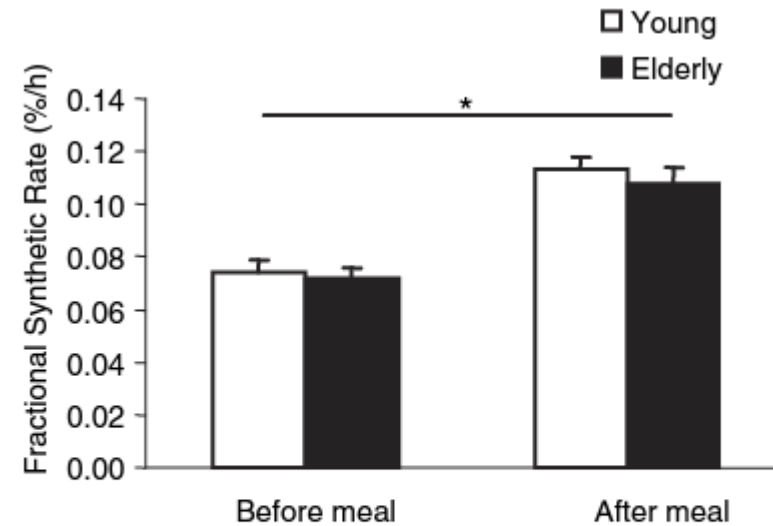


Fig. 5. Mixed muscle fractional synthetic rate (FSR) in young and elderly before and after ingestion of 15 g of EAA. †Significant difference from corresponding postabsorptive values: young,  $P = 0.012$ ; elderly,  $P = 0.029$ .

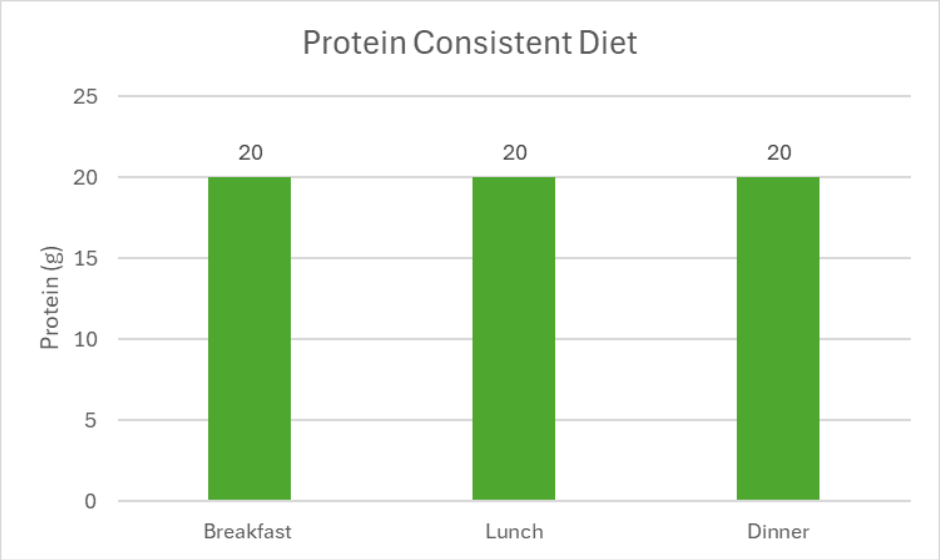
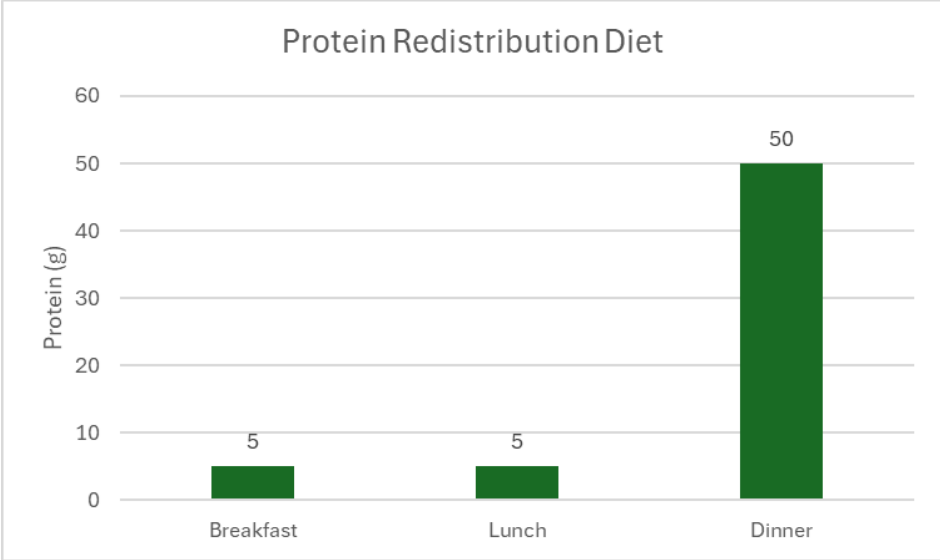
Aging does not impair the anabolic response to a protein-rich meal<sup>1-3</sup>

T Brock Symons, Scott E Schutzler, Tara L Cocke, David L Chinkes, Robert R Wolfe, and Douglas Paddon-Jones



**FIGURE 2.** Mean ( $\pm$ SEM) corrected mixed-muscle fractional synthesis rate before and after ingestion of 113 g of 90% lean beef in elderly ( $n = 10$ ) and young ( $n = 10$ ) persons. Changes in fractional synthesis rate were analyzed with the use of repeated-measures ANOVA with 2 between-subject factors (age and sex) and 1 repeated-measures factor (time). \*Significant main effect for time after beef ingestion ( $P < 0.001$ ).

# Protein Redistribution vs Consistent Diet



# Specific Aims & Measures

Aim 1. Quantify the effects of dietary protein on skeletal muscle in PD

- i. Circulating biomarkers associated with muscle catabolism
  - i. Serum growth differentiation factor 15 (GDF15)
  - ii. Serum fibroblast growth factor 21 (FGF21)
- ii. Handgrip strength

Aim 2. Determine the effects of dietary protein pattern on sleep quality in PD

- i. Sleep actigraphy



# Participants



Eligible if:

- PD diagnosis for >5 years
- 45 years or older
- Stable Ldopa regimen
- Self-reported motor fluctuations
- No dietary restrictions that would preclude participation
- No medical conditions that would preclude participation
  - E.g., CKD, **deep brain stimulation**, stroke, untreated low/high blood pressure, chest pain, pregnancy

# CEDHARS Adaptive Human Performance Lab

AHPL provides services for exercise, nutrition, physical activity, and health assessments and interventions for research related to improving physical and psychological well-being of people with disabilities.



- 3,000 sq ft lab space
- Adaptive equipment
- Staff trained in inclusive protocols/techniques
- Services: phlebotomy, body composition, maximal and submaximal exercise testing, functional or mobility testing, supervised exercise training, tele-exercise

# Participant Involvement

## Study Overview

- 5-week study: 2 weeks on PCD, 1 week break, 2 weeks on PRD (randomized order)
- 4 in-person study visits on Lakeshore campus
  - Blood draw
  - PD Assessment (MDS-UPDRS)
  - Handgrip strength

## Support from Team

- One-on-one diet education
- Structured meal plans with recipes and shopping lists
- Meal plan checklists and food records

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Thank you!

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**Thank you!**