



Virginia Mason™

# Education IS Empowerment

## The Many Faces of Therapy

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# Cognition & Language in Parkinson's

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# Goal/Rehab. Approach

- To enhance & maintain level of function
- Manage @ any stage of progression of PD
- Encourage to participate in activity-early on
- More traditional rehab/compensation-later stages

# SLP in Parkinsons

Frequently talk about:

Main areas:

- Voice/Speech: Hypophonia
- Swallowing: Dysphagia

# SLP in Parkinson's

Increased awareness

More research

Many publications regarding:

- Cognitive changes in Parkinson

# Cognitive Changes in PD

- Mild Cognitive Impairment (MCI)\*
- Dementia (~ 40% of PD pts.) If it develops before/same time as PD = Lewy Body Dementia
- Focus today on MCI (~20-50% of patients w/PD)

# Cognitive Changes in PD

\*Mild Cognitive Impairment in Parkinson Disease. *Neurology*, 2010, Sept.21.1062-1069. Multicenter pooled analysis.



# Cognitive Changes in PD

\* Science News: Cognitive Changes in Parkinson's: A Complex Picture. Parkinson Disease Foundation. 12/08/16.

# Cognitive Changes in PD

- Cognitive Impairment  
Parkinson Disease Foundation:  
[www.pdff.org/cognitive\\_impairment\\_pd](http://www.pdff.org/cognitive_impairment_pd)

# Cognitive Changes in PD

- Cognitive Changes. APDA.  
[www.apdaparkinson.org/what-is-parkinsons/symptoms/cognitive-changes](http://www.apdaparkinson.org/what-is-parkinsons/symptoms/cognitive-changes). Jennifer Goldman, MD, MS.  
(Rush Univ. Med. Cntr.-Chicago)

Info. from this [talk.fr/Dr. Goldman](http://talk.fr/Dr.Goldman)

# Cognitive Changes in PD

Recognition: PD is > motor disorder, as Dr. Ghandy stated. Cognitive change = only one non-motor symptom commonly seen in PD.

\* Studies of PD patients over yrs. non-motor symptoms more important as PD progresses.

# Cognition

## What is COGNITION?

\* Refers to mental abilities we use to process information and apply knowledge

# Cognition

- Mental processes allow us to perform activities of daily living. This would include:
  - paying attention
  - solving problems
  - remembering where items are
  - how to do certain tasks

# Cognition

People typically talk about cognition, tend to focus on “memory” - 1 aspect

Rather, in the study of cognition, we talk about “cognitive domains,” which reflect different types of cognitive processes.

# Cognitive Domains

- Attention & working memory
- Executive Function
- Memory
- Language
- Visuospatial skills



# Cognitive Domains: Attention

Attention & working memory: ability to selectively focus on a particular aspect of one's environment, while ignoring competing stimuli.

In PD:

- Trouble concentrating on a conversation or book
- Challenging talking while walking/maintaining balance

# Attention/Working Memory

Working memory: memory process of temporarily storing information in one's mind and manipulating it over a short period. (cashier)

# Attention/Working Memory

Processes linked to alertness.

- \* sleepiness
- \* sedating medications

Involve the frontal and parietal lobes in the brain. Working memory also involves the basal ganglia and dorsolateral prefrontal cortex, regions affected in PD

# Cognitive Domains

Executive Function: ability to:

- \* Plan
- \* Organize
- \* Initiate
- \* Regulate goal directed behavior

# Executive Function

- “CEO” : multitasking, solving problems, starting or initiating new tasks, switching tasks.
- Prefrontal cortex & dopamine system, affected in PD.
- Executive dysfunction= one of the most common cognitive changes reported in PD

# Executive Function

Executive functioning problems:

1. Failure to initiate activities spontaneously
2. Decreased problem solving
3. Decreased goal planning

# Cognitive Domains

Memory: learning and remembering information.

- \* immediate (sec./min)
- \* short term (min./days)
- \* long term (days/ years)

Memory as process:  
attention/concentration, encoding,  
storing, eventually retrieve/recall

# Memory

- Memory for facts/events (declarative)
- Memory for a doing tasks (procedural)
- Working memory

PD: reduced ability to recall info, but memory is less impaired compared to AD. Cues or choices helps trigger memory from PD patients. LTM strong.



# Cognitive Domains

Language: ability to name objects, generate words, comprehend.

In PD, finding the “right” word can be a problem. Also tend to speak less (hypophonia), and use simpler speech.

Verbal communication is so important. Frustration for person w/PD & listener.

# Visuospatial Deficits

- Facial recognition
- Judgement of direction, orientation and distance
- Constructional praxis
- Spatial attention

# Cognitive-Lang. Assessment

SLP: Presence, type and extent of cognitive changes = critical in planning appropriate management programs

Conservative estimates: 15%+ of patients w/PD meet the DSM-III criteria for dementia

Higher proportion = milder or highly focal cognitive deficits or MCI

# Cognitive

Important patient able to follow directions, remember treatment guidelines and actively participate in therapy

Support of family member/spouse, friend or caregiver in therapy

# Language

Increasing attention to language abilities in PD

Language/communication complicated by cognitive deficits and poor motor speech aspects of PD. Also: barriers of masklike affect & facial expression. Language difficult to extract from complex motor speech & cog.changes

# Language

May have problems following complex commands

Decreased sentence/info processing

Decreased syntax complexity in spontaneous speech

# Assessment

SLP: cognitive-language assessments

- MoCA
- RBANS
- CLQT
- Sunderland Memory Question

Neuropsychological Assessment

# Therapy

Cognitive Training: improve cognitive function using strategy-based skills (errorless learning, spaced retrieval, external aids as scaffolding)

Cognitive Rehab: achieves patient/family identified goals for improved daily functioning (ie: computerized training)



# Therapy

## Clinic /HEP:

### Some external aids:

- \* calendar
- \* Day-planner
- \* alarm system
- \* pill organizer
- \* drop zone

# Therapy

- aerobic exercise: support MD rec.
- socialization
- nutrition: support MD rec.
- sleep hygiene
- attention strategies
- active listening strategies
- reminiscing therapy

# Therapy

ABODES: organizational strategy/executive function

PQRST: organizational strategy for recall of complex written information

# Cognitive Changes in PD

Summary: Cognitive changes are common in PD

Mild, some severe, impacting daily function

- \* slower thinking
- \* slow information processing
- \* attention & working memory
- \* executive function
- \* visuospatial function

# SLP Therapy

- Seeing more PD patients with MCI.
- Incorporating cognitive therapy along with voice therapy and swallowing therapy
- Training spouse/family to facilitate use of strategies and cog. training



# Parkinson's Disease and Driving

# Virginia Mason

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Occupational Therapist



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Occupational Therapist



# Skills for Driving

- Motor
  - Coordination of Limbs
  - Range of Motion & Strength
- Vision
  - Visual Spatial
  - Visual Perceptual
- Cognition
  - Attention
  - Memory

Driving is complex!



# Parkinson's Symptoms Affecting Driving

- Tremors
- Bradykinesia
- Rigidity
- Postural Instability
- Cognitive changes
- Visual Perceptual changes

# Medications

- Many different types of medications may impair driving safety
- Talk with your physician to understand your medications benefits AND potential side effects which could affect driving
- Can affect: levels of alertness, judgement, coordination, reaction time, blood pressure, and vision
- Conversely, Parkinson's medications may improve some symptoms.
- Driving ability may vary when meds are "on" vs. "off"

# Who will know when it is no longer safe to drive?

- Person with Parkinson's
- Family/Care Partner
- Physician
- Occupational Therapist – Clinical Assessment
- Certified Driver Rehab Specialist (CDRS)/(DRS)
- DMV

# Self Assessment: Am I a Safe Driver?

I get lost while driving.  
My friends or family members say they are worried about my driving.  
Other cars seem to appear from nowhere.  
I have trouble finding and reading signs in time to respond to them.  
Other drivers drive too fast.  
Other drivers often honk at me.  
Driving stresses me out.  
After driving, I feel tired.  
I feel sleepy when I drive.  
I have had more “near-misses” lately.  
Busy intersections bother me.  
Left-hand turns make me nervous.  
The glare from oncoming headlights bothers me.  
My medication makes me dizzy or drowsy.

I have trouble turning the steering wheel.  
I have trouble pushing down the foot pedal.  
I have trouble looking over my shoulder when I back up.  
I have been stopped by the police for my driving.  
People no longer will accept rides from me.  
I have difficulty backing up.  
I have had accidents that were my fault in the past year.  
I am too cautious when driving.  
I sometimes forget to use my mirrors or signals.  
I sometimes forget to check for oncoming traffic.  
I have more trouble parking lately.

# Family/Care Partner

From The Hartford - At The Crossroads

Warning Signs for Drivers with  
Dementia

Agreement With My Family About  
Driving

Create a transportation plan

# Physician

- Concerns raised by patient or family
- AMA Physician's Guide to Assessing and Counseling Older Drivers
- ADReS – Assessment of Driving-Related Skills
- MoCA – Montreal Cognitive Assessment - 18 or less
- Clock Drawing Test
- Trails B- Trail Making Test

# Occupational Therapist

Performs a Clinical Assessment of Driving Skills – 60-90 minutes in length – ordered by MD and results given to ordering practitioner

- Coordination of Limbs
- Range of Motion
- Visual Spatial
- Visual Perceptual
- Attention
- Memory

# OT -continued

The outcome of this clinical assessment can be one of three options:

1. Continue driving – education provided
2. Concern for driving- recommend behind-the-wheel test
3. Retire driving – counseling provided



# Certified Driver Rehab Specialist (CDRS)/(DRS)

The Association for Driver Rehab  
Specialists

3 CDRS in Washington State

-Northwest Driver Rehab/Assistive  
Technology Solutions

-UW Driver Rehab Program

dol.wa.gov

Driver Evaluation Request - can be made by any concerned party - DMV will follow up with a letter outlining next steps

# What else can OT do?

Focus is function! We can help with:

- difficulty with self-care activities
- home safety and adaptive equipment
- management of arm weakness, stiffness or tremors
- strategies for success at home and at your job around physical and cognitive challenges
- pacing and energy conservation

# Resources

The Hartford – At the Crossroads –  
Family Conversations About Alzheimer's  
Disease, Dementia & Driving

[http://hartfordauto.thehartford.com/UI/Downloads/  
Crossroads.pdf](http://hartfordauto.thehartford.com/UI/Downloads/Crossroads.pdf)

National Parkinson Foundation – On the  
Road: Keeping Driving Skills Sharp

[http://www.parkinson.org/sites/default/files/On%20  
the%20Road%20Keeping%20Driving%20Skills%20  
Sharp.pdf](http://www.parkinson.org/sites/default/files/On%20the%20Road%20Keeping%20Driving%20Skills%20Sharp.pdf)

# Neuroplasticity and Exercise

# Virginia Mason

Laurel Beck  
Physical Therapist



# neu·ro·plas·tic·i·ty

n(y)oŏrō ,pla'stisədē

*Noun*

the ability of the brain to form and reorganize synaptic connections, especially in response to learning or experience or following injury.





# Neuroplasticity

The brain encodes experiences and learns new behaviors

Modification of existing neural networks

- Synaptogenesis
- Neurogenesis
- Neuronal sprouting
- Potentiation synaptic strength

In English: strengthen, repair, and form brain connections



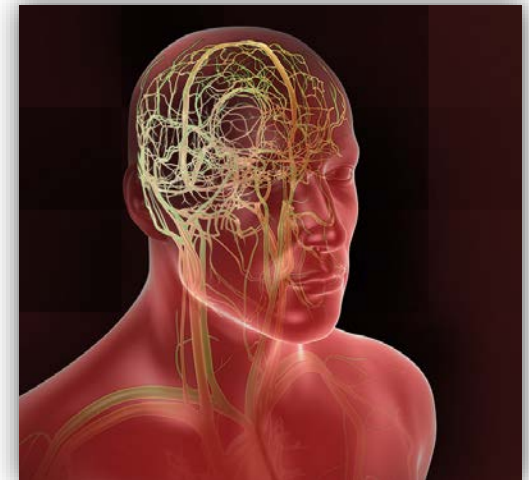
# Exercise Promotes Brain Health

## Blood flow to the brain

- Angiogenesis and altered blood-brain barrier permeability

## Delivery of molecules to the brain

- Insulin
- Angiogenic factors (VEGF)
- Leptin
- BDNF



# Exercise at the Cellular Level

Growth factors (VEGF) build new capillaries & expand vascular system in the brain

BDNF important to take in new information and necessary for making new cells

- In reserve pools near synapses

- Unleashed with increased blood flow

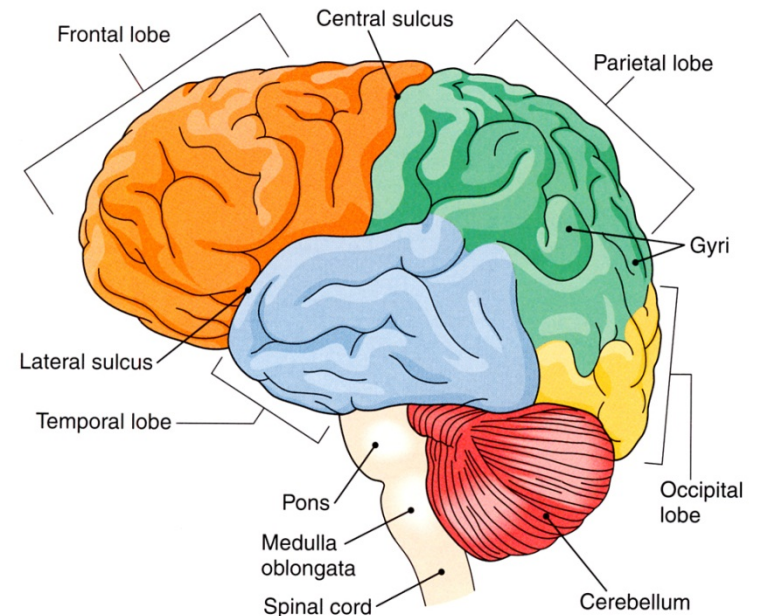
Increases efficiency of intracellular energy production



... Not quite

# Brain Activity

- fMRI shows increased activity in the frontal and parietal regions (attentional control and performance) in aerobic training
- In older adults, higher aerobic fitness = more brain tissue



# Tandem Cycling

- Forced Cycling (speed/assisted)
- 80-90 RPM, or 30% >preferred
- Improved automatic manual dexterity
- Connectivity within brain
- Develops areas of automaticity on functional MRI



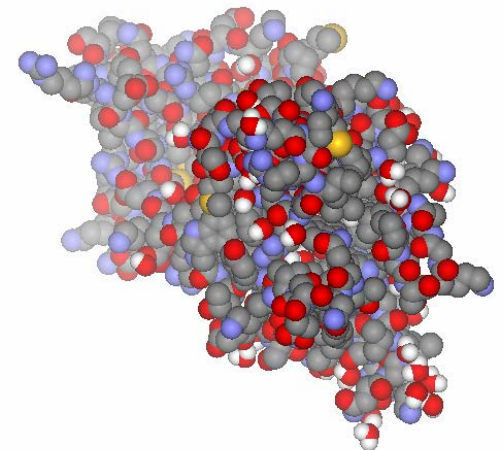
# Neuroprotection

Exercise protects global circuits

- Includes dopaminergic neurons
- Overlapping motor circuitry involved in cognitive and automatic components of motor movement

Exercise-induced increase of neurotrophic factors

- BDNF
- GDNF

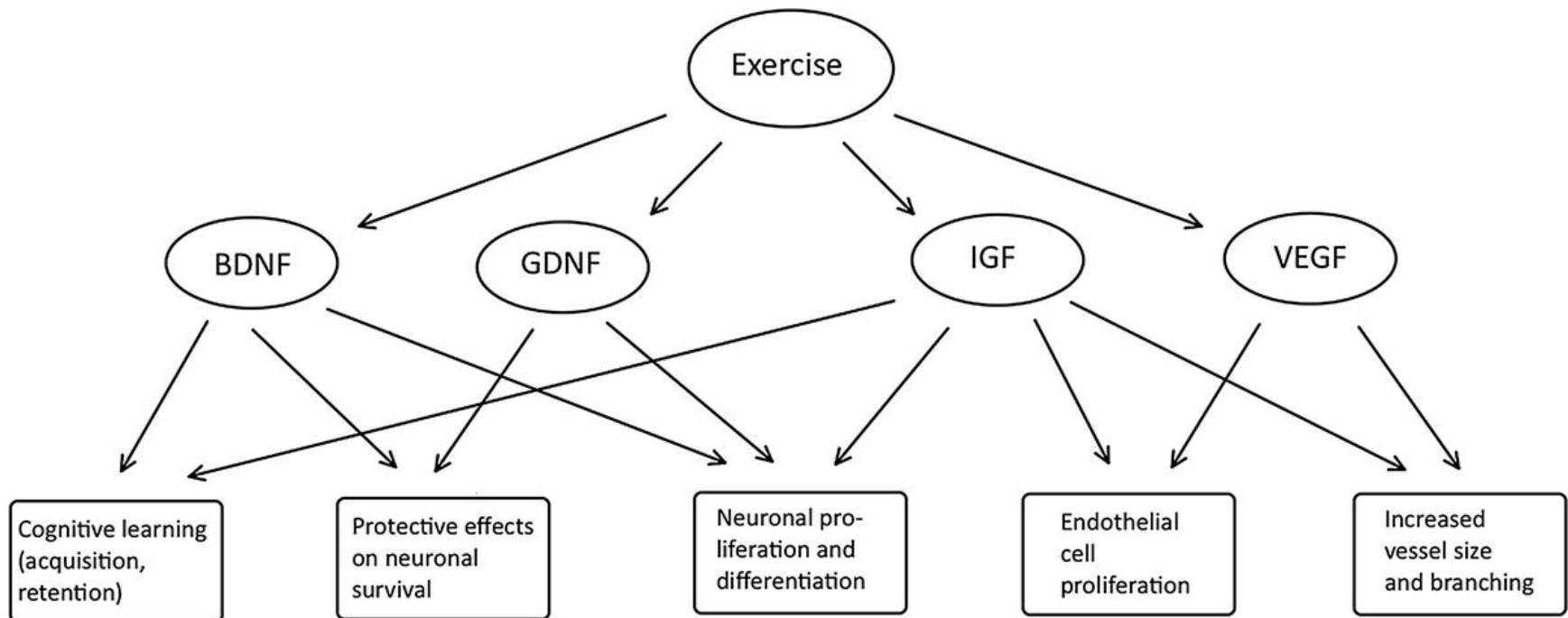


# Neuroprotection

- Early non-use is especially relevant, as recent research in animal models of PD has shown that inactivity may actually *contribute* to degeneration
- Continuous practice and forced use of impaired limbs *prevent and/or reverse* motor impairments



# Exercise Effects on Brain



# Goal-based Exercise

Practice activity = improve performance

Intensity

Repetition

Specificity

Difficulty

Complexity

Cognitive engagement

# Feedback



- Reinforcement of new task
- Challenge beyond self-selected levels of capability
- Motivation
- Engagement to be cognitively aware of movement

# Goal-based + Aerobic Exercise

- Combine specificity with vigorous and sustained activity
  - Improved O<sub>2</sub> consumption and blood flow to brain
- Possibly synergistic benefits
- May help restore automaticity in PD
- More complex movement = more complex synaptic connections with thicker myelin (skill acquisition)

# Cognition and Exercise

- Loss of dopamine also impairs cognitive function
  - Mental flexibility and set shifting
- Aerobic exercise may improve executive function in those with Parkinson's disease
- Well established benefits in general population and with Alzheimer's

# Boxing

The classes (non-contact) concentrate on overall fitness and include:

- calisthenics
- core work
- double-ended bags
- focus mitts
- heavy bags
- jump rope
- ring work
- speed bags
- circuit weight training



Boxing includes dynamic balance activities with multidirectional movements.

*“It is possible to take charge of your life, even with Parkinson’s.*

*It is possible for your will to override your brain.*

*It is possible to have  
Power Over Parkinson’s”*

*~Sharon Kha*

*LSVT BIG and LSVT LOUD Graduate*

# Summary

Neurobiological and behavioral evidence supporting benefit of intensive, goal-based exercise in people with PD

Goal-based exercise programs have excellent potential to movement and quality of life for people with PD

- LSVT

- Rock Steady Boxing

**CHOOSE** something that will work for you.







EYEWITNESS NEWS  
TREATING PARKINSON'S



# Exercise Information

[www.apdaparkinson.org/community/northwest/resources-support/health-wellness-opportunities](http://www.apdaparkinson.org/community/northwest/resources-support/health-wellness-opportunities)

[www.danceforparkinsons.org](http://www.danceforparkinsons.org)

[www.rocksteadyboxing.org](http://www.rocksteadyboxing.org)

[www.lsvtglobal.com](http://www.lsvtglobal.com)

[www.justmove.org](http://www.justmove.org)

[www.shapeup.org](http://www.shapeup.org)

[www.americanheart.org](http://www.americanheart.org)





Virginia Mason™

Each Person.  
Every Moment.  
**Better Never Stops.**