



Advanced Approaches for Improved Mobility in Parkinson's Disease

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What to expect

- Overview of PD
- Overview of treatments
- Assessment
- Movement strategies
- Other treatment strategies
- Exercise research
- Exercise selection

Demographics



Is Parkinson's is not Rare

- Involves 1% of population over age 65
- Increases with age
- By age 70: the disease occurs 120 patients per 100,000 population
- Average age of onset 62 y.o.
- Approximately up to 10% are early onset (Dx before the age of 40.)
- PD rarely seen before age 30.

What causes Parkinson's Disease?



What is Parkinson's Disease

- It is a progressive neurodegenerative disease.
- Characterized by movement disorder due to changes in the midbrain (Substania nigra)
- Automatic motor responses impaired.

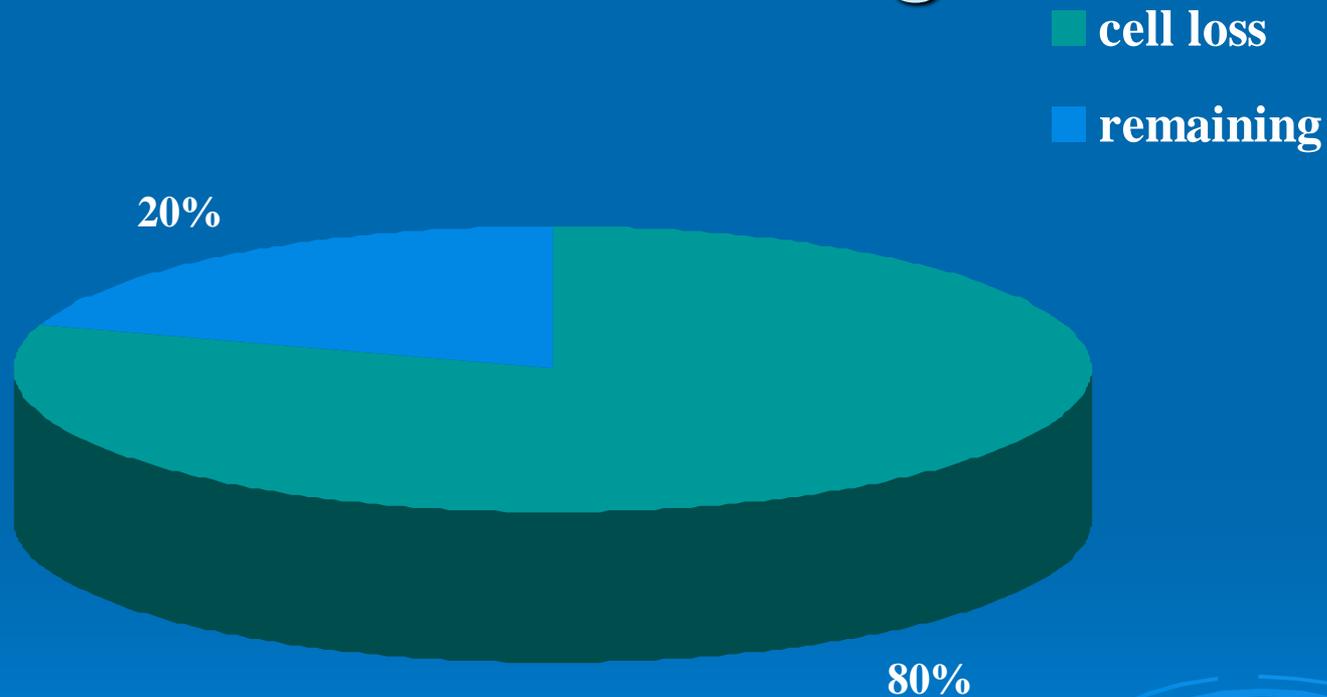
PD Risk Factors

- * Exposure to pesticides & herbicides
- * MPTP (methyl-phenyl tetrahydropyridine)
 - synthetic narcotic related to heroin
- * Chronic use of neurolyptic drugs
- * Repetitive head trauma
- * Rural Living
- * Well Water
- * Less risk in Smokers and coffee drinkers

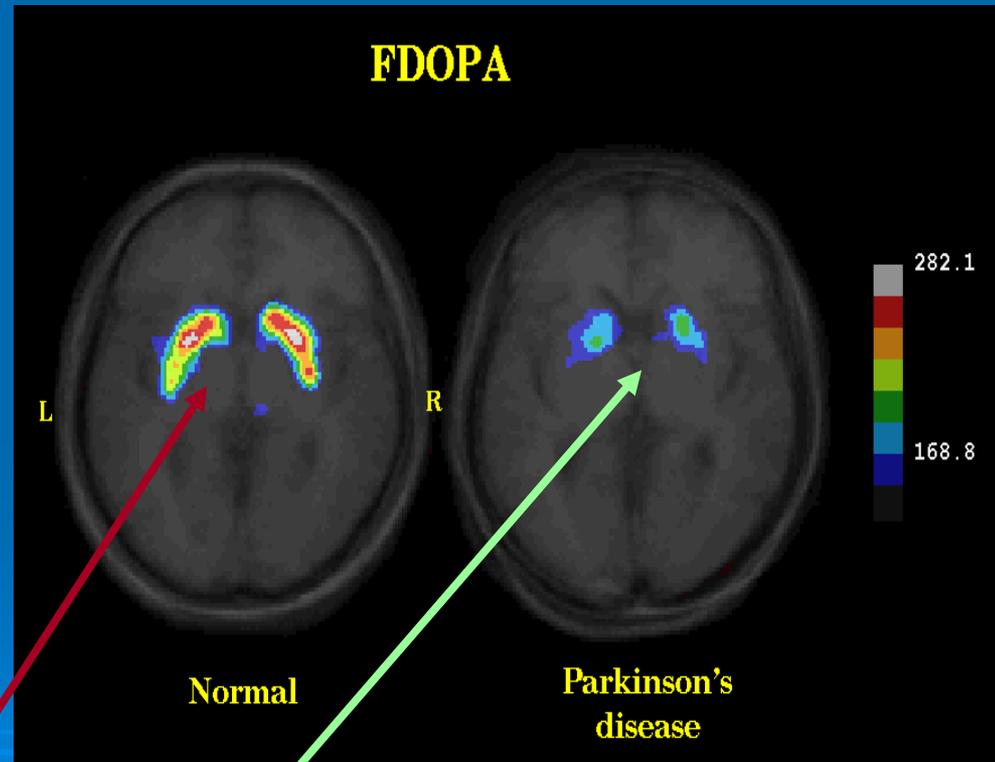
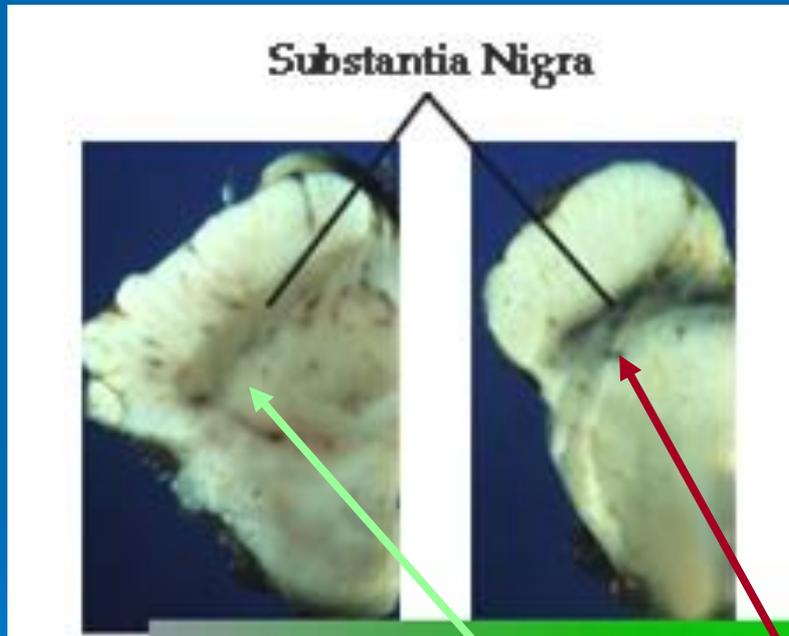
How is diagnosis made?

- No specific standard test to diagnose
- Symptomatic & Differential Diagnosis
- Rule out other Parkinson's like symptoms including essential tremors, progressive supranuclear palsy, multi-system atrophy, Dementia with Lewy bodies, etc.
- Disease advanced by time of diagnosis

Symptomatic Parkinson's occurs with loss of 80% of Substantia Nigra



Substantia Nigra damage causes loss of dopamine in brain

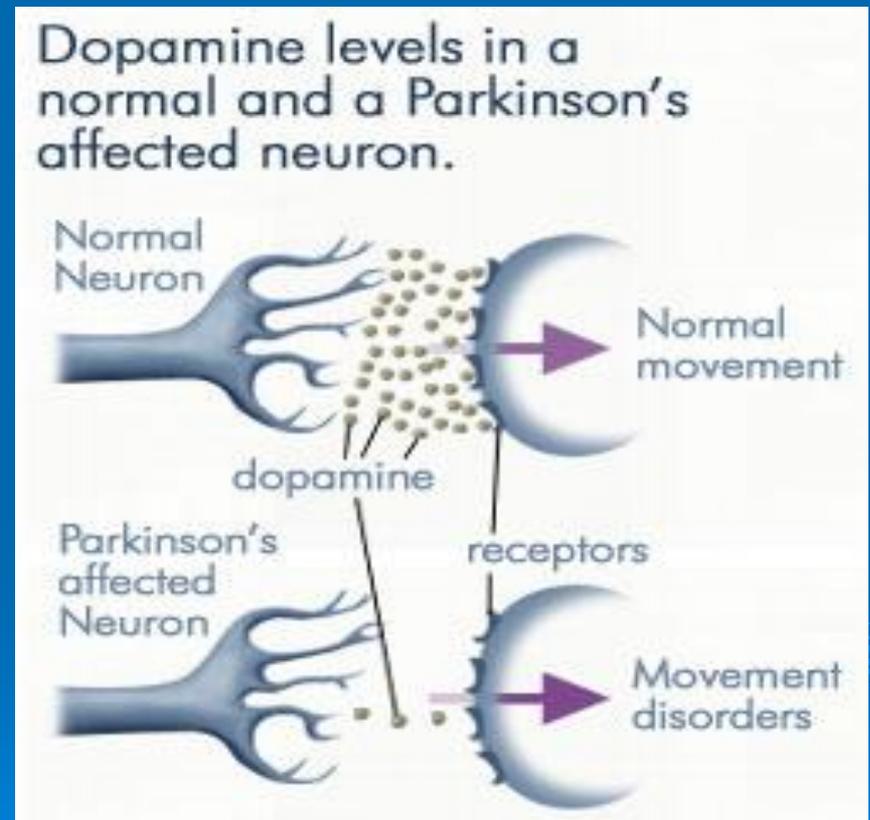


normal

abnormal

Definition: Dopamine

- An important neurotransmitter (messenger) in the brain
- Parkinson's disease is believed to be related to low levels of dopamine in certain parts of the brain.



Neuro-transmitters

- Primary symptoms of PD are excessive muscle contraction resulting in rigidity (rigidity vs. spasticity).
- Acetylcholine primarily stimulates muscle contraction.
- Dopamine primarily reduces (dampens) muscle contraction.

Parkinson's Disease is not for sissies!



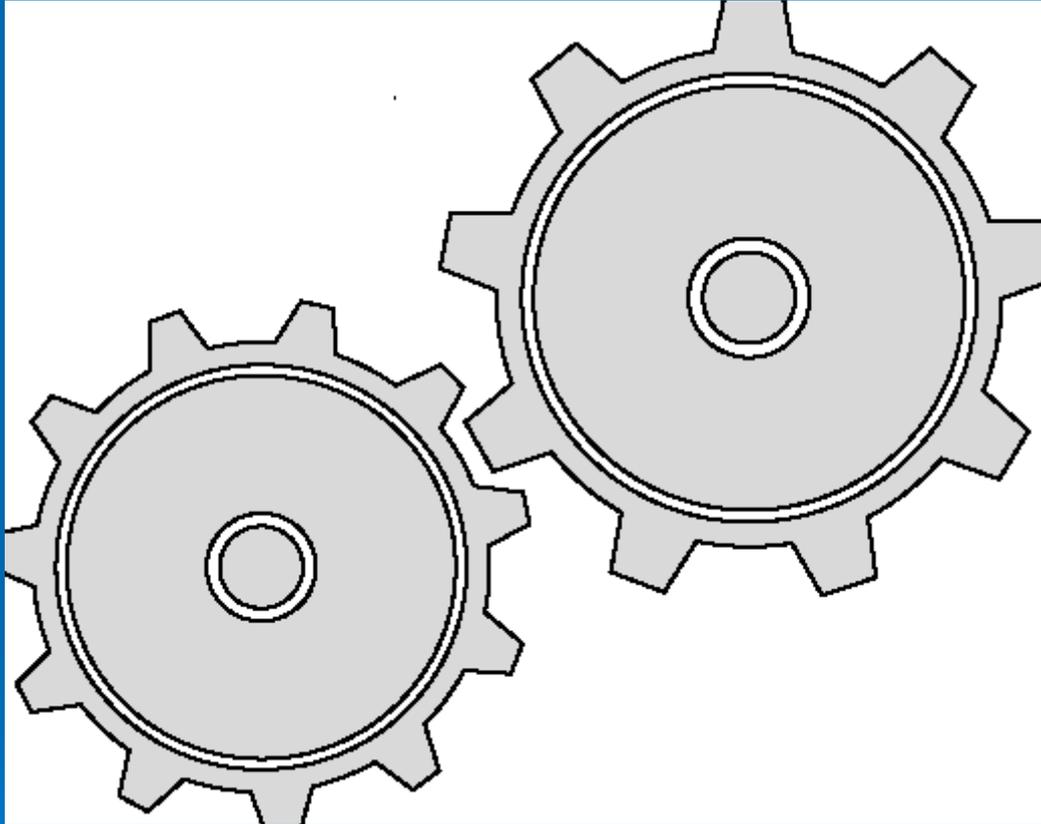
Sitting in a 3.8-metre sea
kayak and watching
a four-metre great
white approach you is
a fairly tense experience

Hallmark of Parkinson's Disease

- Cogwheel rigidity
- Bradykinesia/Akinesia
- Abnormality of posture and gait
- Tremor
- Other: Dyskinesia, Falls



Cogwheel rigidity



Cogwheel rigidity

- Rigidity with superimposed tremor
- Ratchet-like feel
- Felt as tightness or stiffness
- Very different properties than seen in spasticity (upper motor neuron syndromes)

Bradykinesia



Bradykinesia

➤ Several Theories

1.) Difficulty in maximizing movement speed when motor output is driven by internal control.

2.) Unable to generate adequate power/force

(power= work x distance/time)

3.) Difficulty in changing motor set (motor plans in readiness.)

Gait Abnormality

- Loss of arm swing
- Stiff legged gait
- Leads with head and shoulders
- Festination (difficulty with initiation and termination. Shuffling style gait)

Gait



Postural Instability

- Emerges later on
- Least responsive to dopaminergic drugs
- Not usually improved following DBS
- Loss of protective reactions: cut tree falling

Retropulsion

- Tendency to fall backwards
- Strategies
 - * One hand support when reaching overhead
 - * Lower cabinets and close bars (closet)
 - * Tai Chi stance for improve BOS (saggital plane)

Tremors

- Resting tremors
 - 70% of PD cases
 - Will start with one body part like toe or finger.
 - Pill rolling
 - Tremors reduced with purposeful activity.
- 

FREEZING (Akinesia)

- 'Episodic' gait disorders- symptoms are intermittent (e.g.,freezing of gait)
 - very incapacitating because individuals cannot easily adjust to the unpredictable gait problem
- Freezing of gait is associated with a high risk of falls and injuries
- Freezing of gait is independently associated with a decreased quality of life

Freezing Environmental Triggers

- Turning
- Confined Spaces
- Doorways/thresholds
- Perceived obstacles
- Floor surface changes
- Elevators
- Escalators



Turning in Parkinson's Disease

- Individuals with PD often have difficulty turning in bed and while standing
- Turning problems may result from trouble in maintaining an interlimb connection and axial (trunk) rigidity.
 - 'En bloc' turning
 - Levodopa does not seem to decrease turning problems

Definition: Dyskinesia

- Difficulty or distortion in performing voluntary movements.
- Dyskinesia can occur as a side effect of certain medications such as L-dopa and the antipsychotics.
- The word dyskinesia (dis-ki-ne'ze-a) is logically derived from two Greek roots: dys-, trouble + kinesis, movement = trouble moving.

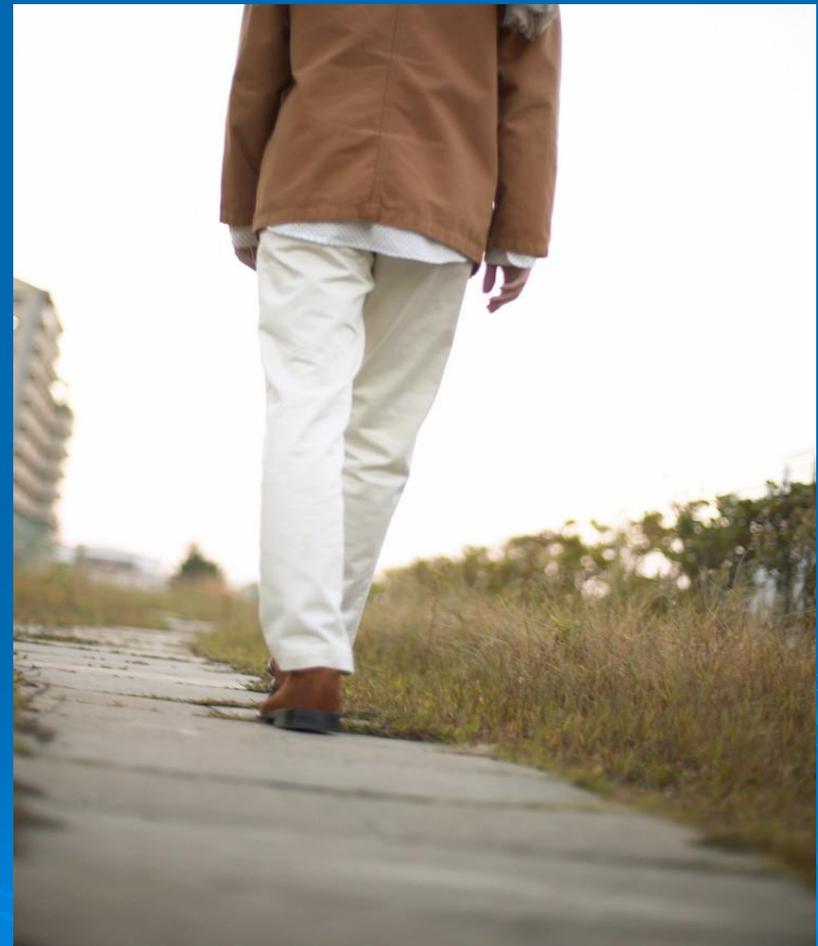
Epidemiology of falls in Parkinson's Disease

- It is estimated that up to 70% of Parkinson's Disease patients fall annually
- 13% fall more than once weekly



Fractures in Parkinson's patients

- Individuals with Parkinsonism (from any cause) have a more than two-fold increased risk of sustaining a fall-related fracture



Risk Factors for Falls in Parkinson's Disease

- Dyskinesias and sleep disturbances associated with dopaminergic medications
- Orthostatic hypotension
- Freezing
- Compromised posture and postural stability



Parkinson's Disease



Risk Factors for Falls in Parkinson's Disease



- Impaired ambulation
- Psychological disturbances: depression and post-fall anxiety
- Compromised motor control, agility & planning of lower limbs
- Compromised lower limb strength & muscular endurance

Other Motor Signs & Symptoms

- Micrographia
 - Masked Face
 - Decreased eye blinking
 - Hypophonia
- 

Non-motor Complication

➤ Autonomic

- postural hypotension
- urinary frequency/
incontinence
- Thermal
dysregulation
- Constipation and
other GI problems
- Sialorrhea

➤ Pain

➤ Sleep problem

- Insomnia
- REM behavior
- Excessive sleepiness
(side effects of meds)

➤ Psychiatric

- Depression
- Hallucination
- Dementia (6 x more
likely)

Today's Treatments (symptomatic)

- Medication
- Deep Brain Stimulation vs. Ablative (thalamotomy, pallidotomy)
- Future Therapies: Stem Cell, Gene Therapy, experimental drugs, supplements (creatine)
- Physical Therapy & Exercise

Medication side-effects

- Hallucinations
- Orthostatic hypotension
- Sexual dysfunction
- Sleep Disturbances
- Dyskinesia
- Depression
- Impulse control
 - Hyper sexuality
 - Gambling

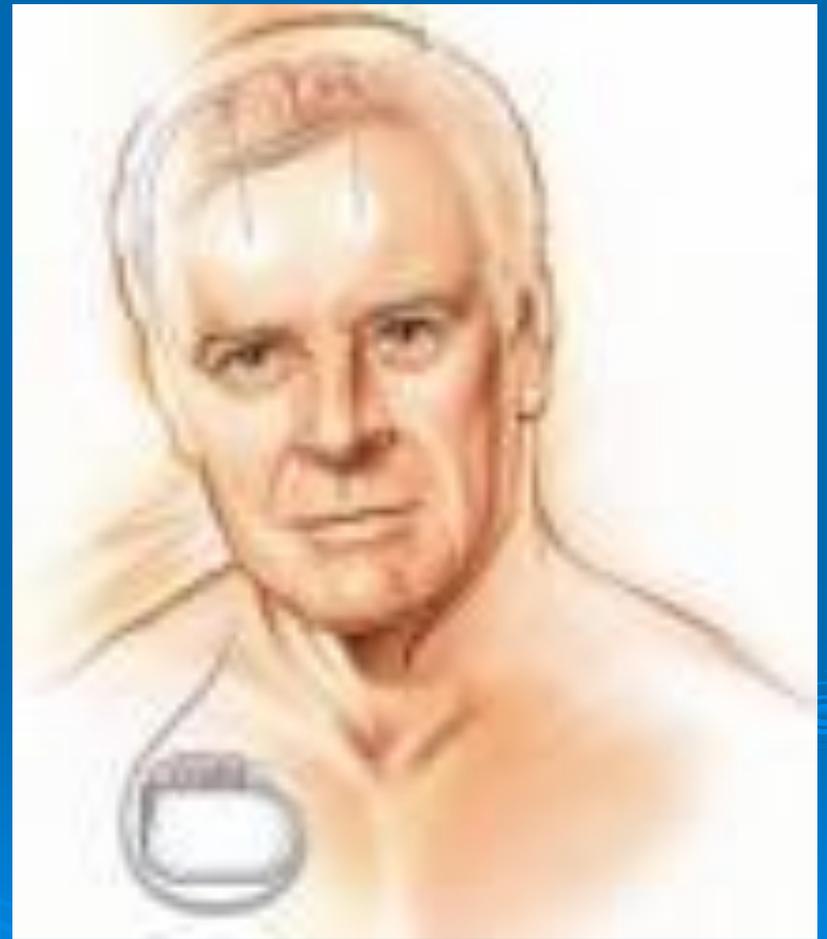
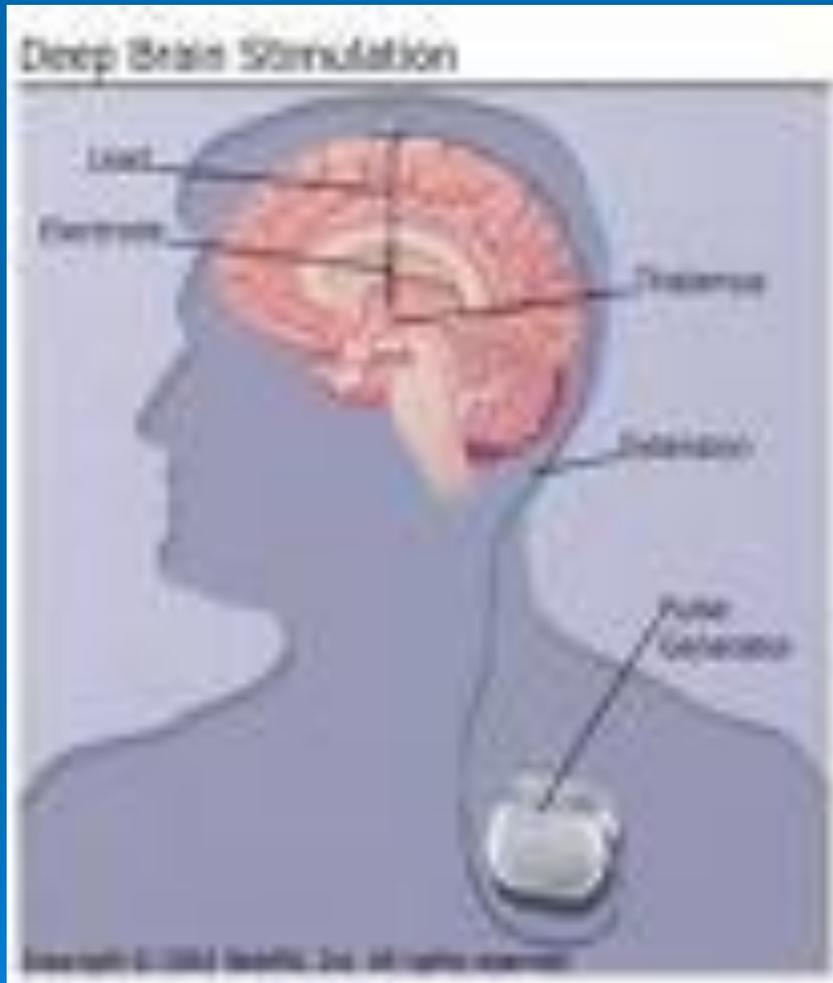
Medication

ON & OFF

TIME



DBS



When do we refer patient to DBS surgery?

- Motor Fluctuation
- Surgery will help prolong patients “BEST ON STATE” on meds, decrease OFF time
- Cannot usually make ON better
- Can help reduce medication

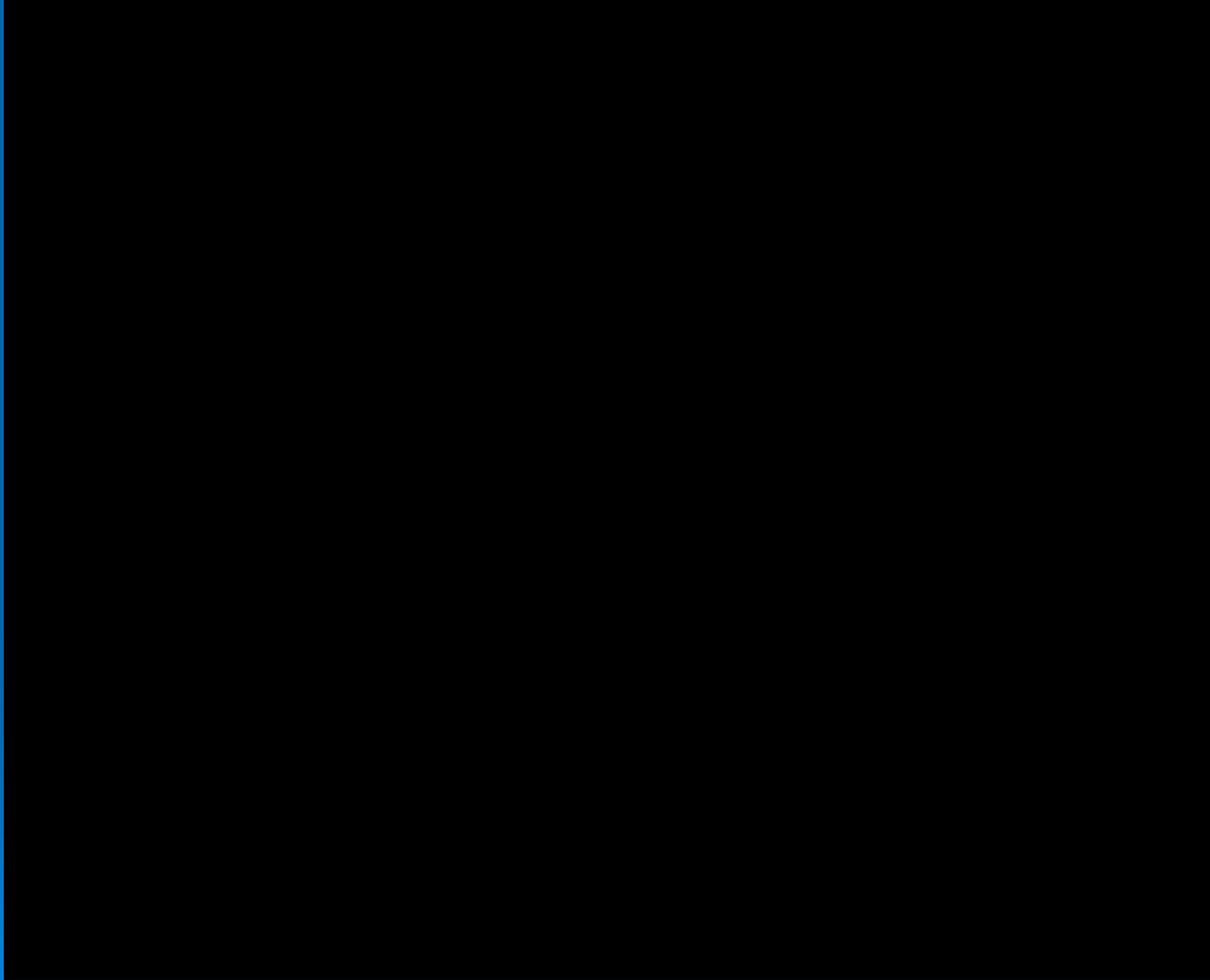
When Should Active DBS Therapy be Considered?

- When, despite optimized pharmacotherapy, your patient experiences troubling motor symptoms, which may include:
 - Wearing off – Off periods that contain troubling bradykinesia, rigidity, tremor, and/or gait difficulty
 - Troubling dyskinesia
 - Motor fluctuations
 - Refractory tremor

Additional Benefits of Activa DBS Therapy

- Bilateral, reversible, and adjustable
- Non-destructive versus ablative procedures
- Can be non-invasively fine-tuned to each patient's individual needs

DBS



Non-pharmacological treatment

- Physical Therapy-
Movement Strategies
- Exercise

PHYSICAL THERAPY

- Early Intervention should always be the focus.
- Rationale for therapy
 - Education on Movement Strategies
 - Increase ROM
 - Improve co-ordination of movement
 - Improve/maintain posture and functional abilities.
 - To prevent secondary sequelae
 - TO MINIMIZE FALLS!

Treatment Focus

- Movement Strategies
- Posture
- Exercise (Life sentence)



PT Treatment: Movement Strategies

- No more automatic pilot/ Purposeful movement
- Conscious posture/darn that gravity
- Blending/sequential movement
- Freezing/external cues/anti-freezing techniques
- Festination (PD gait)/walking strategies

No more automatic pilot

- Prior to PD you did not have to think to move.
- The automatic pilot does not always work especially during wearing off (off periods) of medications.
- During off periods, you need to turn off the faulty automatic pilot and fly the plane manually!

Purposeful Movement

- Ability to move is not lost
- Basal Ganglia is responsible for automatic motion in learned motor tasks
- Bypass the depleted basal ganglia and use fronto-cortical pathways instead (requires conscious thought)

No more automatic pilot/ Purposeful movement

- ***Visualize***
- ***Plan***
- ***Sequence (one step at a time)***
- ***Complete***

Blending Movements

No More Multi-Tasking



**STAY IN
THE
MOMENT**

**TURN YOUR PATIENT'
INTO MENTAL
SUBSCRIBERS**

Blending movement



Sequential movement

One step at a time. Complete each step.



Manual flying applied to walking

- Focus on a target down the road.
- Keep stringing targets together to avoid stopping/freezing.



POSTURE

"Your back will tell you that Sister Anne Marie was right."



Poor Posture=Poor Function

- Sit posture drill (decrease ADLs)
(Dressing, etc.)
- Promotes freezing/festination
(COG in front of base of support)
- promotes retropulsion (Inclines, reaching overhead)

Typical PD Posture







Freezing/external cues/anti-freezing techniques

- Initiating Movement (poor man's hula)



External Cues

- Attention- conscious movement
 - Auditory- Rhythm
 - Visual- Marker/target
 - Tactile- Sensory Stimulation
- 

External cues

- Visual: Imaginary Line, tape, laser
- Auditory: Talking to self, counting,)
- Focus on a target/destination
- External focus vs. Internal focus (study)



Anti- Freezing Strategies

- **Stop when freezing occurs. Do not attempt to move through it as it often leads to loss of balance.**
- **Restart movement with a purposeful step (See *Poor Man's Hula*).**
- **Visualize stepping over an imaginary object.**
- **If doorways and elevators are a problem, try to look past the threshold focusing on where you want to go to versus the threshold itself.**
- **See what tricks work for you and practice these strategies. Having done this may decrease anxiety lessening the “freezing affect”.**

Walking Strategies

➤ Four Point Gait



Walking Strategies

➤ “The British Soldier”



Walking Strategies

➤ Heel First



Fall Prevention Strategy

➤ Arms up



Assistive Devices

- Balance & Posture vs. Off-loading
- Stability vs. Mobility



Specialty Devices

➤ U-Step Walker (Laser)



Specialty Devices

➤ Next Step Cane



Captain Cheapo



Walking Poles

- Nordic poles or wooden sticks



MOVE IT!



MOVE IT!

An Exercise and Movement Guide
for Parkinson's Disease

Exercise DVD/Book

- MOVE IT!
- www.parkinsonsmoveit.com or available on Amazon.com

THE END



QUESTIONS

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