

MOVEMENT REHABILITATION:

Exercise in Parkinson's Disease

CLINICAL AND RESEARCH EVIDENCE
TOWARDS A CURE

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QUICK HISTORY

BRITISH, FRENCH, SWEDISH



- *An Essay on the Shaking Palsy* 1817
 - ✦ James Parkinson
- Paralysis Agitans
- Parkinson's Disease
 - ✦ Jean-Martin Charcot
- Nobel Prize (biochemical changes in the brain)
 - ✦ Arvid Carlsson 1950
- Clinical practice with L-dopa 1967
- Published study on L-dopa treatment 1968

**The upright
posture.
Now, stooped.**

Dame Anna Neagle
English movie actress



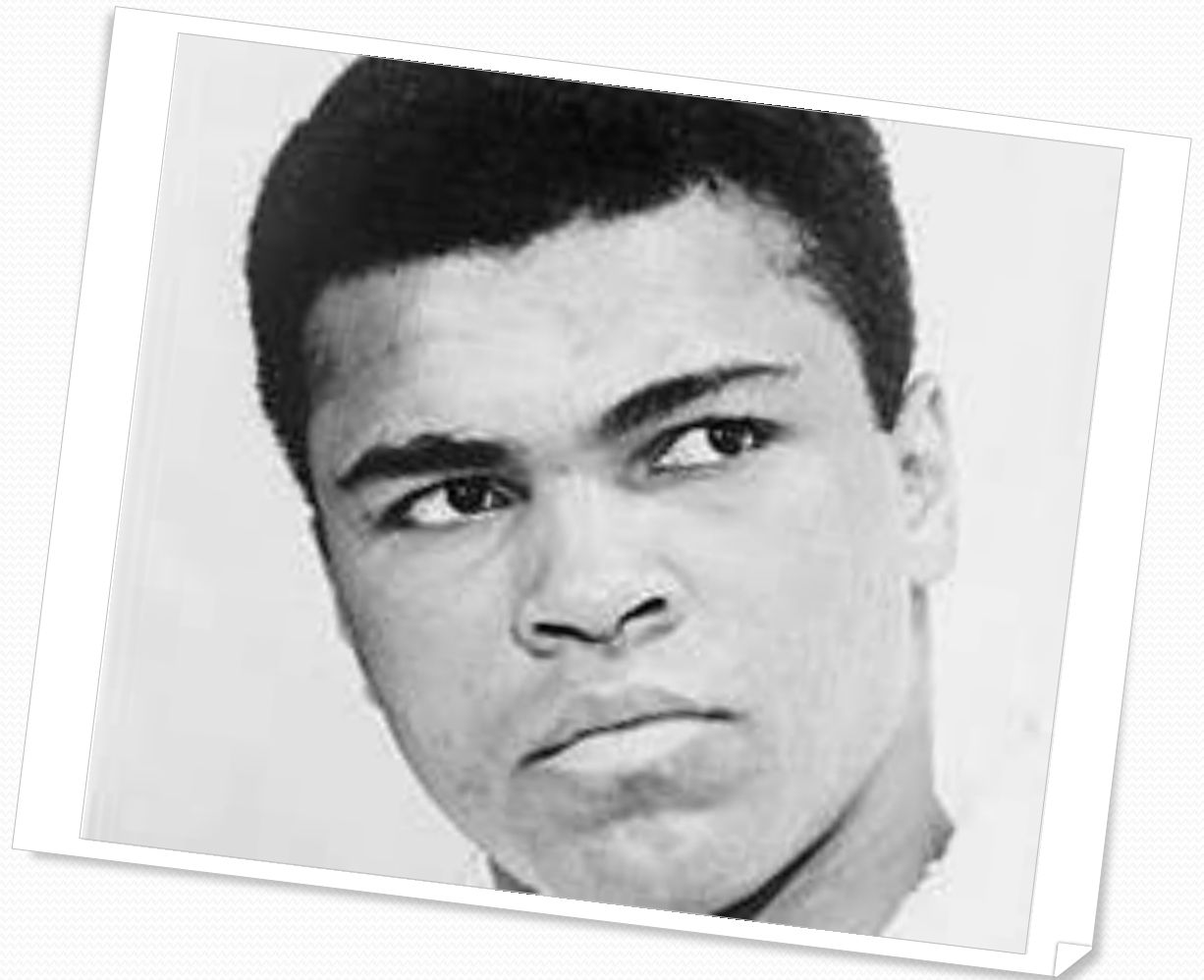
**The mind, slow
and forgetful.
Confused.**

Harry Dalton
Manager
American baseball team,
Baltimore Orioles



Fighting emotions.

Muhammad Ali
Float, butterfly.
Sting, bee.



**The face, a mask.
The voice,
a whisper.**

Dame Anna Neagle
English stage singer



**The movements,
unsteady.
The fall, again!**

Pains.
Spin .
Back .
Future(?)



QUICK HISTORY

EXERCISE SCIENCE



- *The Physiology of Body Exercise* 1890
 - ✦ Lagrange
- Wolff's Law of Bone Transformation
- Muscle Size
 - ✦ Increased diameter of muscle fibers, not increased number of fibers
- Revival of Olympic Games (formation of IOC) 1894
- Atwater and Bryant (crew team diet) 1900
- Dudley Sargent, MD 1879 – 1919
 - ✦ Director of Hemenway Gymnasium at Harvard University

QUICK HISTORY

EXPERIMENTS AND NEW IDEAS



- Muscle Biopsies and Fiber Typing
- Journal of Applied Physiology 1948
- National Athletic Trainer's Association 1950
- *Krebs Cycle* (Biochemistry Nobel Prize winner) 1953
 - ✦ Hans Krebs and Fritz Lipman
- American College of Sports Medicine 1954
- Overload principle to increase strength 1955
- Increased use of maximal oxygen consumption testing
- *“Scientific Principles of Coaching”*
- *“Hypokinetic Disease due to Lack of Exercise”* 1961
- *“Aerobics”* 1968
 - ✦ Kenneth Cooper

DISABILITY IN THE UNITED STATES



- An estimated [45 million](#) persons in the United States have a disability
- Estimated direct and indirect annual costs related to disability (including medical expenses and lost workdays) total [\\$170 billion](#)
- The prevalence of disability in 2005 (21.8%) remained [unchanged](#) from 1999 (22.0%)



WHAT ARE THE FACTS?



- Only 50% of Americans meet the guidelines for exercise!

- There is little information on exercise patterns of people living with Parkinson's.

- People with disability are *less physically active*, but reasons are unclear!

1817...

1982



“...exercise is a waste of time.”

First Parkinson Foundation of Canada Educational Meeting

Calne, S. Introduction. *Topics in Geriatric Rehabilitation*, 2008;24:91.

1982...

1994



“...exercise is one of the most beneficial things a patient can do for himself.”

American Academy of Neurology

Koller, WC et al. An algorithm for the management of Parkinson's disease.
Neurology 1994; 44(suppl 10):S1-52.

1994 ...

2001



“...exercise is also helpful... walk as much as several miles a day if possible or swim regularly.”

2001 Treatment Guidelines

Olanow CW et al. An algorithm (decision tree) for the management of Parkinson's disease: Treatment guidelines. *Neurology* 2001;56 (suppl 5)S1-88.

NO CONCLUSIVE EVIDENCE!



“..insufficient evidence for the effect of physiotherapy versus no physiotherapy for Parkinson’s disease.”

Cochrane Database Systematic Review

Deane KH et al. Physiotherapy for patients with Parkinson’s disease: a comparison of techniques.2001; CD002817

PARKINSON'S DISEASE



...today!

- prevalence 120/100,000 in North America
 - ✦ less in African American community
- annual incidence 20/100,000
- 1.5 million cases in the USA

PARKINSON'S DISEASE



...who?

- mean age 75 years old
- males 63% > females 37%
- living alone 24%, with family 64%
- about 2 - 4 % will have a companion
- 26,000 admitted for acute care in CY'04

NMH AND RIC CARE MODEL : MULTIDISCIPLINARY & COLLABORATIVE



- NMH Dept of Neurology
Northwestern Movement Disorders Center
- National Parkinson Foundation
Center of Excellence
- NPF Comprehensive Care and Outcomes Research
Collaboration with RIC



THE MISSION OF PARKINSON REHABILITATION



To maximize the Parkinson patients' functional abilities through collaborative clinical and innovative rehabilitation care, and to support their families through progressive learning, advocacy and nationally-established services.

...enhance human ability!



DRUGS!

Rx

*Sinemet
25/100 mg*

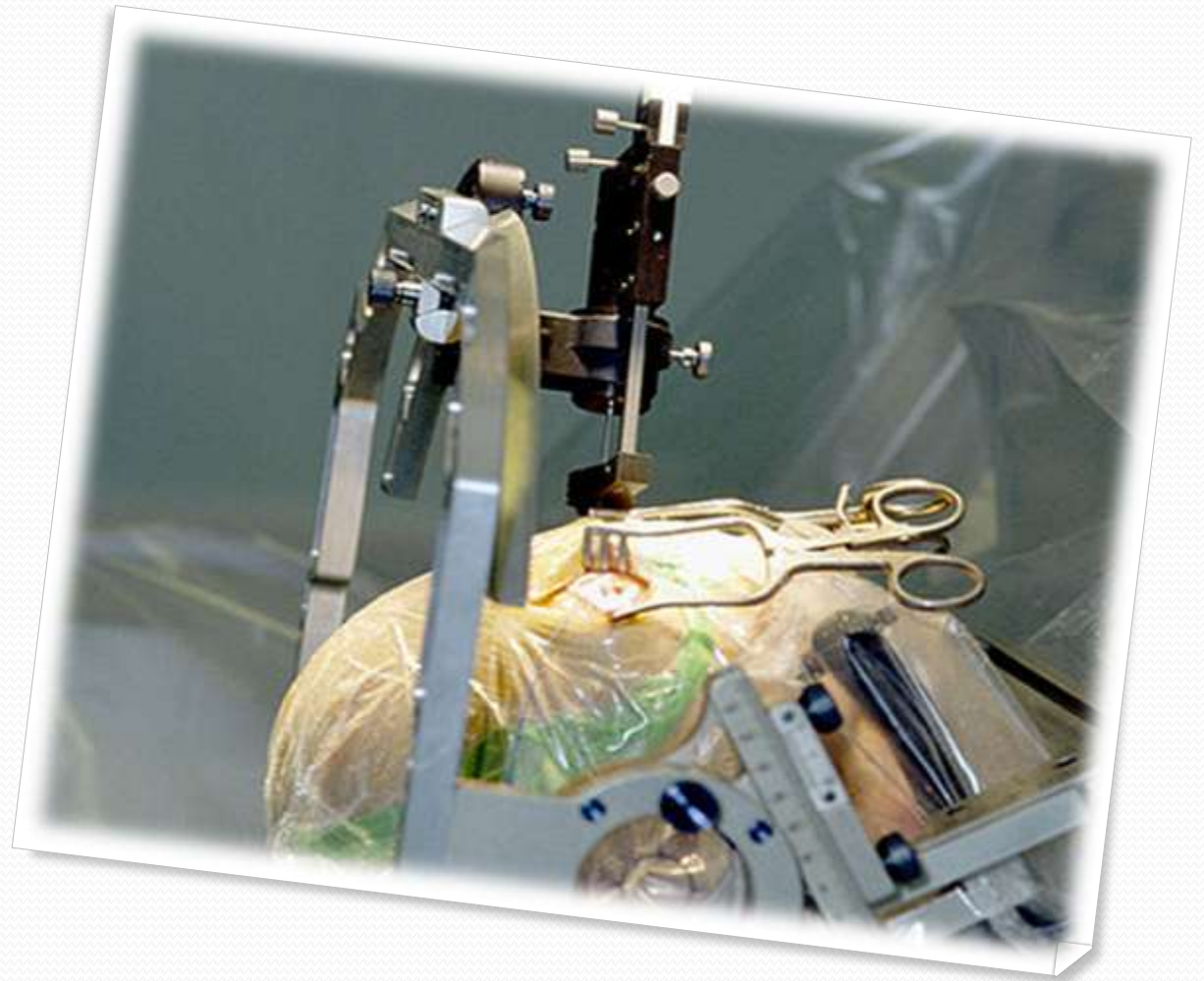
Sig. 1 tab PO

*#120 tabs
3 refills*



BRAIN SURGERY!

STN
PPN



PHYSICAL ACTIVITY

Move in bed.

Stiff!

Stand up.

Leaning back!

Walk.

Freezing!



NO EXERCISE IS PRO-DEGENERATIVE



- Periods of inactivity and failure to engage damaged systems (impairment-related or self-imposed) may be pro-degenerative and contributing to further degradation of function and disease progression.

Tillerson JL et al. Forced nonuse in unilateral parkinsonian rats exacerbates injury. J Neurosci 2002;22:6790-9.

EXERCISE AND BRAIN HEALTH



- Inactivity as prodegenerative
- Exercise as neuroprotection
- Exercise and neurorestoration

“Exercise may promote brain repair and reorganization (neuroplasticity) in persons living with PD; and this is accompanied by behavioral recovery.”

NEUROPROTECTION



- Exercise may delay or prevent PD in healthy individuals, and in early PD, slow disease progression and thereby motor deterioration.

Sasco AJ et al. The role of physical exercise in the occurrence of Parkinson's disease, Arch
neurology 1992; 49:360-5.

NEURORESTORATION



- Exercise may restore motor function *beyond* that of baseline unexercised controls, but comparable to exercised controls.
- Progressively higher intensity, longer duration practice, and task-specific paradigms may be required in human PD.

Petzinger GM et al. Effects of treadmill exercise on dopaminergic transmission in 1-methyl-4-phenyl-1,2,3,6-tetrahydropyridine-lesioned mouse model of basal ganglia injury. *J Neurosci* 2007; 27:5291-300.

A NOVEL APPROACH TO REHABILITATION OF PARKINSON'S



MOVING TOWARDS A CURE:

INNOVATIVE PATIENT CARE
AND APPLIED SCIENTIFIC RESEARCH
AT THE REHABILITATION INSTITUTE
OF CHICAGO



One more step.

The next step.

Step by step.

MOVE!



1,2,3... Pedometer.



Rhythm.

Harmony.

Cadence.

DANCE!



Tic-tac. Metronome.

Hmmmmm.
Ahhhhhhh.
LOUDER!



Sound level meter.



Inhale

Inhale deeper

Exhale

BREATHE!



FLUTTER Valve



Assistive.

Adaptive.

Advanced.

WALK!



U STEP: 7-wheels and a laser.





Chest up.

Shoulders back.

STRIKE A POSE!



Posture sway. Balance.

RIC FELLOWSHIP RECOGNITION



- James Brown IV Fellowship
 - “Dual Task Treadmill Training for Parkinson’s Disease” – Miriam Rafferty

- Dorothy R. Donnelley *and* Geraldine S. Taylor Fellowship
 - “Interdisciplinary Team Training for Parkinson’s Disease” – Uzma Khan, Kristin Schmidt, Jennifer Krauss, Annette Lapinski, Shelley Klass, Eileen French

ALLIED TEAM TRAINING FOR PARKINSON



ATTP INTENSIVE

4 1/2 day curriculum leading to NPF certification of trainees who receive in-depth knowledge of how to assess and treat persons with PD in an interdisciplinary setting

...BRINGING IT HOME!

LSVT INTENSIVE



The singular focus is on improving functional communication, with a specialty in Parkinson disease.

The treatment effects carry the added benefit of improved self-confidence and control over a significant symptom of Parkinson disease.

...BRINGING IT HOME!

LSVT[®] Training for Parkinson's



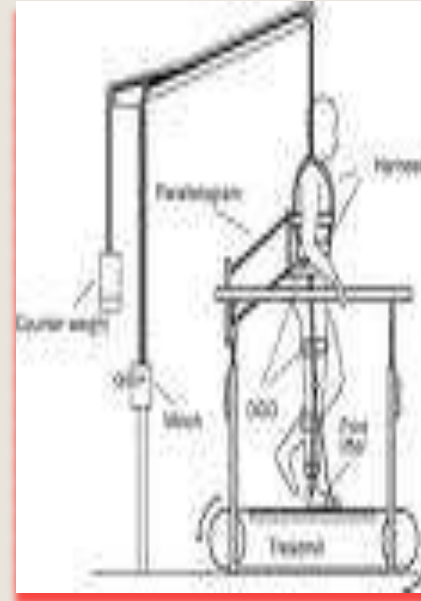
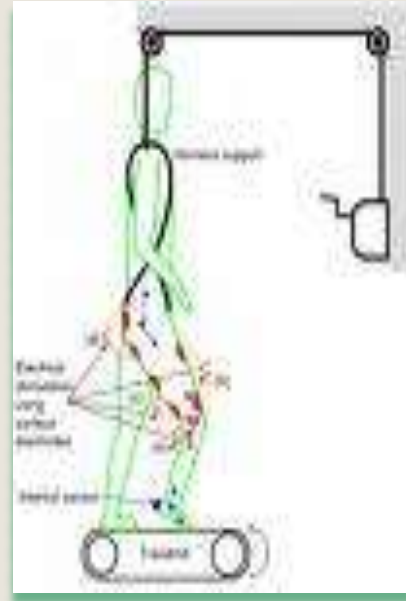
Wii[®] Board Training for Parkinson's



Treadmill Training for Parkinson's



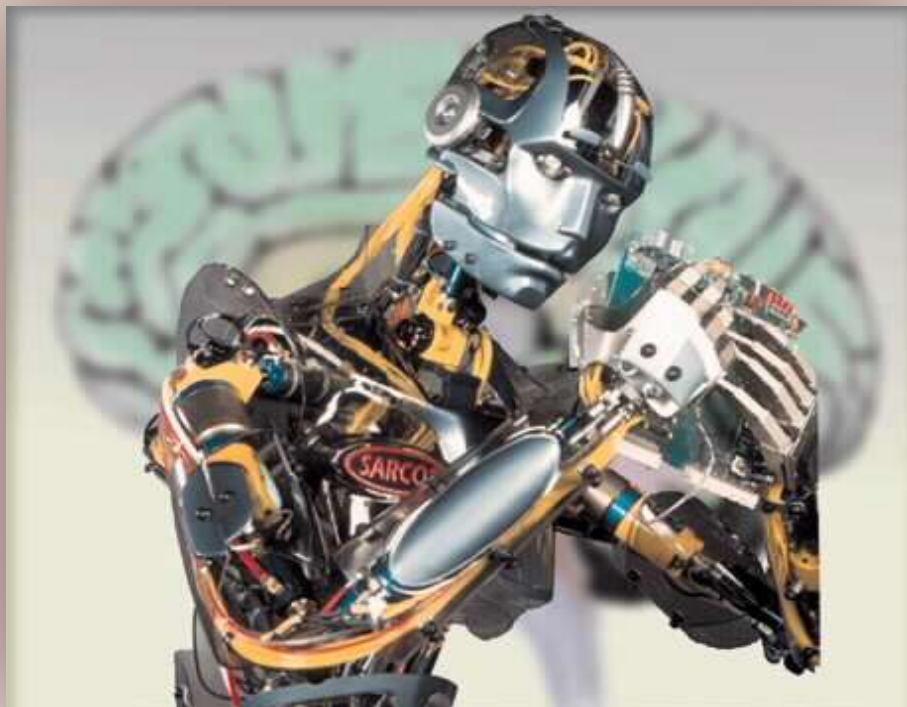
Technology: Bodyweight Support



Tandem Cycle Training in Parkinson's



Motor Learning in Parkinson's Robot-Assisted





EXERCISE

MOVEMENT

REHABILITATION

TOWARDS

A CURE



Enhancing abilities...



EXERCISE

MOVEMENT

REHABILITATION

TOWARDS

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...living with Parkinson's disease