

# Exercise and Brain Health

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National MS Conference  
24<sup>th</sup> September 2016



Feidhmeannacht na Seirbhíse Sláinte  
Health Service Executive



# Outline and Objectives

- Summary of effects of exercise
- Brain Health- Neuroprotective and role of Cytokines
- Relapse rate and exercise
- Efficacy of exercise in improving cognitive dysfunction
- Types of exercise and what works best
- Where to go from here

Name: .....

DOB:.....

Other relevant findings:

.....

Clinical Impression:

.....

.....

.....

.....

Date	Problem List			Goals(SMART)	Treatment Plan	Date resolved
	Impairment	Activity	Participation			

# Exciting and Dynamic Times



- What do we know about the effects of exercise??

# Impairment Level

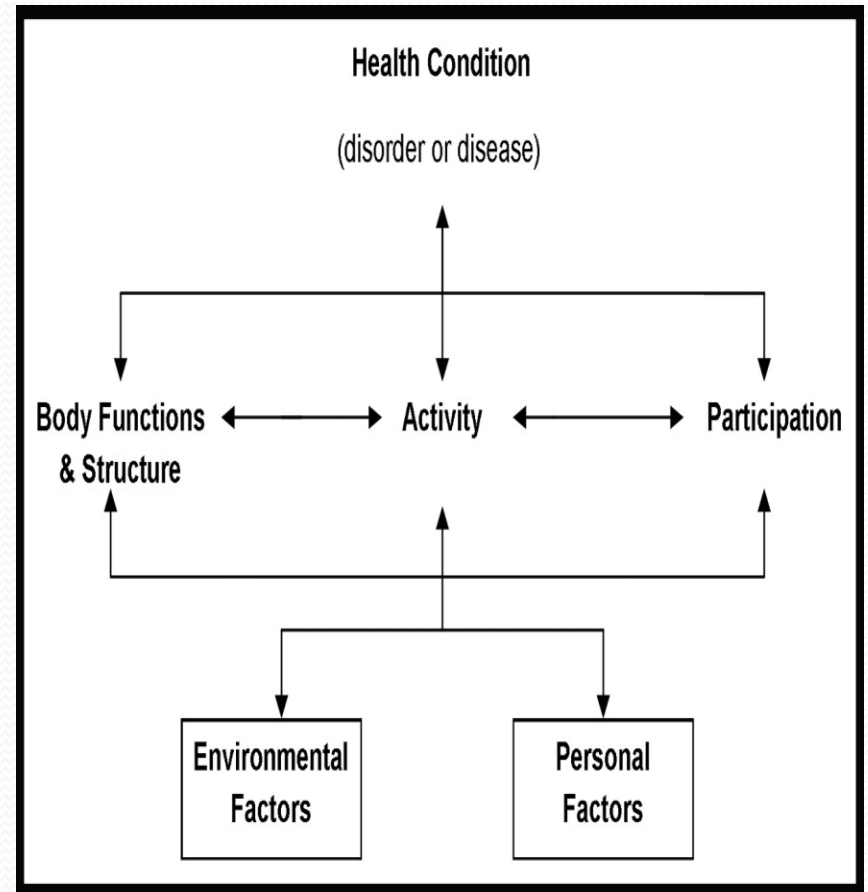
- Muscle Strength

**-Giesser et al 2015**

-Protocols have included progressive resistance training, aerobic exercise, combining the above

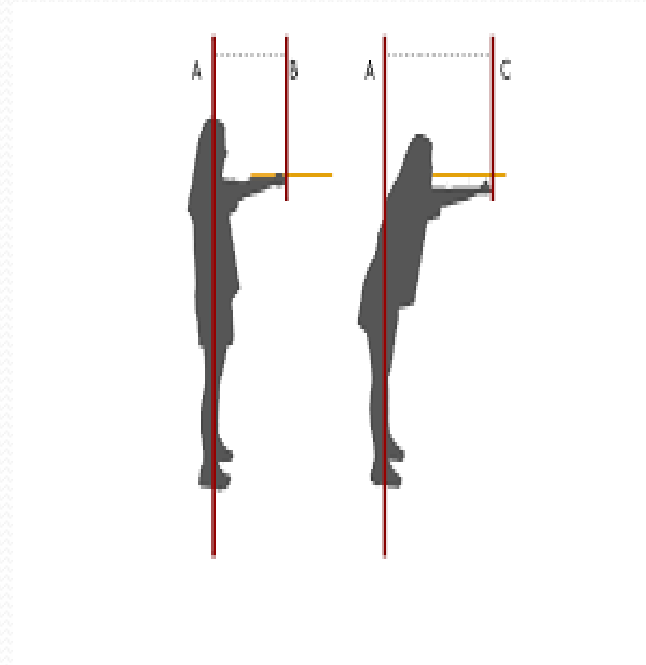
**-Latimer-Cheung et al 2013**

More research needed to definitively determine minimal dose



# Resistance Training

- 2 RCT's reported a significant increase in Functional Reach as a result of progressive resistance training



# Muscle Strength

- Study concluded that 30-60 minutes of moderate intensity aerobic training performed at least 2/3 times a week improves physical capacity and that resistance training performed 2/3 times per week increases muscular strength
- But....  
Study underscored the NB of 2 fundamental training principles...

# Fatigue

- Most common symptom, incidence of up to 90%.
- Multidimensional symptom
- **Pilutti et al 2013**- meta-analysis

Multi-dimensional

Neuro-degenerative

De-conditioning



# Mobility

- Often used to track *disease progression* over time.
- Most commonly assessed using performance measures such as 6MWT, timed 25FTW and TUG.
- + Evidence that exercise improves speed and endurance. (Latimer-Cheung et al 2013)



Archives of Physical Medicine and Rehabilitation

Journal homepage: [www.archives-pmr.org](http://www.archives-pmr.org)

Archives of Physical Medicine and Rehabilitation 2013;94:1800-28



## REVIEW ARTICLE (META-ANALYSIS)

### Effects of Exercise Training on Fitness, Mobility, Fatigue, and Health-Related Quality of Life Among Adults With Multiple Sclerosis: A Systematic Review to Inform Guideline Development



Amy E. Latimer-Cheung, PhD,<sup>a</sup> Lara A. Pilutti, PhD,<sup>b,c</sup> Audrey L. Hicks, PhD,<sup>b</sup> Kathleen A. Martin Ginis, PhD,<sup>b</sup> Alyssa M. Fenuta, HBSc,<sup>b</sup> K. Ann MacKibbin, PhD,<sup>b</sup> Robert W. Motl, PhD<sup>c</sup>

Freeman&Gear/MSTrust/2015

From the <sup>a</sup>School of Kinesiology and Health Studies, Queen's University, Kingston, Ontario; <sup>b</sup>Department of Kinesiology, McMaster University,

# Exercise and Brain Health





## EDITORIALS

### Exercise: not a miracle cure, just good medicine

Physical activity remains the best buy for public health

Domhnall MacAuley *visiting professor*<sup>1</sup>, Adrian Bauman *professor of public health*<sup>2</sup>, Pierre Frémont *associate professor*<sup>3</sup>

<sup>1</sup>Faculty of Life and Health Sciences, University of Ulster, Northern Ireland; <sup>2</sup>School of Public Health, and Director Prevention Research Collaboration, University of Sydney, Australia; <sup>3</sup>Department of Rehabilitation, Faculty of Medicine, Université Laval, Québec, Canada

There is nothing miraculous about exercise. What is extraordinary is how long it is taking mainstream medicine to accept the importance of physical activity. A recent report from the Academy of Medical Royal Colleges, *Exercise: the Miracle Cure and the Role of the Doctor in Promoting It*, reminds us of the benefits of physical activity,<sup>1</sup> but we already know that it is effective in primary prevention, secondary prevention, and in the treatment of many common diseases. The report builds on

#### Doctors' contribution

The role of doctors seems more aspirational than evidence based. Although the benefits of exercise are well documented, there is less evidence that interventions led by doctors are effective at the population level. We have developed comprehensive, evidence based guidance on appropriate prescribing of exercise.<sup>2</sup> But a systematic review of interventions in primary care to

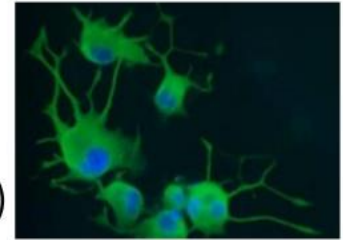
# Neuroprotective Effect

- Cytokines- play a prominent role in the process of demyelination and axonal damage in MS.

## Potential Impact of Physical Activity on Brain Health and the Immune System

Mediates processes:

- Neuroprotective,
- Neuroregenerative,
- Adaptive (Neuroplasticity)



enhancement of neurotrophic factors

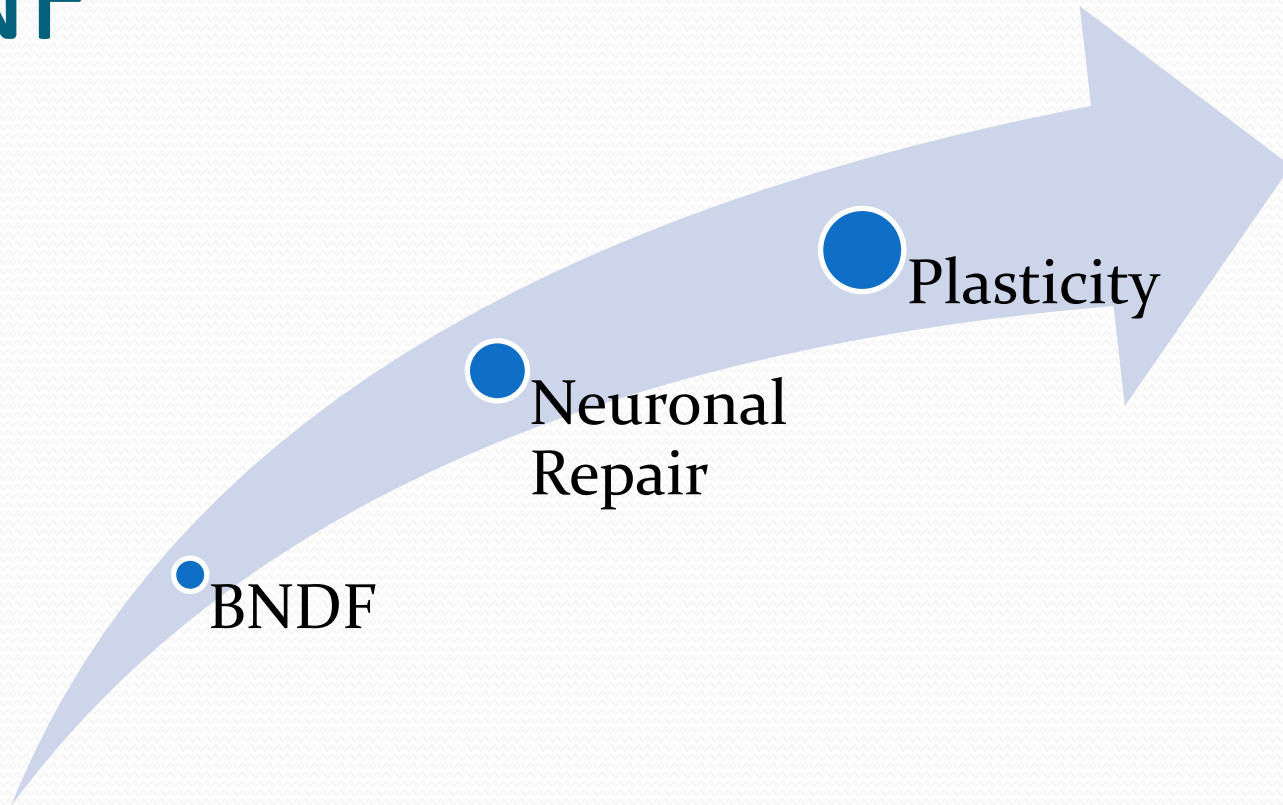
enhance stress resistance

influences balance of pro/anti-inflammatory response

(Gold et al 2003; Heesen et al 2003; White et al 2006; White and Castellano 2008; Golzari et al. 2010)

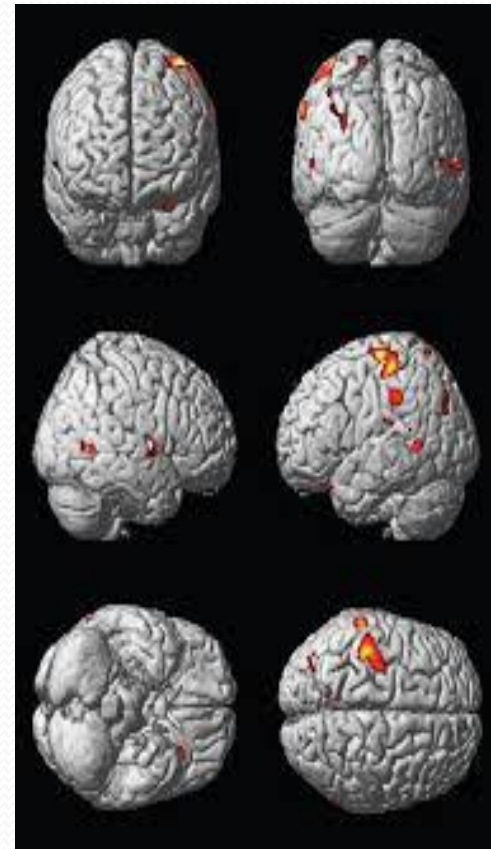
Freeman&Gear/MSTrust/2015

# BDNF



# Brain Health

- Aerobic fitness is associated with gray matter volume and white matter integrity in MS.
- Prakash et al 2009- A positive association between cardiorespiratory fitness and regional gray matter volumes were reported.
- Prophylactic



# Brain Health

- Physical activity was significantly correlated with cognitive processing.
- Less in learning and memory

Review

MULTIPLE  
SCLEROSIS  
JOURNAL | MSJ

Cognitive dysfunction and multiple sclerosis: developing a rationale for considering the efficacy of exercise training

Multiple Sclerosis Journal  
17(9) 1094-1099  
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[sagepub.com/journalsPermissions.nav](http://sagepub.com/journalsPermissions.nav)  
DOI: 10.1177/1352458511409412  
[msj.sagepub.com](http://msj.sagepub.com)

SAGE

Robert W Motl<sup>1</sup>, Brian M Sandroff<sup>1</sup> and Ralph HB Benedict<sup>2</sup>



# Reduction in Relapse?

- Tallner et al 2011
- Examined the relationship between physical activity and MS relapses over 2 years in 600 MS patients.
- Self reported
- Most active group had the lowermost mean and standard deviation





**What does  
all this  
mean???**

Where to  
start...



# Type of Exercise

- Aerobic plus Resisted – for best effect on Cytokines
- Balance Specific-individual and needs to be assessed
- Agility Bootcamp
- Guidelines
- Secondary weakness from disuse is common and reversible

# Aerobic Exercise



# Resisted Exercise



# NFTP

- Commenced Jan 2013
- Initially a wait list management initiative and to facilitate discharge planning



**Functional Zone**





# MS Programme in NFTP

- Individual
- Assessment pre commencement
- Knowledge to overcome barriers
- Frequency
- Peer Support
- Physiotherapy/Gym Instructor mix
- MS Ireland support
- Exercise Buddy
- Categorisation
- Progression of exercises
- Outcome Measures
- Relapse rate

# Summary and Key Suggestions

- Extensive and consistent data supporting the beneficial effects of exercise training on muscular strength and aerobic capacity.
- May have the potential to slow down disease process
- Some evidence on the Neuro-protective effects of exercise.
- Combined aerobic and resisted training is best
- Physiotherapy assessment for tailored programme
- Need to address at initial diagnosis – “Use it or loose it”
- Can be perfomed anywhere!
- MS Ireland support

A photograph of a paved road winding through a dense forest of tall, thin trees. The road is dark and has a white dashed line in the center. The text is overlaid in the middle of the image.

**DO NOT  
LOOK BACK  
YOU'RE  
NOT  
GOING  
THAT WAY**