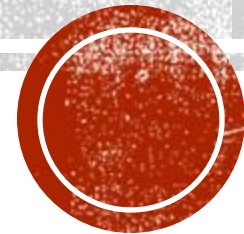


# EXERCISE AND PARKINSON'S: WHY, HOW, WHAT

John Herndon, MD MFA

OHSU Center for Parkinson's and Movement Disorders

2024

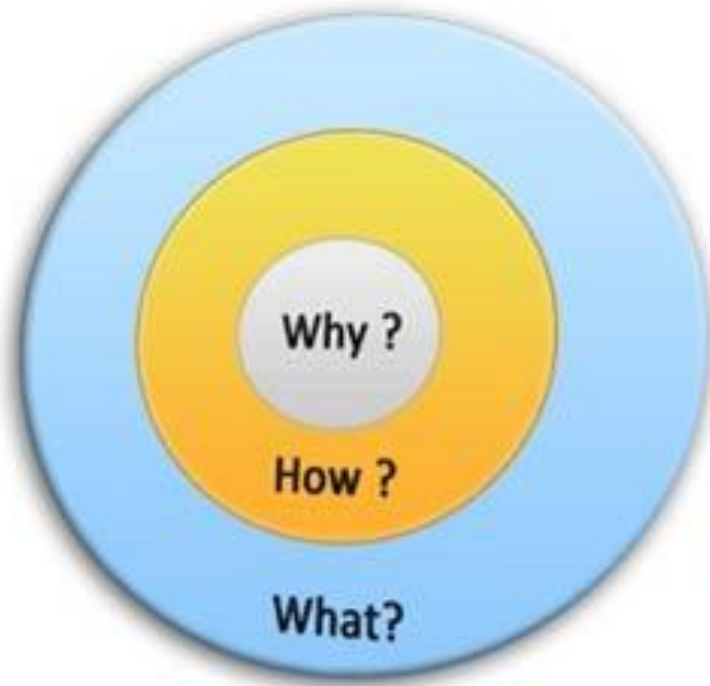


# DISCLOSURES

- None
- I want you to exercise.
- !
- !!
- !!!



# OVERVIEW



**Why** = The Purpose

*What is your cause? What do you believe?*

**How** = The Process

*Specific actions taken to realize the Why.*

**What** = The Result

*What do you do? The result of Why. Proof.*



# WHY SHOULD I EXERCISE

- Bones
- Muscles
- Cardiopulmonary



- **Brain:**
  - Cerebral blood flow: angiogenesis
  - Brain-derived neurotrophic factor (BDNF)
    - Neuroprotective for dopamine producing cells
  - Neuroplasticity : synaptogenesis
  - Gray matter volume
  
- Dose effect on neuron count
  
- Start early to PROTECT neurons and function



# WHY : PD SPECIFIC

- Rigidity
- Posture
- Gait/balance – difficult to manage with medications or DBS
- Falls
- Getting up from chair/floor/bed
- Pain



# NON-MOTOR SYMPTOMS



Fatigue



Sleep



Memory



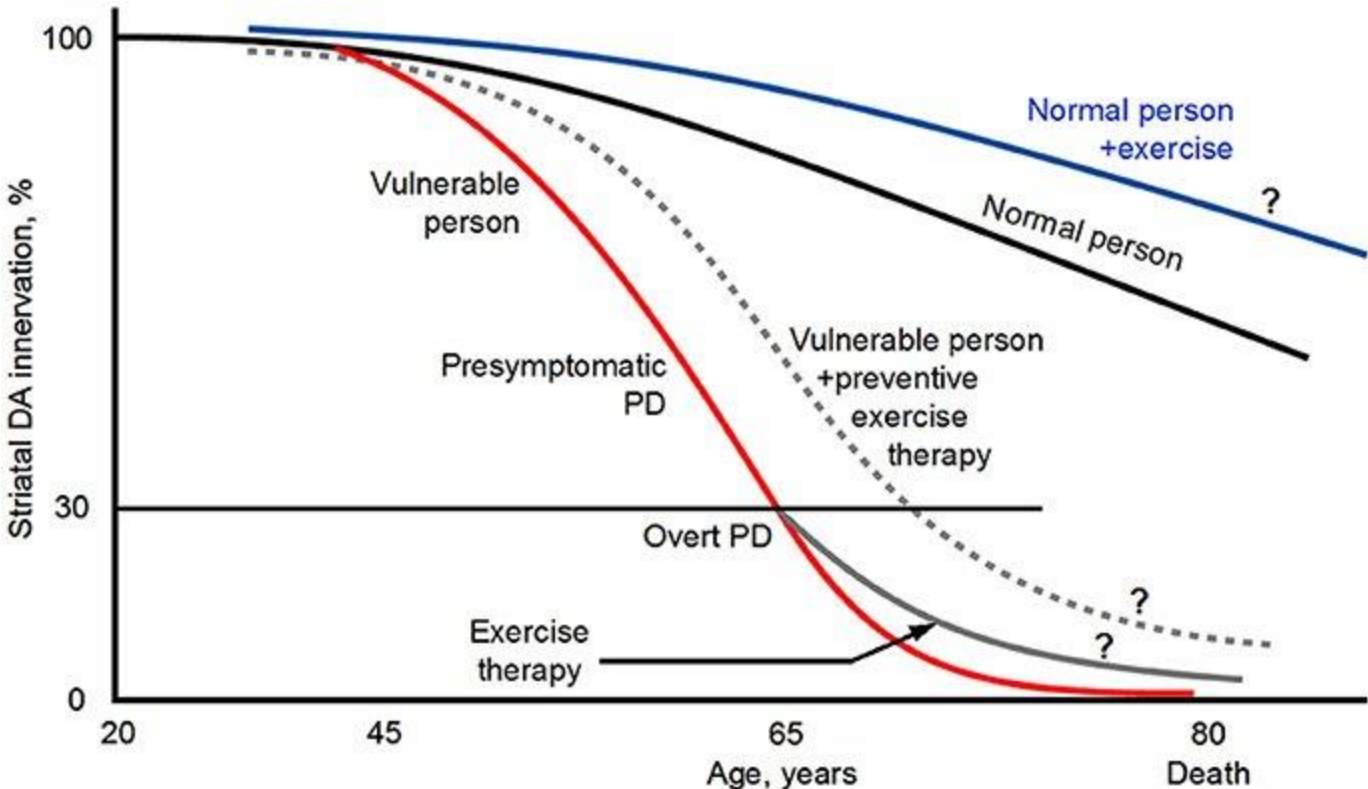
# DEPRESSION

- Can decrease pain and increase endorphins
- Improved QoL and depression with aerobic exercise
  - 3x/wk for 16 wks
  - 20 min → 45 min on treadmill (inc by 5 min per week)
  - 50% max HR → 75% (inc by 5% per week)

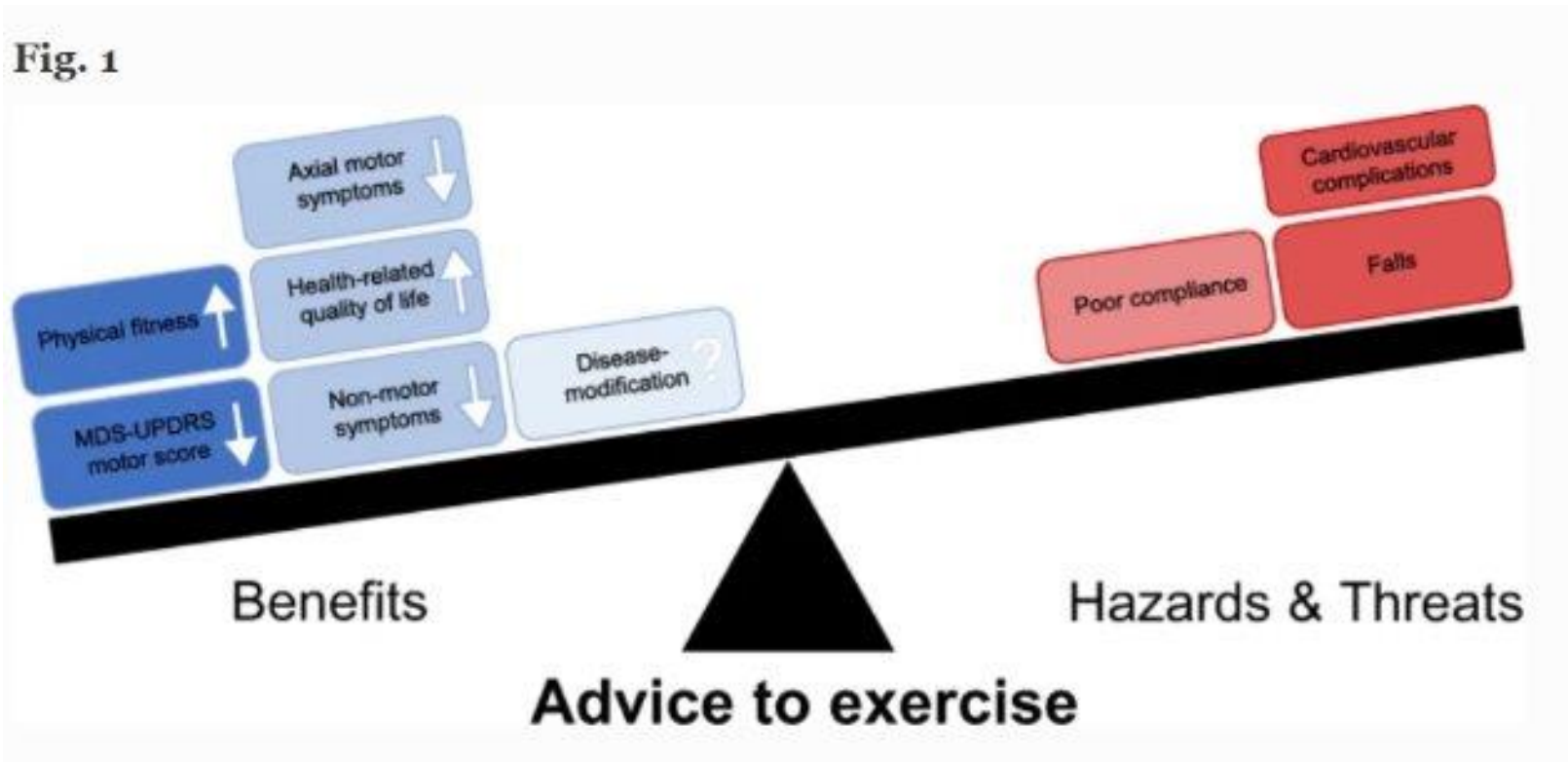




# AT THIS POINT: GOOD EVIDENCE FOR SYMPTOM MODIFICATION BUT NOT FOR DISEASE MODIFICATION



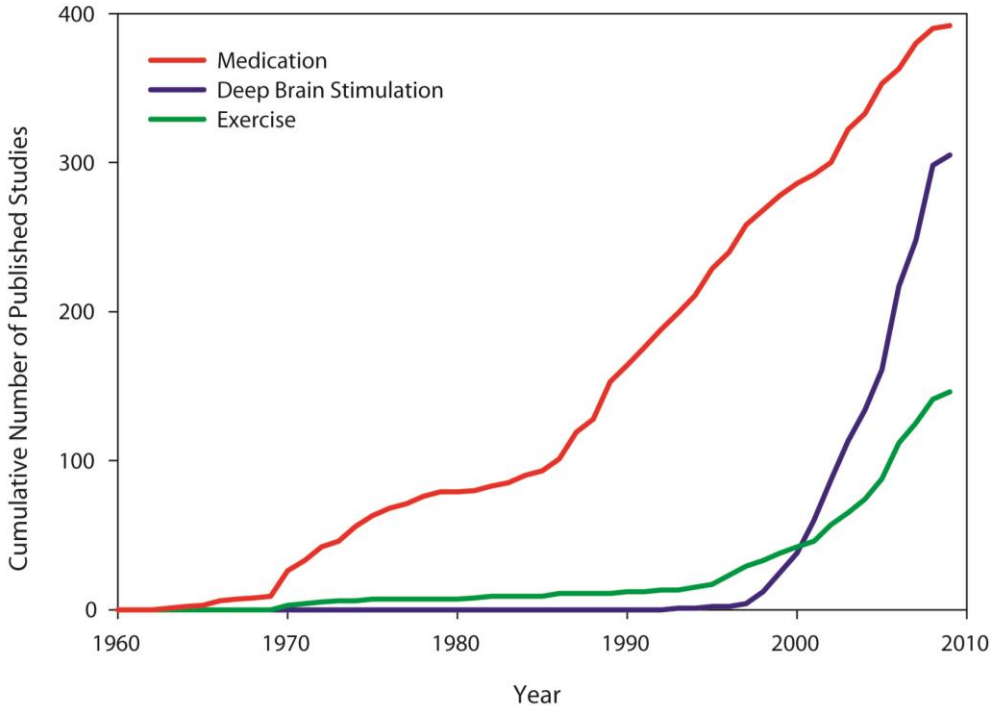
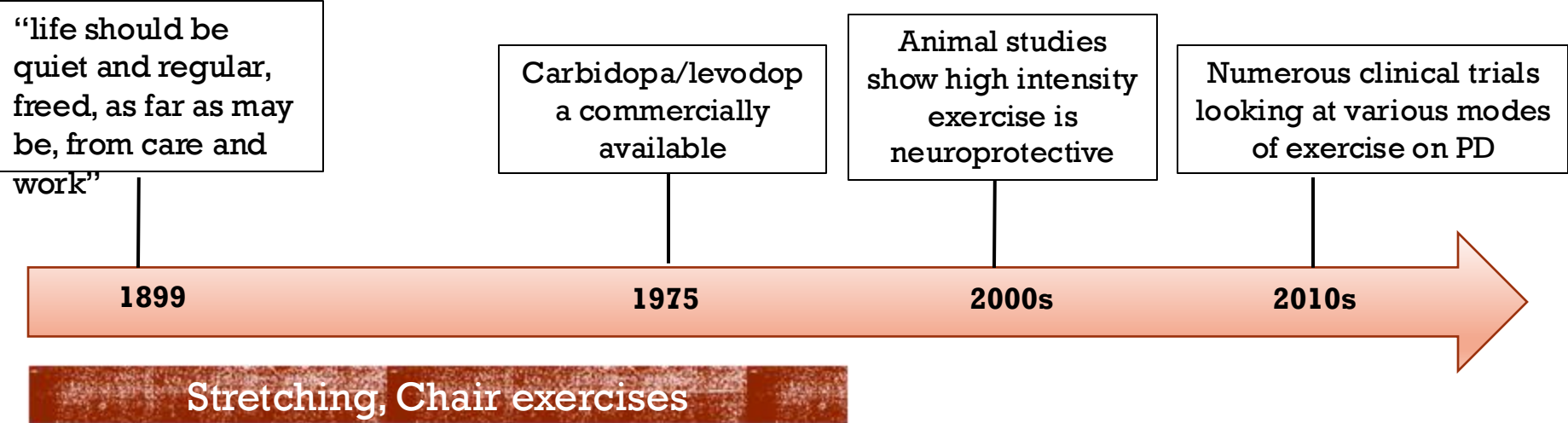
# SUMMARY OF WHY



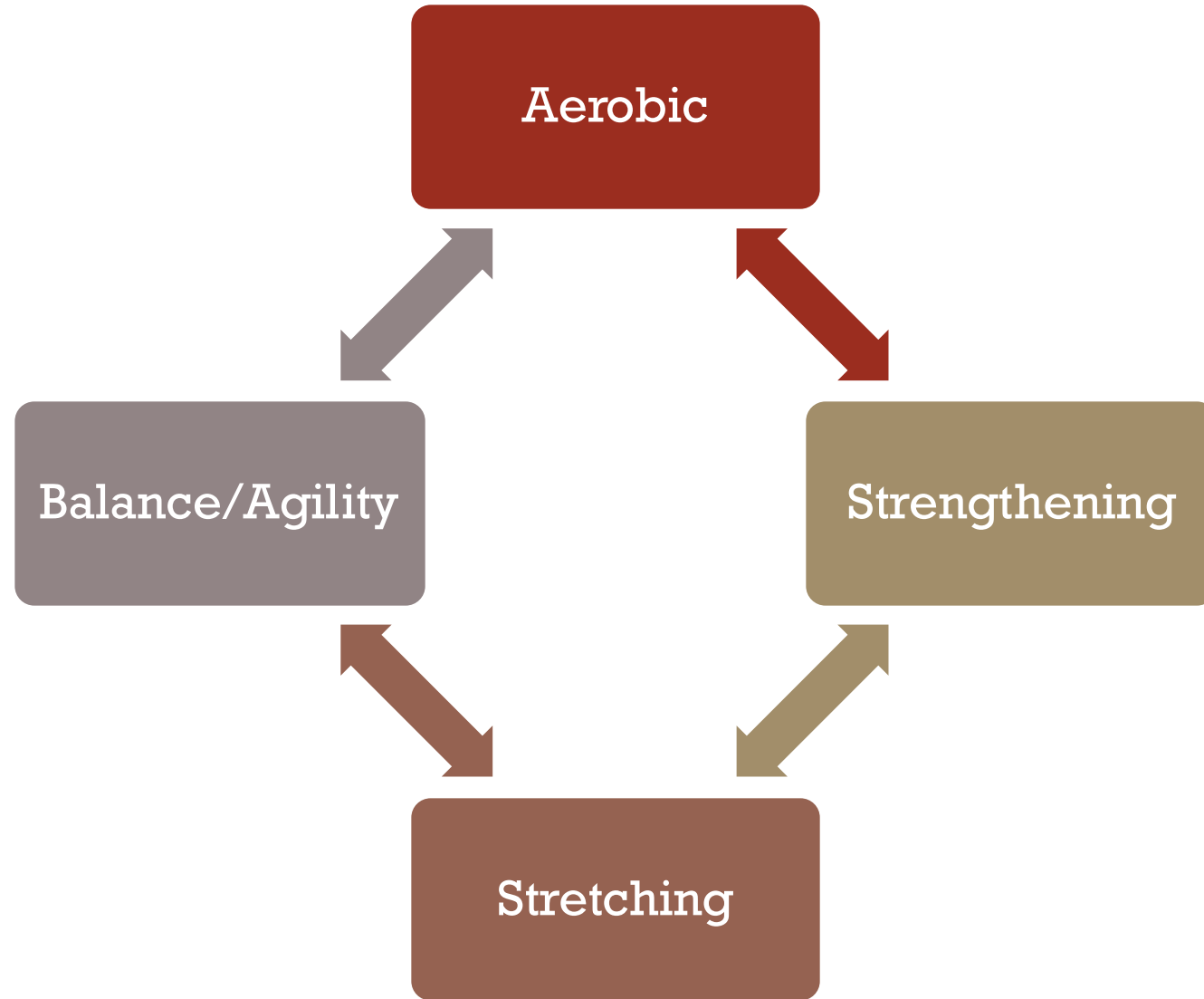
**ALL THAT SOUNDS  
GREAT...  
BUT NOW HOW?**



# Historical Perspective



# TYPES OF EXERCISE





# Physical Therapist Management of Parkinson Disease

## Clinical Practice Guideline

### Preliminary Recommendations

Jacqueline Osborne, PT, DPT, Terry Ellis, PT, PhD, Sujata Pradhan, PT, PhD, Miriam Rafferty, DPT, PhD, NCS, Cristina Colon-Semenza, PT, MPT, PhD, Janet Readinger, PT, DPT, Heidi Kosakowski, PT, DPT, PhD

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# AEROBIC

- **Benefit**
  - **High Quality Evidence**
    - VO2
    - Motor disease severity
    - Gait related outcomes
  - **Moderate Quality Evidence**
    - Non-motor symptoms
    - Balance
    - ADLs
    - QoL
- **Risks, Harms, Costs**
  - Does not cause harm if screened
  - Can cause minor musculoskeletal injuries
  - Important to pick the right mode



# A VERY GOOD PLACE TO START...

- The WHO recommends, at minimum, older adults (65+) should complete at least 150 minutes of moderate intensity or 75 minutes of vigorous intensity aerobic exercise per week





RPE SCALE	RATE OF PERCEIVED EXERTION
<b>10</b> /	<b>MAX EFFORT ACTIVITY</b> Feels almost impossible to keep going. Completely out of breath, unable to talk. Cannot maintain for more than a very short time
<b>9</b> /	<b>VERY HARD ACTIVITY</b> Very difficult to maintain exercise intensity. Can barely breathe and speak only a few words
<b>7-8</b> /	<b>VIGOROUS ACTIVITY</b> Borderline uncomfortable. Short of breath, can speak a sentence
<b>4-6</b> /	<b>MODERATE ACTIVITY</b> Breathing heavily, can hold a short conversation. Still somewhat comfortable, but becoming noticeably more challenging
<b>2-3</b> /	<b>LIGHT ACTIVITY</b> Feels like you can maintain for hours. Easy to breathe and carry a conversation
<b>1</b> /	<b>VERY LIGHT ACTIVITY</b> Hardly any exertion, but more than sleeping, watching TV, etc



Aerobic activities combined with movements that address specific symptoms are the most effective.

## BASIC PRINCIPLES

- Cardiovascular conditioning
- Big movements using large muscle groups
- Full, functional, sequential movements
- Speed drills (external vs internal generated)
- Progressive complexity of movements by varying contexts (sensorimotor or dual task)

## EXAMPLES

- Cardio equipment: treadmill/stationary bike (80-90 RPM)
- High intensity boot camp
- Marching: forwards/backwards
- Walking in different directions
- Skipping/hopping/jumping
- Agility drills
- Sit to stand or floor transfers



# STRENGTHENING

- **Benefits**
  - High quality evidence
    - Strength and power
    - Non-motor symptoms
    - Function
    - QoL
- **Risks, Harms, Costs**
  - May result in minor muscular strain



# STRENGTHENING

## How?

- Goal is to build muscle power and endurance
- Requires good nutrition (protein)
- Focus on extensors (gluts, quads, back muscles)
- Fatigue with 3 sets of 8-10 reps
- Need to “feel it”
- Joint protection

## Examples:



# STRENGTHENING

- **Dosing**
  - Frequency: 1-2x/wk
  - Duration:
    - 8 wk-24 months
  - Intensity:
    - 80% 1 RM (strength)
    - 40% 1 RM (power)
    - Increase to max 15 reps, 3 sets, load by 2%
- **Considerations**
  - Should be progressive
  - Should include balance component



## BASIC PRINCIPLES

- Prioritize posture and body mechanics
- Ideally done ON meds
- Include all major muscle groups including trunk, upper and lower body
- Focus on extensors
- Including instability adds balance and may improve outcomes

## EXAMPLES

- Progressive machines
  - Leg press/Lat pull/Scap row
- Free weights
  - Triceps/Diagonals/Shoulders
- Body weight
  - Squats/Lunges/Plank series/Superman
- Instability includes sensory integration exercises

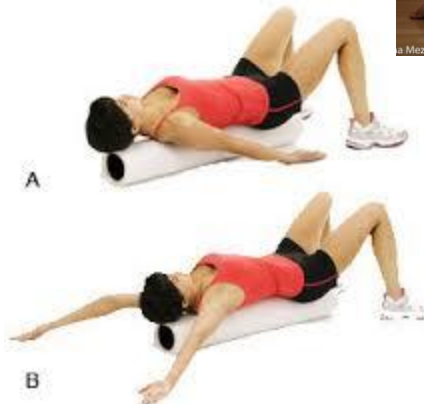


# STRETCHING

## How?

- Goal is to maintain motion despite rigidity
- Focus on flexors (hip flexors, chest, hamstrings)
- Can help with posture and pain
- Hold for 20-30 sec; 2-3 reps

## Examples



# STRETCHING

## Dosing

- I recommend daily



## Tips

- Ideally done throughout the day
- Foam rollers should be part of your tool kit
- Yoga offers great stretching





# FLEXIBILITY EXERCISE PRINCIPLES

## BASIC PRINCIPLES

- $\geq$  2-3 days/week; daily being most effective
- All major muscle groups several times/day including after exercise
- **Full ROM:** flexion/extension and rotation
- Flexors and rotators tend to be tight
- 60 sec per muscle
- Include diaphragmatic breathing and meditation
- Make modifications for flexed posture (support of head)

## EXAMPLES

- Static stretching: 2-4 reps of 15-60 sec
- Dynamic stretching: 8-10 reps; prior to intense aerobic exercise/strengthening
- Key areas:
  - Axial rotation
  - Trunk extension (foam roller)/pecs
  - Hip flexor and hamstring
- Warm up or cool down in class/session
- Yoga



# BALANCE / AGILITY

## Benefits

- High quality evidence:
  - Balance and mobility
  - Walking
  - Balance confidence and quality of life
- Moderate or other evidence:
  - Falls (mixed)
  - Non-motor symptoms (moderate)

## Risk, Harms, Costs

- Risk of increased falls
- Supervised groups may be more expensive



# BALANCE / AGILITY

## Dosing

- Frequency: 2-3x/wk
- Duration:
  - 5-10 weeks
- Intensity:
  - Challenge
  - Supervised

## Considerations

- Should include:
  - Different sensory conditions
  - Strengthening
  - Agility and stepping in different directions
  - Walking and functional task training
- Supervised programs likely more effective



# BALANCE / AGILITY

## How?

- Exercises focused on problems specific to Parkinson's
- Can include aerobic, strengthening and balance
- Great variety and complexity

## Examples

- Tai Chi
- Dance
- Boxing
- Ball sports
- Agility ladder: quick footwork drills



# BALANCE/AGILITY EXERCISE PRINCIPLES

## BASIC PRINCIPLES

- 30-60 min; goal of 2-3 hrs/week
- Big, flexible, functional movements
- Multiple directions
- Lots of turns
- Quick task changes
- Changing environments and surfaces
- Practice difficult situations
- Can add in **sensory integration** or **dual task**
- **Consider risk of falls** and make modifications when needed

## EXAMPLES

- Multi-directional walking: head turns, obstacles, turning
- Agility ladder, agility dots
- Static and dynamic balance with various surfaces and perturbations (ball toss, resistance training)
- Dual task activities



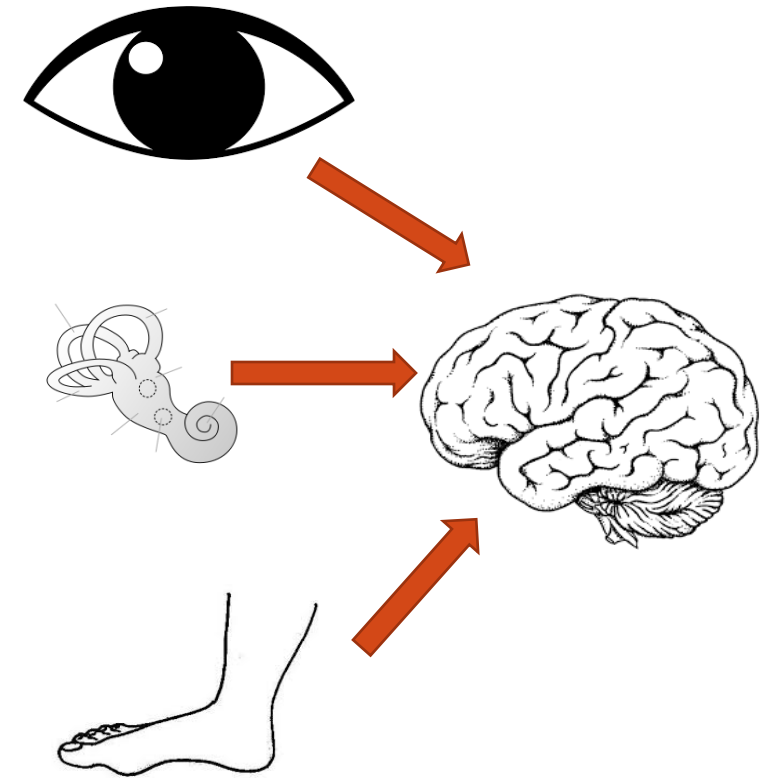
# **SENSORY INTEGRATION**

- Fundamental for balance
- Made of sensory input and motor outputs
- Deficits can be related to falls



# SENSORY WEIGHTING AND PD

- Basal ganglia is involved with sensory integration
- Parkinson's disease
  - Increased use on visual system
  - Poor kinesthesia
  - Proprioceptive deficit
  - Difficulty with sensory re-weighting: proprioception and vestibular



# SENSORY TREATMENTS

- Parkinson's patients can improve sensory weighting.... But need more time to transitions
  - Have a hard time quickly switching task
  - Transition period = fall risk
  - Smaller changes = harder





# SENSORY INTEGRATION EXAMPLES

- Reduce vision (avoid over-reliance on vision)
  - Dimmed lights
  - Sunglasses
  - Basketball dribbling glasses
- Change surface
  - Foam: Balance pads, mats
  - Dyna-discs
  - Stability balls (seated)
  - Half rounds (BOSU or foam roller)
  - Pebbled surface
  - Ramps (incline/decline)



# DUAL TASK

- Can address balance deficits and freezing
- Add a motor/cognitive task to progress exercise or increase complexity
- Need to be able to do the basic movement first!



# EXAMPLES OF COGNITIVE DUAL TASK

Switch attention between **SKILL-BASED FUNCTIONAL COURSE** and **COGNITIVE TASKS**.

## Executive Function:

- Switching between tasks
- Inhibition: Go No-GO

## Memory:

- Recite a list: What's for dinner? What's on your grocery list?
- Recall facts



Right hand jab, Go  
Right hand jab, Go  
Left hand cross, NO!  
Left hand cross, Go

## Visuospatial Function

- Depth perception
- Navigation

## Attention:

- Spell backwards
- Digit Span
- Walking + talking
  - List things
  - Math problems
  - Count backwards
  - Alphabetical lists



# EXERCISE AND PD: SPECIAL CONSIDERATIONS

## Balance/Falls

- Challenge self in safe conditions
- Stand near wall/chair with “hand hovering”
- Have a “buddy” to spot you
- Supervised class

## Orthostatic Hypotension

- Do transitions slowly
- Stay hydrated (before, during AND after)
- If you get lightheaded: sit down and hang head

## Pain

- Stretching is vital
- Only go as far as your body will let you
- Slowly increase intensity/resistance
- Exercise should never hurt in joints: STOP or change if painful



# INTEGRATION OF EXERCISE PRESCRIPTION FOR PAIN IN PARKINSON'S DISEASE

Central neuropathic pain

Peripheral neuropathic pain

Musculoskeletal pain (acute/chronic)

Other pain (ie visceral)

## General exercise

- Graded physical activity
- Progress to aerobic exercise
- Progress to high intensity exercise if possible

## Specific exercise

- To reduce compression of nerve
- To reduce neural sensitivity

## General exercise

- Graded physical activity
- Progress to aerobic exercise
- Progress to high intensity exercise if possible

## Specific exercise

- To target specific strength or movement impairments

## General exercise

- Graded physical activity
- Progress to aerobic exercise
- Progress to high intensity exercise if possible

Medical management



# IF I'M HAVING A BAD DAY OR AM OFF, SHOULD I STILL TRY TO EXERCISE?



## Cardio: Decrease intensity

- Can sometimes help with symptoms

## Strengthening: Depends

- If painful: hold or decrease resistance

## Stretching: Absolutely!

- Can decrease stiffness/pain

## Agility: Decrease intensity



# PRINCIPLES OF GENERAL EXERCISE PRESCRIPTION IN PD



Practice something you want to do; something you enjoy



Understand what pain means: pain does not always = damage



Get a baseline: what are you doing now and how can you monitor progress?



Pacing with steady, measured progression



Avoid cycle of overshooting/undershooting for activity



Avoid acute pain exacerbation if possible (and have a plan if this occurs)



Coordinate medication management with general exercise












# TAKE HOME: WHAT TYPE OF EXERCISE SHOULD I DO?



- Exercises you enjoy!
- Variety is key
  - Aerobic
  - Strengthening
  - Flexibility
  - Agility
- Include level of difficulty/complexity
  - Intensity matters: 7-8/10
  - Adding dual task
  - Changing sensory information
  - Trying a new sport

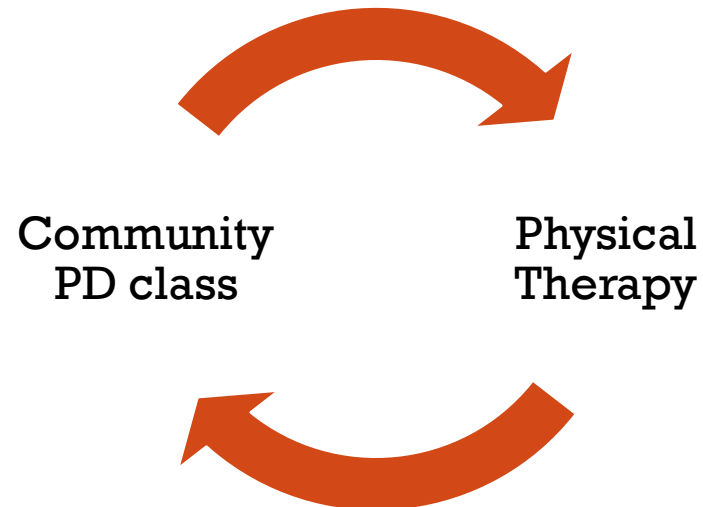




	Examples	Mon	Tues	Wed	Thurs	Fri	Sat	Sun
<b>Cardio:</b> <ul style="list-style-type: none"> <li>• 30+ min</li> <li>• 3 times/week</li> <li>• Moderate to high intensity exercise</li> </ul>								
								
<b>Strength:</b> <ul style="list-style-type: none"> <li>• 1-2 times/week</li> <li>• Max 15 reps per set</li> <li>• 3 sets</li> </ul>								
<b>Flexibility:</b> <ul style="list-style-type: none"> <li>• 10 min daily at the end of exercise</li> <li>• 10-30 sec per stretch</li> </ul>								
<b>Balance:</b> <ul style="list-style-type: none"> <li>• 20-30 min</li> <li>• 2-3 times/week</li> </ul>								
								
								
								
								



**CONSIDER COLLABORATING WITH A LICENSED PHYSICAL THERAPIST SPECIALIZING IN PARKINSON'S DISEASE TO ASSIST WITH FULL FUNCTIONAL EVALUATION AND INDIVIDUALLY-TAILORED EXERCISE RECOMMENDATIONS TAKING INTO ACCOUNT COMPLEX MEDICAL HISTORY.**



# IT TAKES A VILLAGE

