



THE HEUGA CENTER

Promoting Health, Creating Hope

PHYSICAL ACTIVITY FOR PEOPLE WITH MULTIPLE SCLEROSIS

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Physical Activity

- Use Physical Activity as a 'therapeutic ritual'; a focal point for self management
- Overall health
- Symptom management
- Disease management??

Effects of MS on Exercise

- Primary
- Secondary
- Tertiary





Primary Effects of MS on Exercise

Blunted Blood Pressure Responses

- Dampened arterial blood pressure response to sustained isometric exercise (Pepin, et.al., 1996 & Ng, et. al., 2000)
 - Pepin: Impaired autonomically mediated pressor response
 - Ng: A function of dampened muscle metabolic response



Primary Effects of MS on Exercise (Gunal, et al., 2002)

- CV autonomic functions decreased
 - HR response to deep breathing, valsalva standing
 - BP response to standing & sustained hand grip
- 90% had symptoms related to autonomic dysfunction 45.5% had abnormal response in CV autonomic testing
- Correlation to length of the disease and not EDSS
- Both parasympathetic and sympathetic functions impaired



Primary Effects of MS on Exercise (Olindo, et.al., 2002)

- Decreases in ventricular ejection fractions (VEFs) in MS patients compared to control group
- No correlation between VEF and sex, age, disease duration, disease course, EDSS score or previous treatment



Primary Effects of MS on Exercise

Fatigue

- Central
- Peripheral
- Thermosensitivity
- Depression



Secondary Effects of MS on Exercise

Impairments

- ROM
- Strength/Weakness
- Sensation
- Balance/Coordination
- Fatigue due to Deconditioning
- Pain
- Medication Effects



Secondary Effects of MS on Exercise

Disability/Activity Limitations

- Mobility
 - Difficulty achieving desired levels of exercise (inability to perform previous activities)
 - Coronary heart disease risk comparable to general population; those with decreased mobility had decline in activity, body comp & nutritional habits (Slawta, et.al. 2003)
- Cognitive



Tertiary Effects of MS on Exercise

Emotional

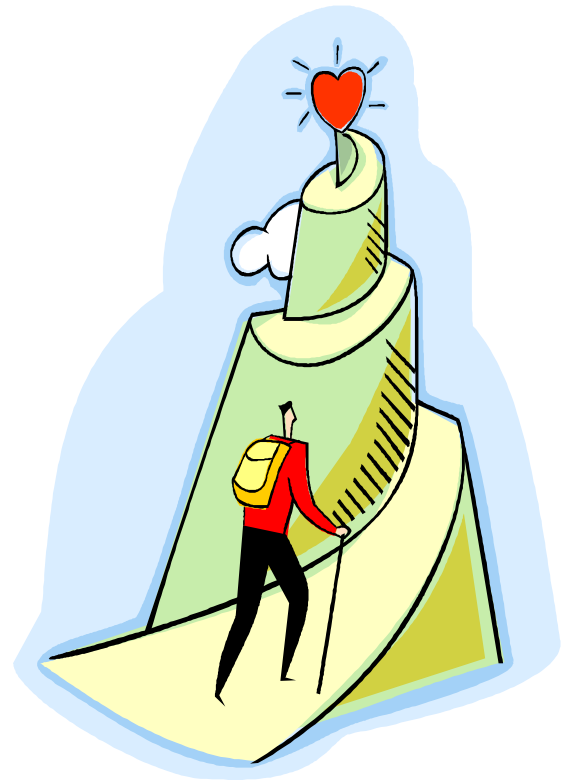
- Decreased motivation
- Family/community support
- Coping skills

Accessibility

- Equipment
- Location(s)
- Expertise

Effects of Exercise on People with MS

- Improvements in Impairments
- Improvements in Disability
- Improvements in Quality of Life
- Improvements in Health Measures
- Disease Effects??





Effects of Exercise on People with MS

Improvements in Impairments

- Improve range of motion
- Improve strength
- Improve endurance/decrease fatigue
- Decrease pain



Range of Motion

- Primarily empirical data
- Decrease in spasticity when stretching added to medication (Brar, et.al, 1991)



Strength/Weakness

- Improvements in muscle strength and endurance with water exercise program (Gehlsen, et.al., 1984)
- Differences in absolute strength measures in those with MS (Chen, 1987 & Ponichtera, 1992)



Strength/Weakness

- Increased strength with lower body, low-resistance training program (Svensson, et.al., 1994)
- Increases in upper and lower extremity strength with aerobic exercise program (Petajan, et.al., 1996)
- Improvements in lower extremity extensor power with 8 week home-based resistance training program (DeBolt, et.al., 2004)



Balance and Coordination

- Most studies for elderly and vestibular populations (Chan, et. al. 1994)
- Improvements in balance with up to six months after physiotherapy treatment (DeSouza, 1984)
- Improvements in balance and balance confidence using ATM group class (Stephens, et.al., 2001)



Fatigue

- Differences in people with MS as it relates to aerobic capacity/ VO_2 max (Schapiro, et.al., 1987; Ponichtera-Mulcare, et.al., 1993)
- Improvements in fatigue with 4-6 week training program (Svensson, et.al., 1994)
- Improvements in VO_2 max with aerobic training program (Petajan, et.al., 1996)



Bowel and Bladder

- Improvements in bowel and bladder function as measured on Expanded Disability Status Scale {EDSS} (Petajan, et.al., 1996)



Impairment (EDSS)

- No change in EDSS with rehabilitation program at discharge or 3 months post rehab (Kidd, 1997)
- No change in EDSS following inpatient rehab (Freeman, et.al., 1997; Solari, et.al., 1999)
- Decline in neurologic status as measured by EDSS over long term (Freeman, et.al., 1999)



Impairment

- 6 month exercise program (aerobic and strength training)
- Exercise groups showed “clinically meaningful” improvements
- Improvements in UE endurance

Romberg, et.al., 2004



Impairment (MSFC)

- 6 month exercise program (primarily resistance training) demonstrated improvement in the MSFC, while the control group demonstrated deterioration in MSFC (Romberg, et.al., 2005)
- Primary improvements exercise group: 25 foot walk
- Primary deterioration in non-exercising group: 9 hole peg test



Effects of Exercise on People with MS

Improvements in Disability/Activity and Handicap/Participation

- Improvement in FIM scores
- Improvement with activities of daily living (ADL)
- Improvements in ESS
- Improvements in LHS



Disability/Activity Limitation (FIM)

- Significant improvement in function (FIM) at discharge and 3 months post rehab (Kidd, 1997)
- Reduced disability (except ambulation) up to 6 months (Freeman, et.al., 1997 & 1999)
- Improvement for up to 9 weeks in FIM scores (Solari, et.al., 1999)



Disability/Activity Limitation

- 6 month aerobic training program had minimal effect on gait abnormalities (Rodgers, et.al., 1999)
- The Potential of Exercise to Improve ADL's (Lexell, 2000)
- Improvements in mobility (RMI) following 8 weeks of physiotherapy (home or outpatient) (Wiles, 2001)



Handicap/Participation

- Trend toward improvement in handicap (ESS) (Kidd, 1997)
- Reduction in handicap (LHS) following IP rehab (Freeman, et.al., 1997)
- Reduction in handicap (LHS) up to 6 months (Freeman, et.al., 1999)



Effects of Exercise on People with MS

Improvements in Quality of Life

- Emotional behavior
- Social interaction
- Recreation
- Home management
- Reduction in depression
- Reduction in anger



Effects of Exercise on People with MS

Improvements in Physical Health Measures

- VO2 max
- Percent body fat
- Blood lipids

Petajan, 1996



Effects of Exercise on People with MS

Effects on Disease Process

- 16 week program of resistance exercise demonstrated decrease in pro-inflammatory cytokines and increase in anti-inflammatory components (University of Buffalo, 2002)



Effects of Exercise on People with MS

Effects on the Disease Process

- Patients without training show a weaker cytokine (TNF & IL-1) induction with exercise
- Increased IL-10 (anti-inflammatory)
- Partially restored with an 8 week interval training twice/week
- Small sample size (low statistical power)

Heesen, et.al., 2003



Effects of Exercise on People with MS

Hessen, et.al., continued

- Increases in interferon gamma
- Moderate exercise increases tolerance to susceptibility of infections
- Exhaustive exercise: might enhance inflammation



Effects of Exercise on People with MS

Potential Effects on the Disease

- Voluntary exercise can:
 - Prime adult dorsal root ganglion for axonal regeneration through a neurotrophin-dependent mechanism
 - Increased neurite outgrowth when cultured from animals undergoing 3-7 days of exercise compared with sedentary animals (Molteni, et.al, 2004)



Effects of Exercise on People with MS

Potential Effects on the Disease (cont')

- 8 week training program 2 times/week; interval training with max at 75% VO₂
- Increases in BDNF, however not statistically significant (Schulz, et.al, 2004)

Summary



- MS and accompanying symptoms can cause difficulty with exercise
- The benefits of exercise outweigh the potential difficulties because of the benefits associated with reducing disability, improving quality of life, overall health and potential effects on neurologic repair

Summary



- Physical activity can be used as a therapeutic ritual as a focal point of health promotion/ self management programs
- Physical activity programs should be recommended and monitored by professionals with training in exercise and rehabilitation management for people with MS