



# The Dizzy in Parkinson's Disease

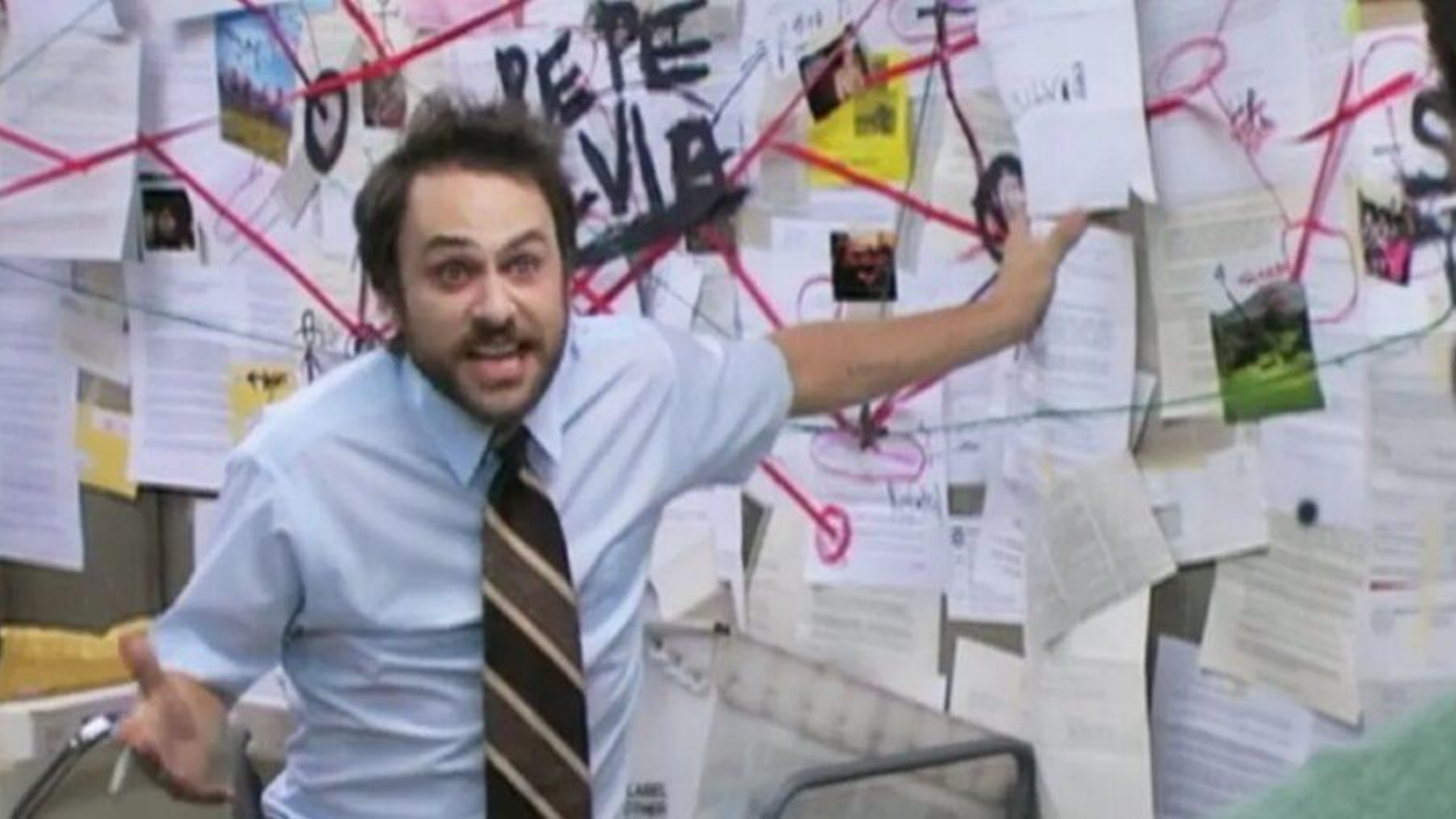
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# Objectives

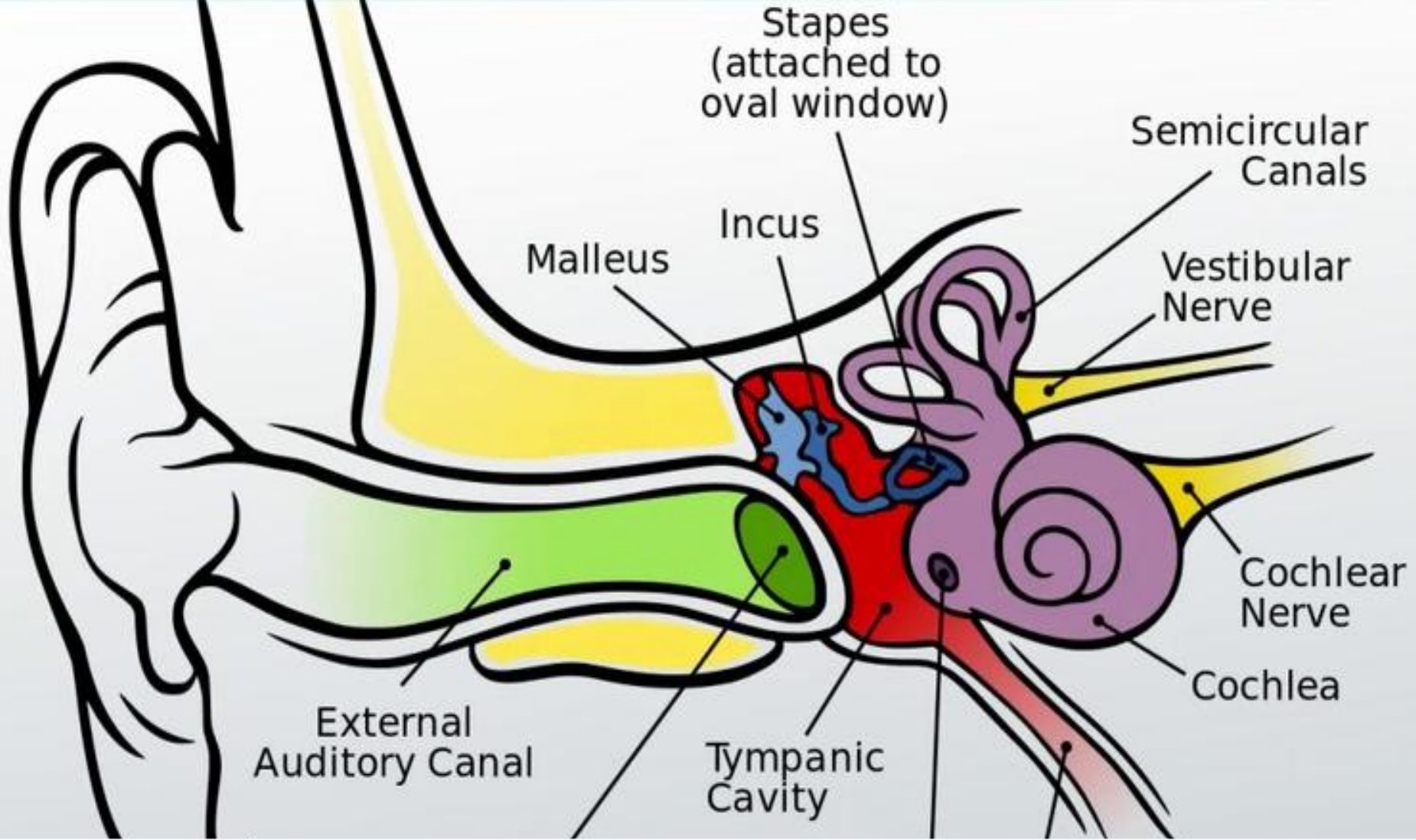
- Will understand central and peripheral vestibular anatomy and function
- Will know the interplay of sensory systems and how it affects our balance and potential dizziness
- Will understand how vestibular and/or sensory dysfunction is affected by Parkinson's Disease
- Will be familiar with conditions directly related to PD that may cause dizziness





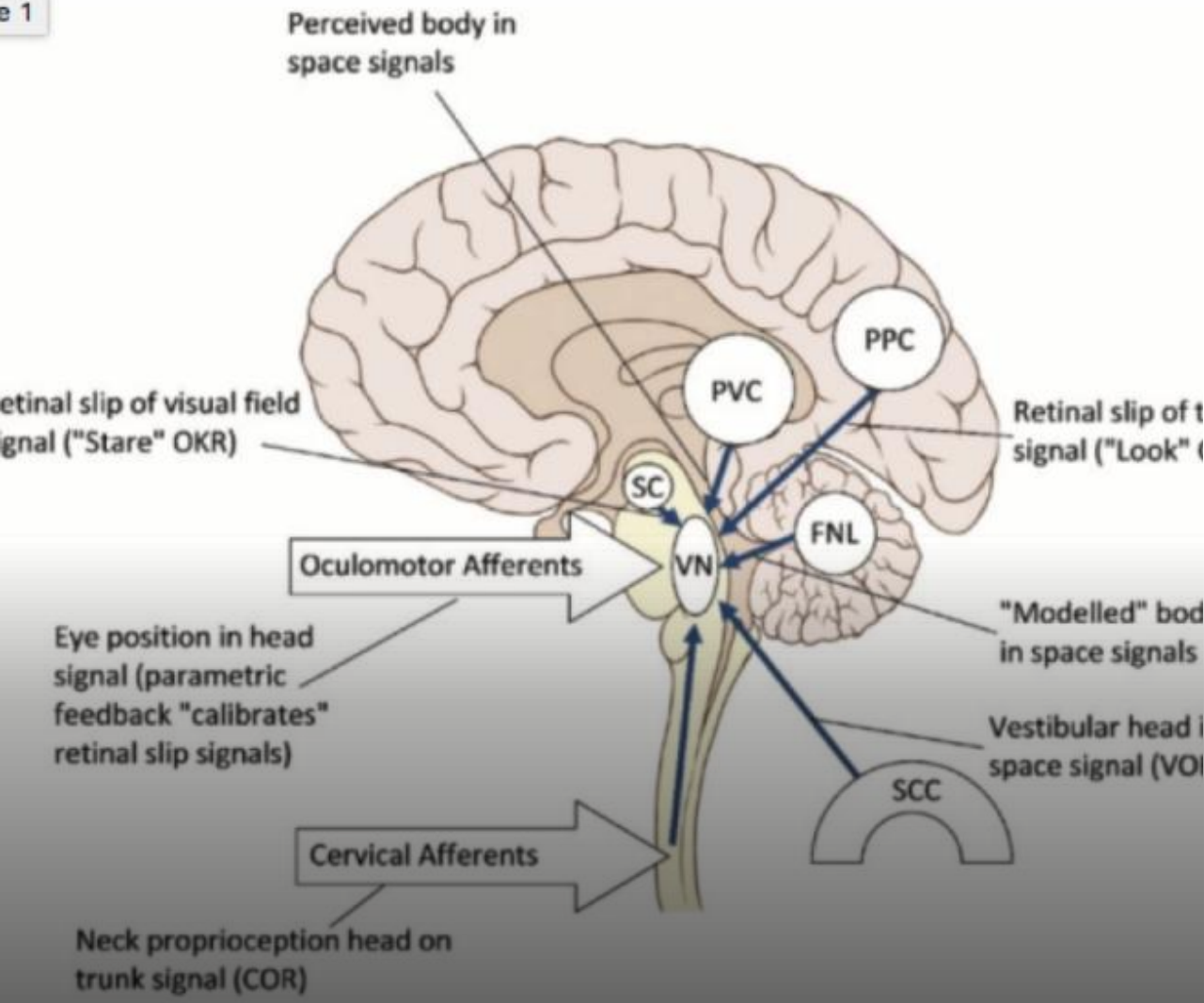
# What does “Dizzy” mean?

- Lightheadedness
- Nausea
- Feeling off
- Unsteady
- Spinning
- Sea-sick
- World is spinning
- Falling
- Pulled to the side
- Etc. etc. etc.



## The Vestibular System

Window

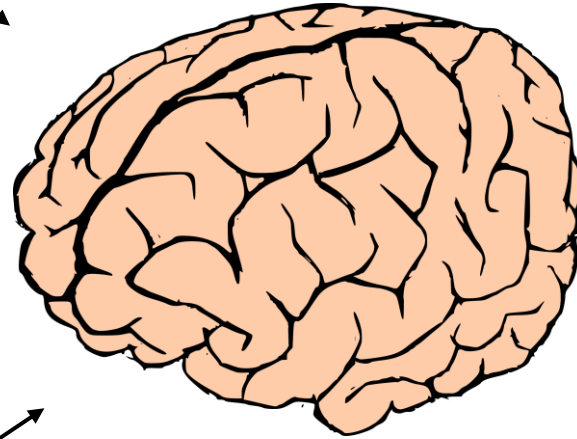
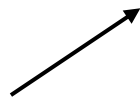
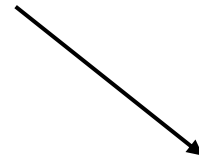
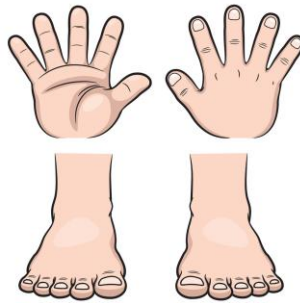
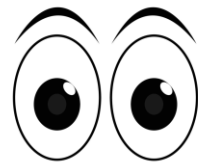


# Central

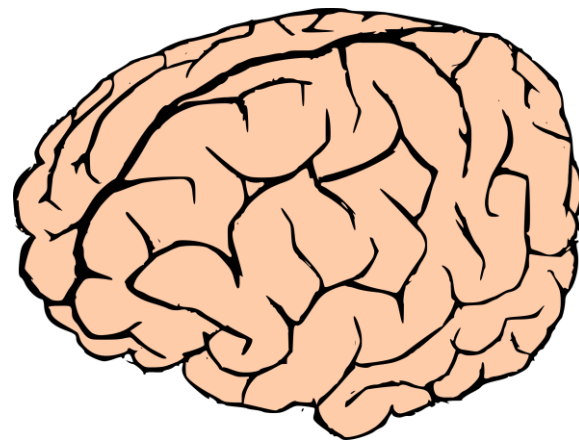
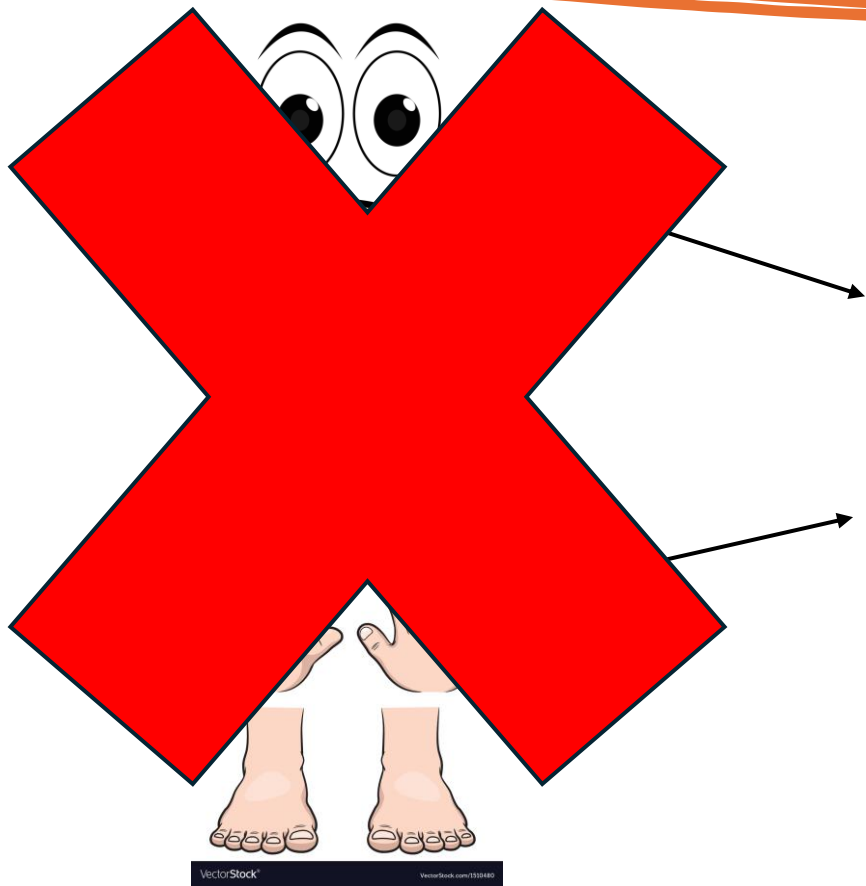
- VN Vestibular Nuclei
- FNL Flocculonodular Lobe
- SCC Semicircular Canals



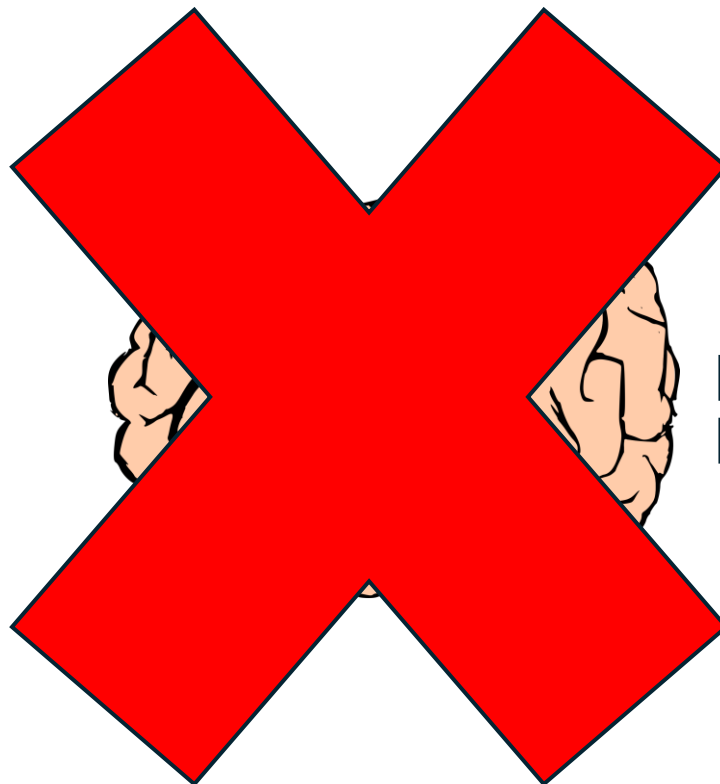
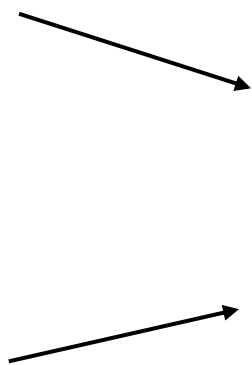
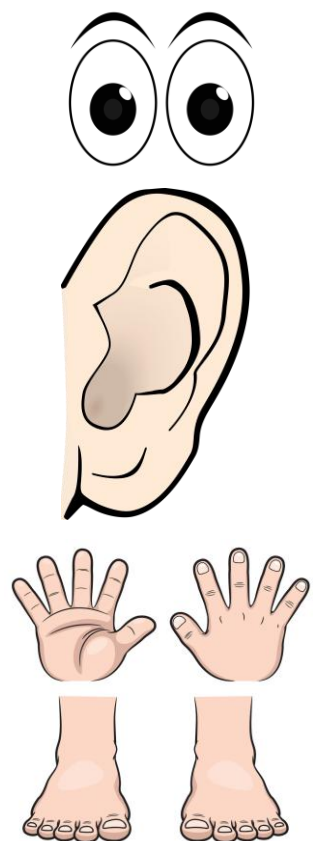
# Normal Sensory Integration



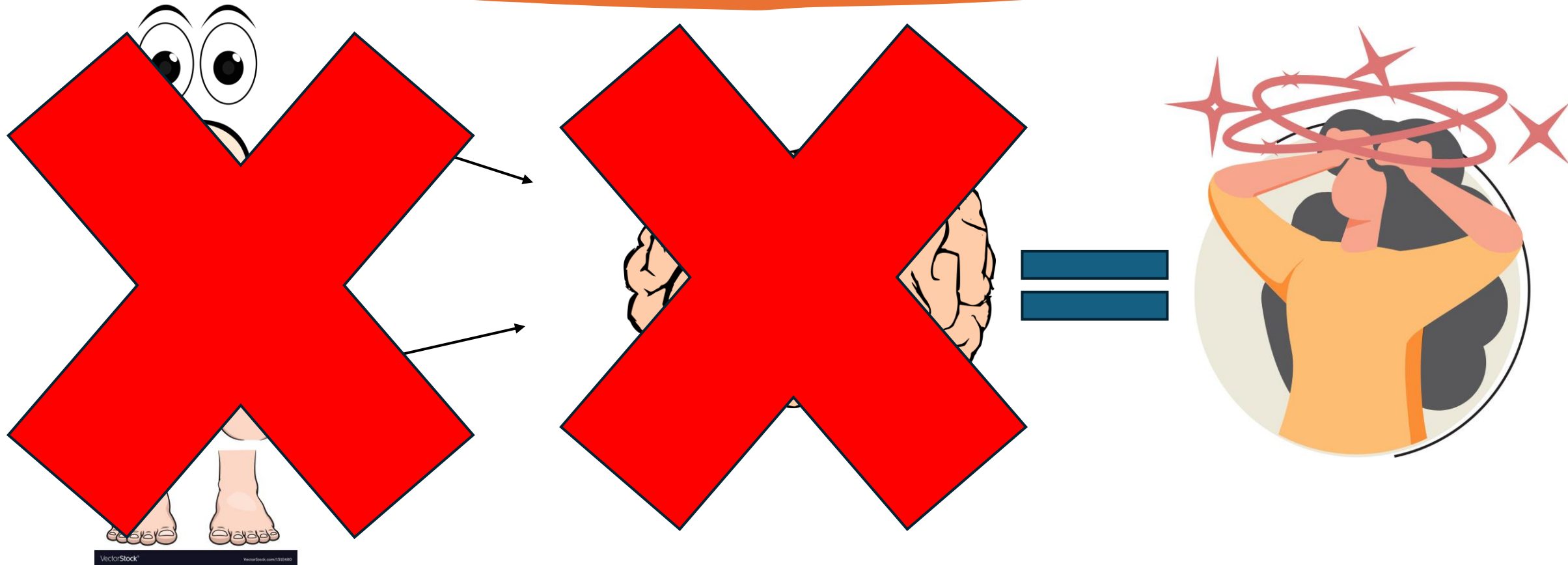
# Peripheral Dysfunction



# Central Dysfunction



# Central and Peripheral Dysfunction



# Dizziness with Parkinson's



**Primary Associated**



**Secondary Associated**



**Comorbid/Other**

Primary  
Associated  
Dizziness



Dizziness that is a direct result,  
or directly related, to the disease  
process of Parkinson's disease



Loss of dopamine in the  
substantia nigra in the basal  
ganglia

# Primary Associated Dizziness in PD



2x higher rate of Dizziness in PwPD vs controls<sup>1</sup>

Vestibular dysfunction in PD associated with motor symptoms<sup>1,2,3,4</sup>

Imbalance in PwPD directly results inability to effectively interpret vestibular information due to loss of nigrostriatal dopamine during disease progression<sup>4</sup>

Alterations in vestibular activity increase with disease progression<sup>5,6</sup>

Vestibular processing deficits linked to Freezing of Gait (FoG)<sup>7,8</sup>

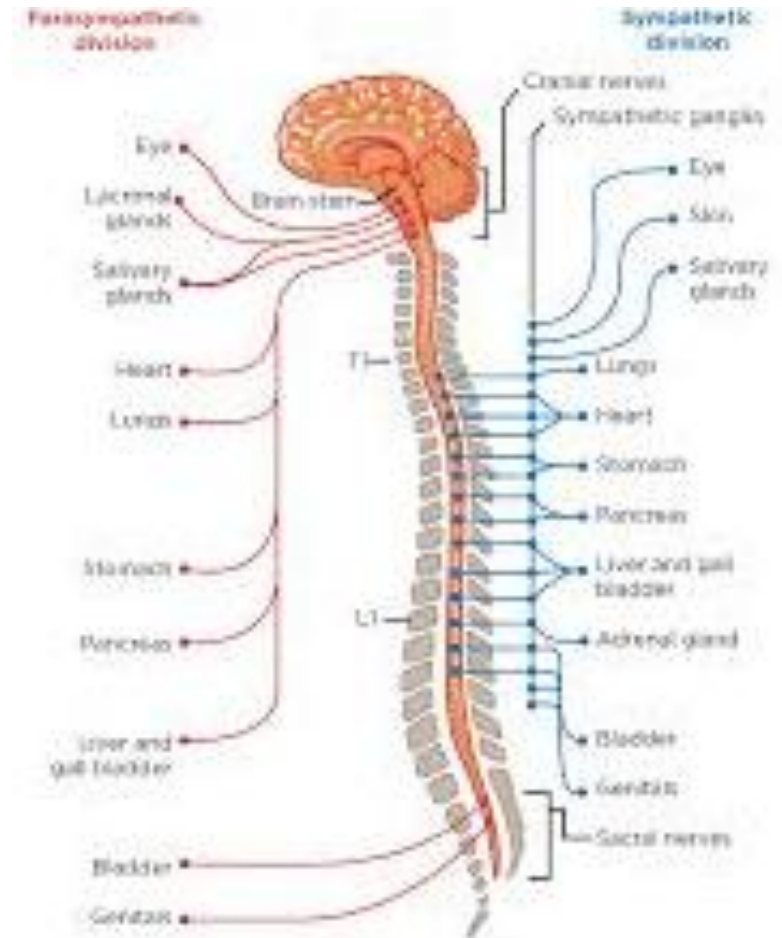
# Primary: Dysautonomia



## “Dysfunction of the Autonomic nervous system”

### “Fight or Flight”

- Gastrointestinal
- Heart Rate
- Blood pressure
- Bowel/Bladder function
- Sexual function
- Temperature Regulation





# Primary: Dysautonomia



Neurocardiological phenomenon that results in orthostatic hypotension<sup>9</sup>

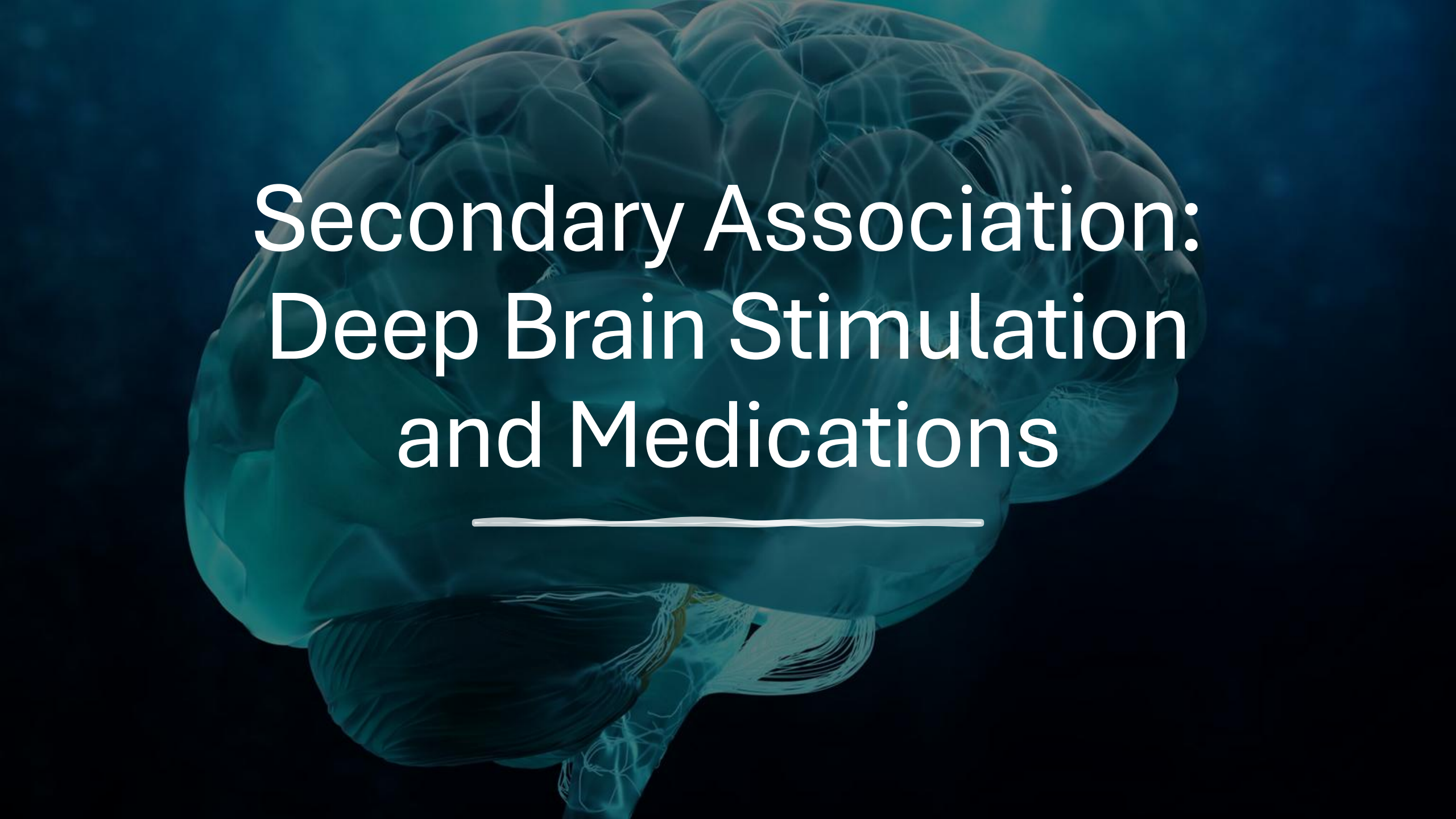
- Low Blood pressure
- Most common cardiovascular sign in dysautonomia

$\alpha$ -synuclein aggregation and autonomic denervation has been widely observed as a link to dysautonomia<sup>9,10</sup>

- No specific culprit as it relates to PD

Primary:  
Dysautonomia

“Software Issue”



# Secondary Association: Deep Brain Stimulation and Medications

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# Deep Brain Stimulation and Dizziness

- Strictly professional experience
- Discuss with your neurologist



# Medications and Dizziness

- Dizziness is a very common side effect in many medications
- Common PD Medications
  - **Carbidopa/Levodopa (Sinemet)**
  - Pramipexole
  - Selegiline
  - Entacapone
  - Ropinirole
  - Etc.
- Cardiovascular medication (blood pressure, heart failure meds)



“Other”

You are still human and can have other causes to your dizziness besides PD!

- Examples
- Orthostatic hypotension
- Postprandial hypotension
- BPPV (crystals in your ear)
- Meniere’s Disease
- Hx of head injuries
- The list goes on.....

# Moral of the story?



DIZZINESS CAN BE  
IMMENSELY COMPLEX



PWPD HAVE HIGHER RISK OF  
EXPERIENCING DIZZINESS



DIZZINESS MAY OR MAY NOT  
BE ASSOCIATED TO PD

# What Can I Do?

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Keep track of your symptoms

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Things that help and make it worse

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How long do symptoms last

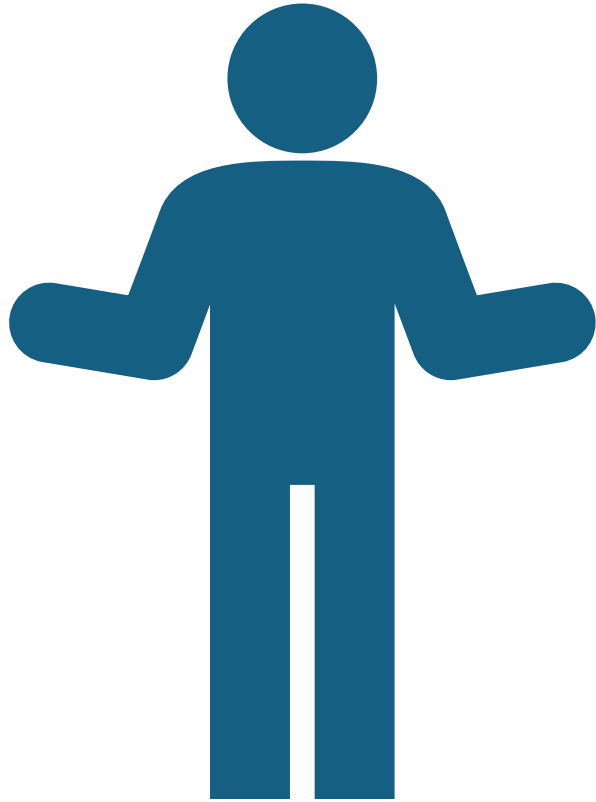
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What is your dizziness like?

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When did it start?





# What Can I Do?

Don't be afraid to get your  
dizziness evaluated

# References:

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Thank You!



Questions