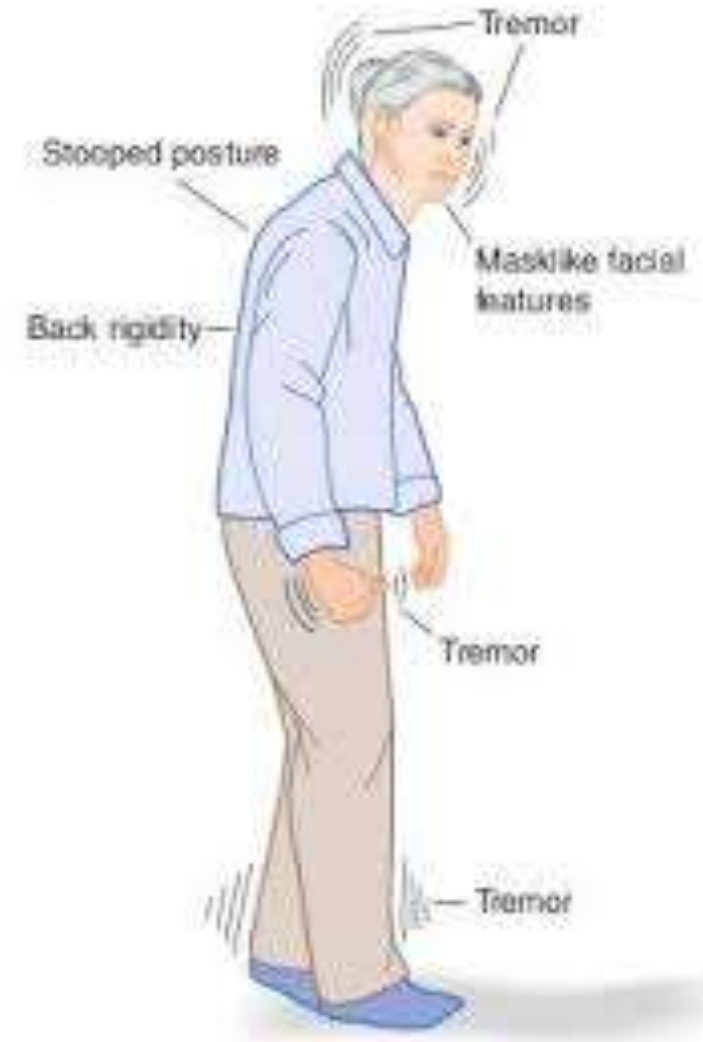


# PARKINSONISM (PD)

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# What is Parkinson's Disease?

- A **progressive neurodegenerative** disorder characterized by the **loss of dopaminergic neurons** in the substantia nigra of the brain
- Affects movement
- Although **PD isn't fatal**, it is progressive and incurable
- Even with medications, symptoms vary in incidence, severity, and timing from person to person day to day
- Currently, there is **no 1 specific test to diagnose PD**

# Four Primary Symptoms of PD

- **Tremor**/trembling in limbs, jaw and face (at **rest**)
- **Rigidity** or stiffness of the limbs and trunk
- **Akinesia** (lack/slowness of initiating or maintaining movement)
- **Postural instability/impaired balance and coordination**



freezing of gait — micrographia — stooping —  
loss of balance — soft voice — tremors

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# Parkinson's **Disease** Symptoms

# Other Signs and Symptoms:

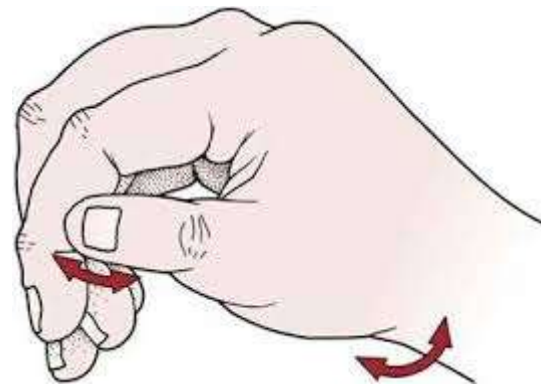
- Limited cervical movement
- Pt's have difficulty reading (don't have saccadic movement)
- ↓ cognition
- Don't sleep well



Tremor of one hand is a common early sign of PD



Tremor often improves or disappears with purposeful function



## The five stages of parkinson's disease:



**Stage 1:**  
Unilateral involvement only with minimal or no functional impairment

**Stage 2:**  
Bilateral or midline involvement, without balance impairment

**Stage 3:**  
Impairment of righting reflex

**Stage 4:**  
Fully developed and severely disabling

**Stage 5:**  
Confinement to bed or wheel chair.

# Treatment of PD

- No cure currently exists
- Treatment does not stop the progression of the disease
- Offers symptomatic relief
- Can temporarily restore function
- Can enhance Quality Of Life
- Each individual responds to drugs differently



# Pharmacological Treatment

- Mild symptoms may not require medication
- When prescription drugs are needed, they help to manage symptoms, but cannot stop the progression of the disease
- When a drug no longer effectively controls symptoms, another drug may be added to existing therapy
- Optimal management is highly individualized and is best determined by a doctor who specializes in the treatment of PD

# Medications

Levodopa	<p><b>Converted to dopamine in the brain</b>, which is responsible for transmitting signals in the brain allowing for normal movements</p> <p>Often combined with Carbidopa (Sinemet), which ↑ the amount of Levodopa that goes to the brain</p>
COMT inhibitors	<p><b>Blocks the action of catechol-O-methyltransferase</b>, an enzyme that breaks down dopamine.</p> <p>Entacapone (Comtan) and Tolcapone (Tasmar)</p>

# Medications

Dopamine agonists	<b>Act like dopamine</b> within the brain Bromocriptine (Parlodel), Pramipexole (Mirapex), Ropinirole (Requip), and Apomorphine (Apokyn)
Amantadine	Unknown mechanism; <b>may ↑ brain's response to dopamine or releases stored dopamine</b> Amantadine (Symmetrel)

# Medications

Anticholinergics	<p><b>Exert a relaxing effect on the body</b></p> <p>Benzotropine Mesylate (Congetin), Procyclidine (Kemadrin), Biperiden (Akineton), and Trihexyphenidyl</p>
Selegiline	<p>Unknown mechanism</p> <p><b>Appears to inhibit the breakdown of dopamine</b></p> <p>Usually added to a patient's therapy when effectiveness of Levodopa is ↓</p> <p>Selegiline (Zalapar, Eldepyrl, Emsam)</p>

# Goals of Treatment of Any Neurological Diseases:

- Fall prevention
- Correct deficits
- Transfers and bed mobility
- Strengthening of trunk, shoulders, hips
- Balance and coordination
  - Swiss ball exercises
  - Squats
  - Reaching out beyond BOS
  - Weight shifting – marching, kicking ball

# Evidence Based Practice: PT and PD

- Most PD patients face mobility deficits
  - Difficulties with transfers
  - Posture
  - Balance
  - Walking
  - Fear of falls
  - Loss of independence
  - Inactivity

# Evidence Based Practice: PT and PD

- PD patients with more than 1 fall in previous year are likely to fall again within next 3 months
- Most falls occur during transfers and freezing of gait
- Therefore, PT should focus on:
  - Promoting active lifestyle
  - Active exercises to improve balance, muscle power, joint mobility, and aerobic capacity
  - Cueing strategies
  - Postural adjustments in bed or W/C
  - Assisted active exercises
  - Education to prevent pressure sores and contractures

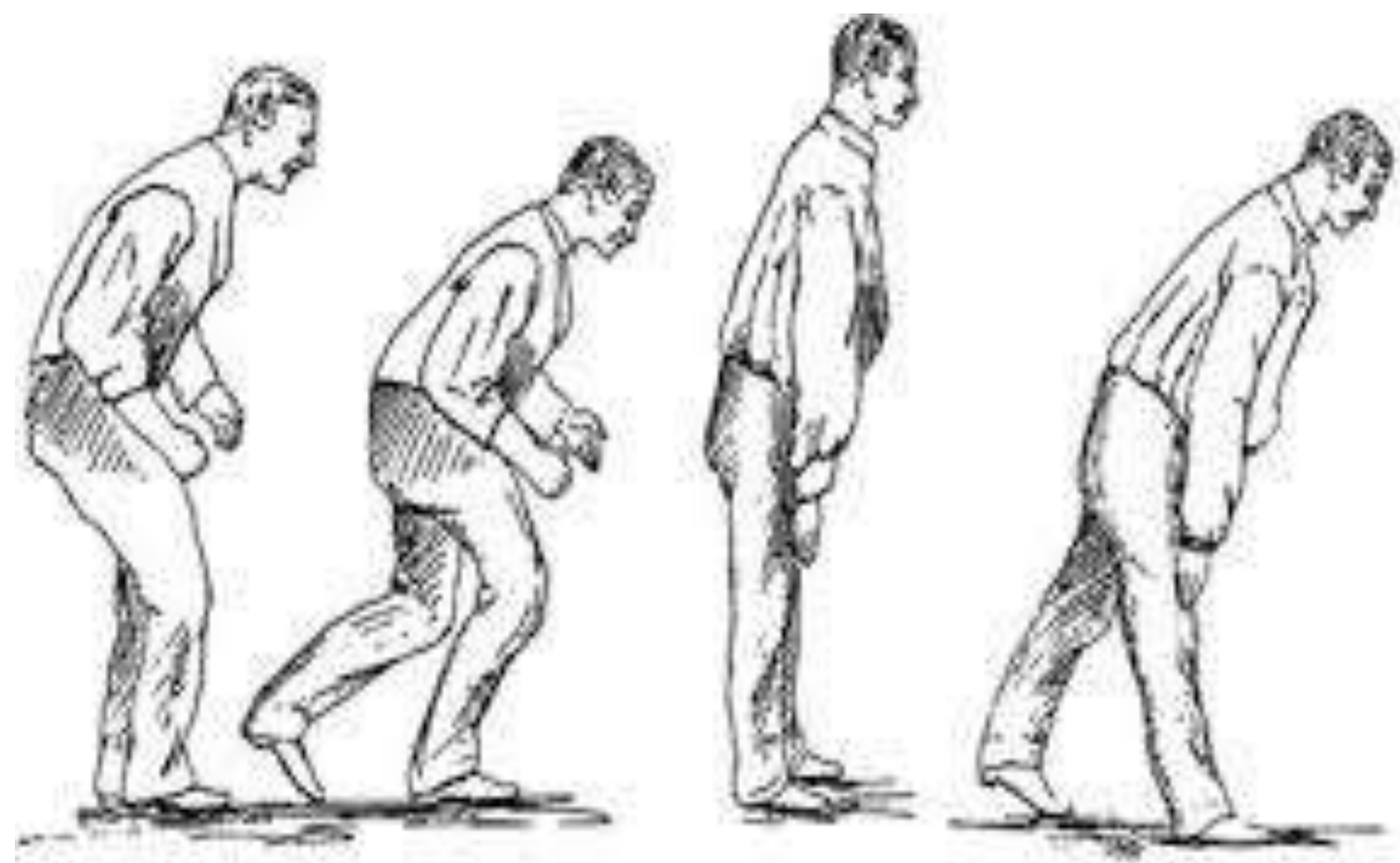






# Abnormal Gait Patterns with PD

- Difficulty weight shifting or initiating movement
- Hypokinesia, associated with reduced walking speed and step length
- Episodes of “freezing” motor blocks
- Impaired balance and postural reactions
- ↓ upright stance with narrow BOS



# Cueing Strategies

- Used during gait training
  - Auditory cues – rhythmic music, metronome, counting
  - Visual cues – stepping over stripes on floor, focus on an object, colors
  - Tactile cues – tapping on hip, leg, etc.
  - Cognitive cues – mental image of appropriate step length



# Exercises

- Focus on ROM, gait, balance, antirigidity, ADLs
- Leg strength – use equipment, resistive bands
- Balance/sway – foam pads, retropulsion tests
- Strengthen trunk muscles for respiration and posture
- Weight shifting
- Exercises for transfers



# Exercises

- Stretching exercises essential
  - Posterior direction: reaching backwards, walking backwards
  - Extension exercised
  - Throwing/kicking a ball
  - Push-ups; superman
- PROM
- PNF
- Respiration exercises
- Relaxation exercises – Yoga, Tai Chi
- Karate exercises – shown to ↓ tremors and ↑ dexterity and coordination
  - Energy Conservation



# Tai Chi

- The slow, rhythmic pace of functionally based exercises, internal organ stimulation, flexibility maintenance, balance training effects, and general health benefits of Tai Chi
- Relevant to PD management: fall prevention, tremor reduction, and motor control



# Balance Training & High-Intensity Resistance Training

- PD patients have dyssynchrony of leg muscles during movement initiation
  - Reduced peak torque production in knee extension, flexion, and ankle dorsiflexion
- LE weakness impairs postural responses to challenged balance
- High intensity resistance training of knee extensors, flexors, ankle plantarflexors
- Cycle ergometer



# Treadmill Training

- Many studies conducted and treadmill training shown to be effective in gait training
- At initial sessions, all patients could walk without freezing phenomenon at higher treadmill speeds
- Improvement in gait speed and number of steps
- Effects lasted 4 months!



Figure 1. Walking Down Stairs

Downward movement will increase the force placed on the knee. The weight of the body down to the knee will be multiplied by the force of the downward movement.

Figure 2. Body weight supported by handrails  
 Reduces an individual's weight on the knee. The handrails help support the body weight that would otherwise be on the knee. The handrails also provide a stable support to add balance, decrease risk of falls, and significantly increase the gait.



# Treadmill Training

- Possible that body-weight supported treadmill training induces implicit motor learning by enhancing alternative brain networks
- Has potential to enhance gait rhythmicity
- Progressive and intensive treadmill training can minimize impairments in gait, reduce fall risk and ↑ quality of life
- Positive Aspects of treadmill training:
  - Rhythmicity
  - Weight-support
  - Aerobic training
  - External pacemaker

# Stretch Reflex – Trager Method

- ↑ muscle rigidity hypothesized to be caused by enhanced activity of a “long latency” component of the stretch reflex
- Manual segmental vibration characteristic of the Trager method, consists of imparting low-frequency movements to a limb to produce a brief but substantial reduction in the H-reflex (stretch reflex)
- Suggests that imparting rocking motions to a body segment can alter the activity of the reflex pathways



# Lastly

- Family & Patient Education