

# **Visual Field Immersion: The Holodeck Comes Alive**

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**McGill**

# Satellite Conference IASP

## Pain, Mind and Movement II

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Dublin, Ireland

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[www.painandmovement.org.uk](http://www.painandmovement.org.uk)





# Introduction

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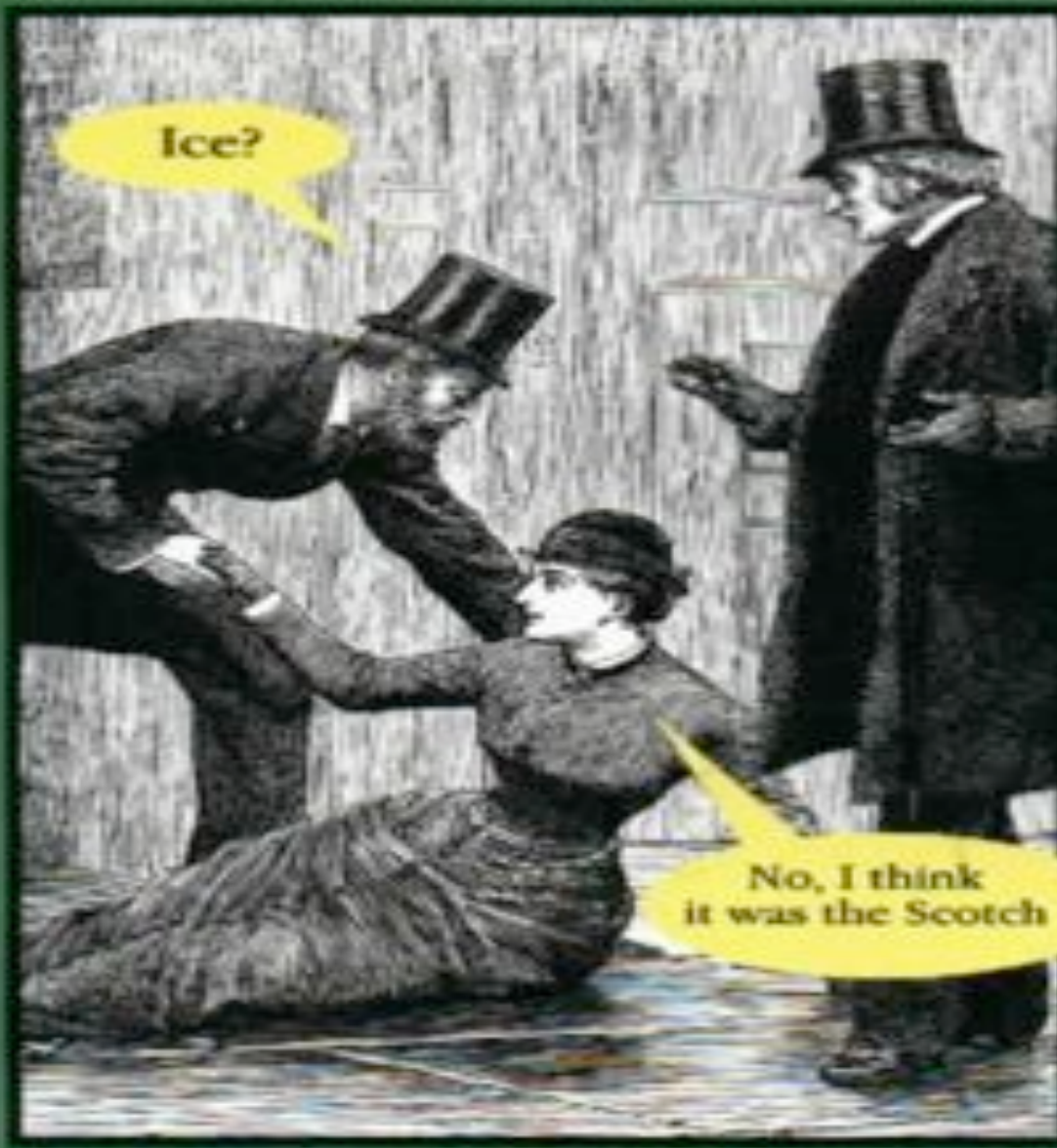
- The problem –
  - Pain
  - Impact of Pain - Movement difficulties
    - Or the motor expression of pain?
- Novel rehabilitation approaches
- Virtual reality
  - Understand mechanisms
  - Means of Intervention



# Introduction

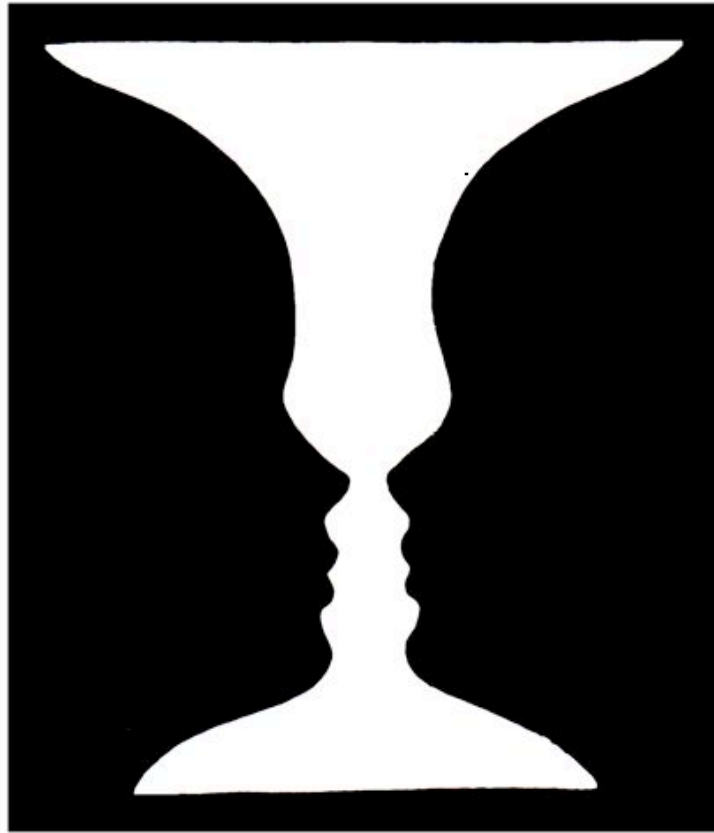
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- The problem –
  - Pain
  - Impact of Pain - Movement difficulties
    - Or the motor expression of pain?
- **Assessment and outcome measures (activity based)**
  - Expanded conceptual framework of what is important and to whom
- Exercise is good for the mind and the body
- How do you get people to exercise?
- **Just do it!**
- **Virtual Exercise?**

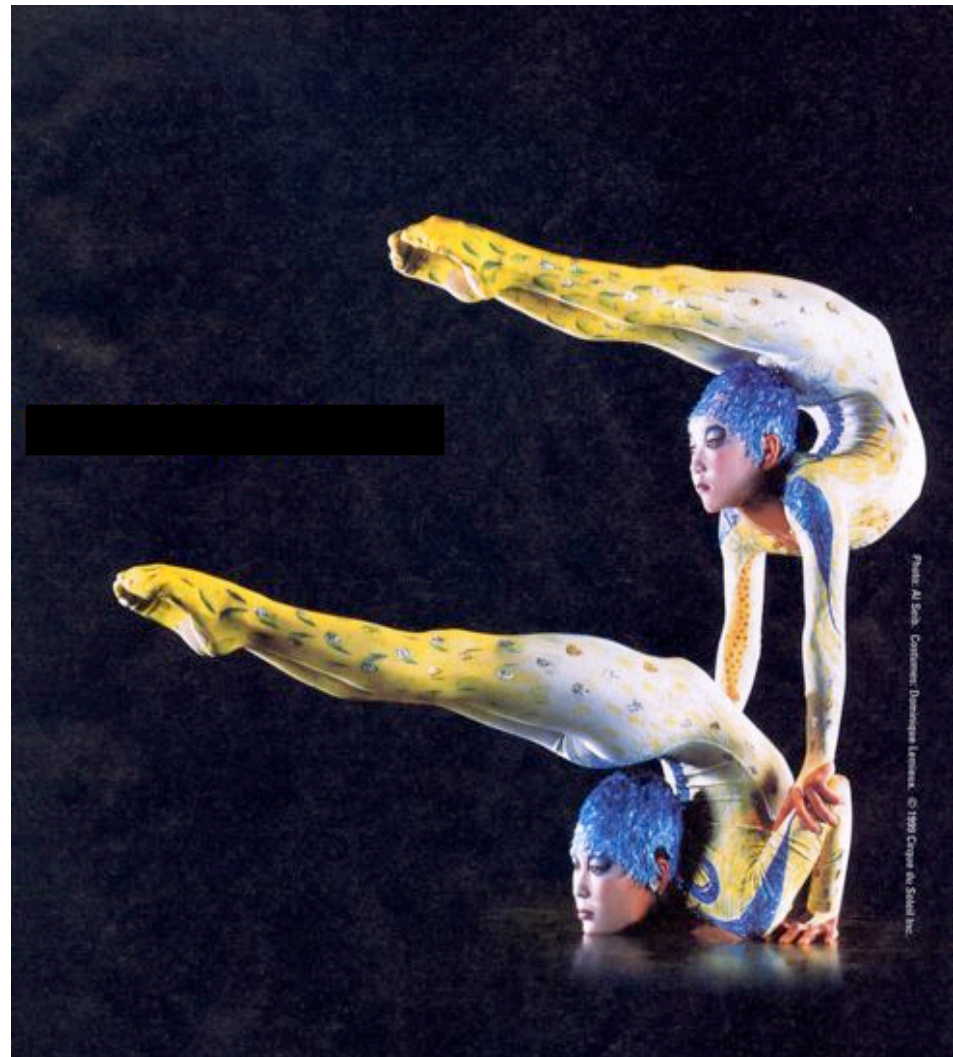


# The Measurement Enigma

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Examine movements & function but .....



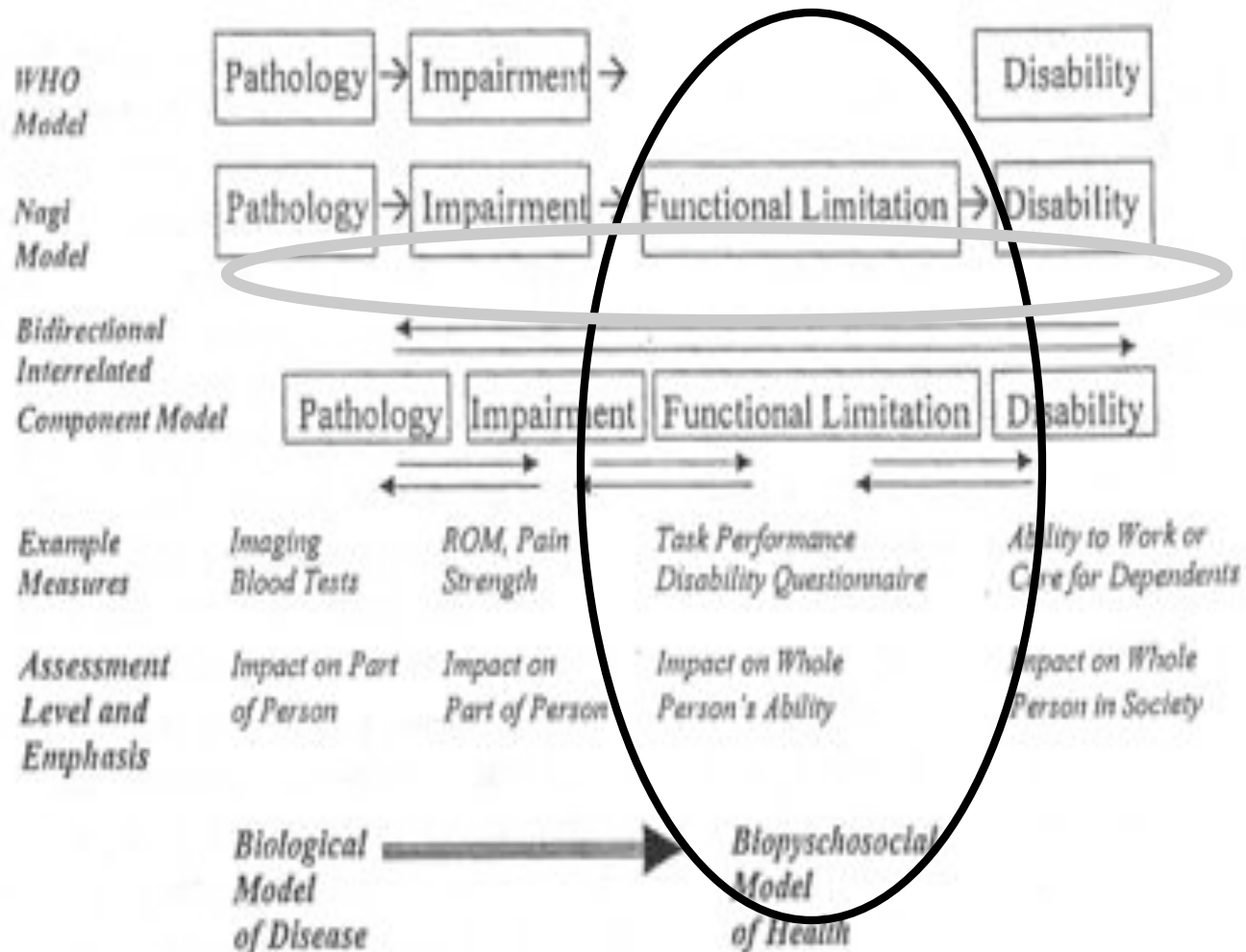
# Timed Sit-Stand & Distance Walk





# Assessment and Outcome Measures

## Expanded Conceptual Framework



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1. Models of disablement and assessment measures.

## Quantifying Performance: *Time taken or Distance moved (walk or reach)*

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Simmonds et al, Spine 1998

- 50 foot fast walk
- 5 minute distance walk
- Loaded forward reach
- Sit-to-stand (5 reps)
- Timed repeated flexion (5 reps)
- 360° rollover



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# Physical Performance Tests (General: including Spine, HIV & Cancers) Simmonds et al, Spine, 1998; J Pain and Symp Manag, 2003; Clin J Pain, 2005)

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## □ *Timed tests*

- Putting on a sock
- Tying a belt
- Reach behind neck x3
- Placing coins in a cup
- Sit-to-stand x2
- Reach up x3
- Picking up a pen
- 50-foot walk-preferred speed
- 50-foot walk- fastest speed
- Repeated Flexion

## □ *Distance tests*

- Functional reach
- Loaded reach
- 5 & 6 minute walk

# Discriminative and Construct Validity of Performance Tasks

(Simmonds et al, 1999; Lee et al, 2000 & 2002; Novy et al, 2002; Lee et al, 2003; Simmonds et al, 2003)

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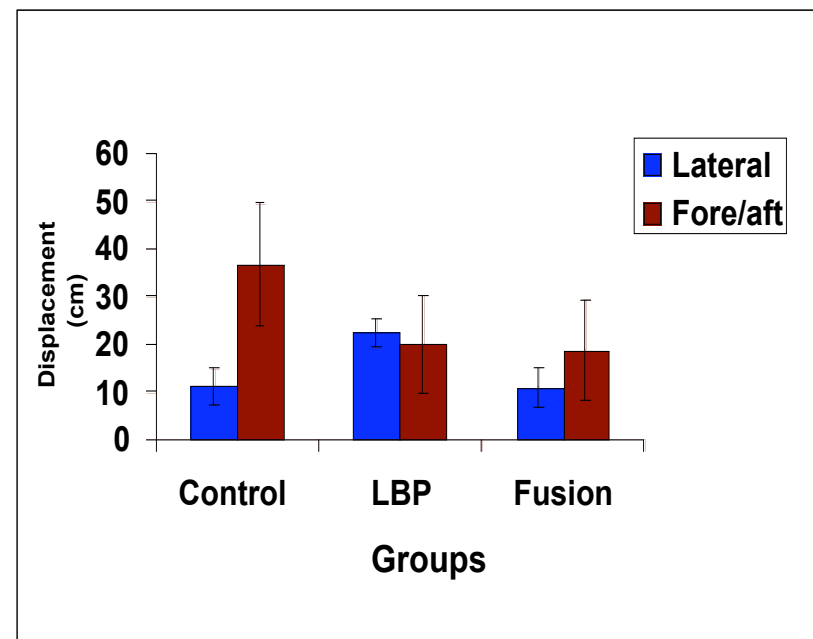
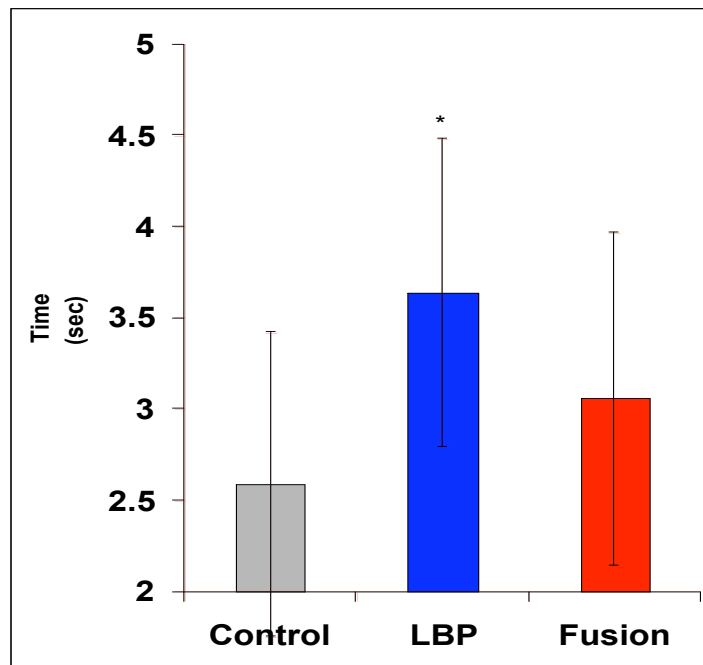
- Discriminant function analysis
- Correct classification
  - 82.7% LBP    85.4% controls
  - Overall correct classification 84.3%
  - Predict survival (lymphoma, aged)
- Performance differences based on
  - Gender,
  - Pain intensity
  - Pain distribution
  - Disease



Control (n=105) subjects outperform those with cancer (n=108) by a factor of 2 or 3 and outperform patients with HIV/AIDS (n=100) by up to a factor of 4

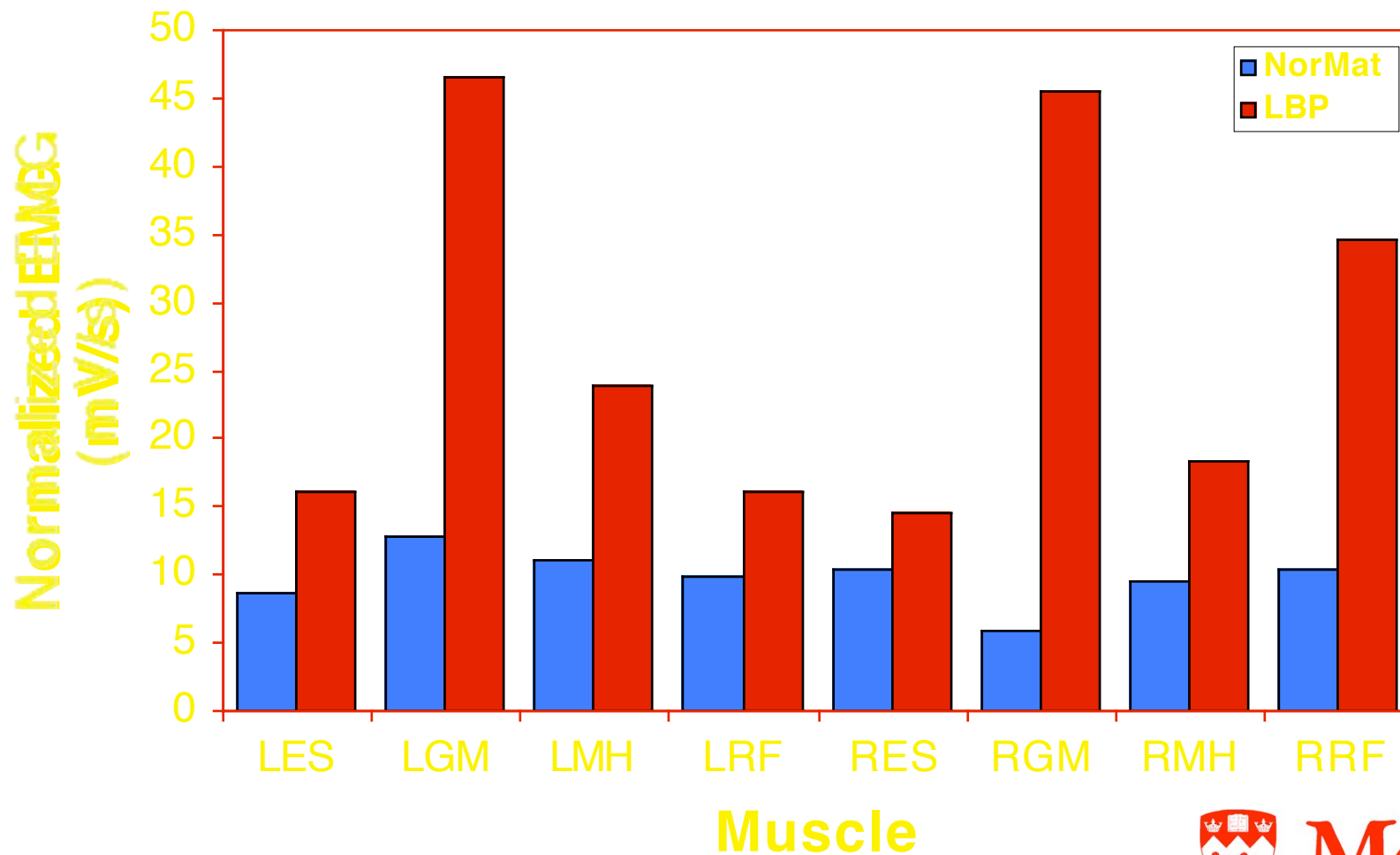
<b>Task</b>	<b>df</b>	<b>F value</b>	<b>P Value</b>
Sock	1,182	18.31	.0001
Belt Tie	1,182	23.50	.0001
Coin	1,182	5.28	.023
Reach up	1,182	94.97	.0001
Forward Reach	1,182	62.77	.0001
Sit-to-Stand	1,182	129.18	.0001
50-foot Fast Walk	1,182	42.59	.0001
6 minute Walk	1,182	146.94	.0001

# Biomechanical Task Analysis: Loaded Forward Reach (n=60)



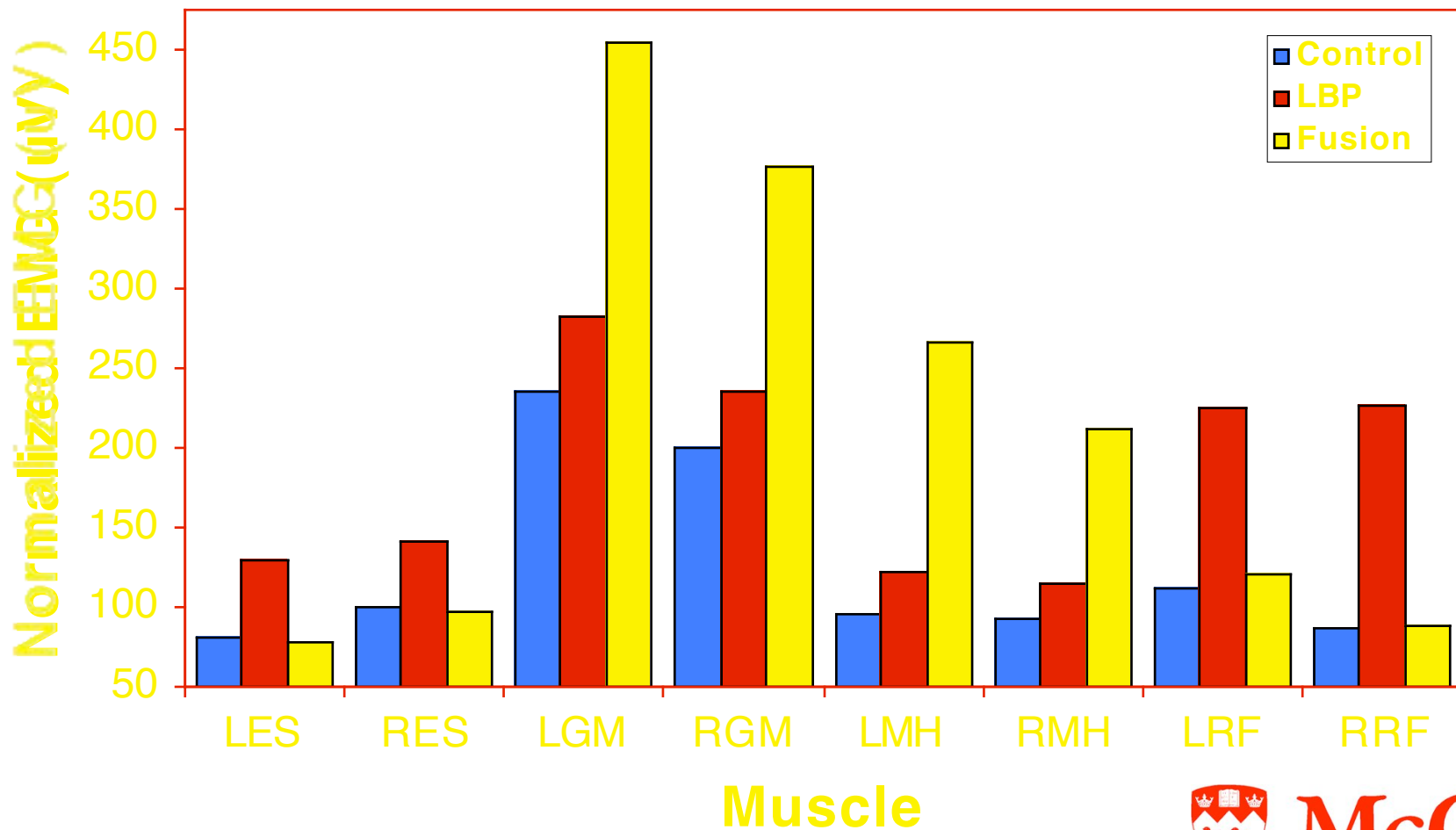
# Sit To Stand

## Quantity of Muscle Activity



# Loaded Reach Test

## Quantity of Muscle Activity

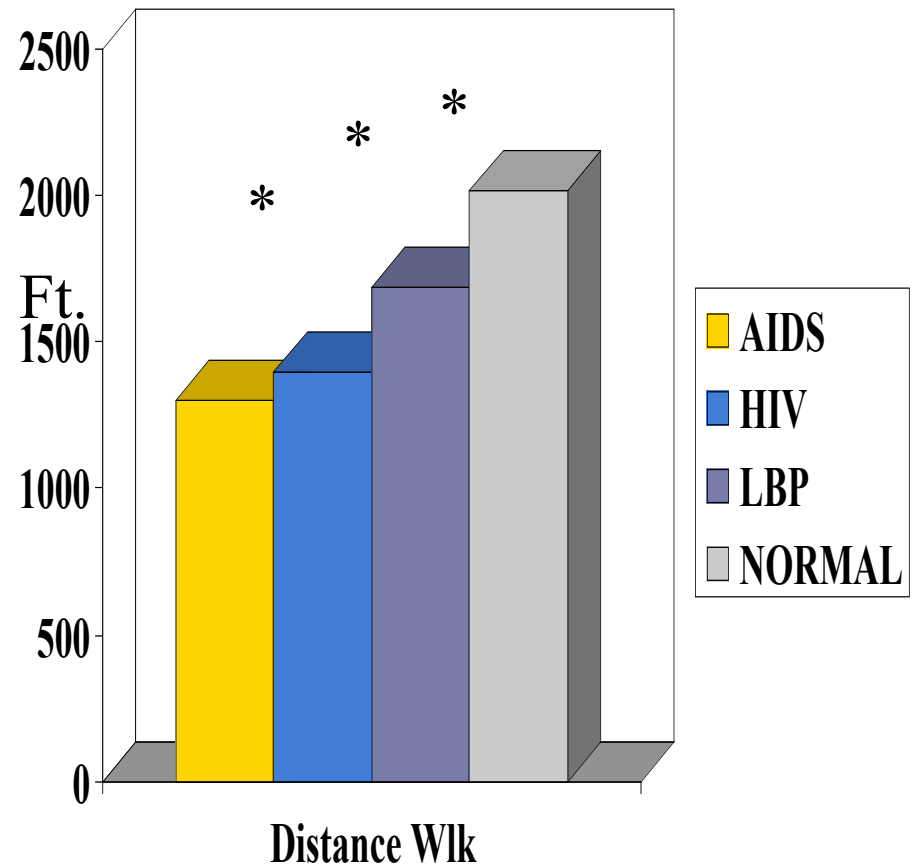
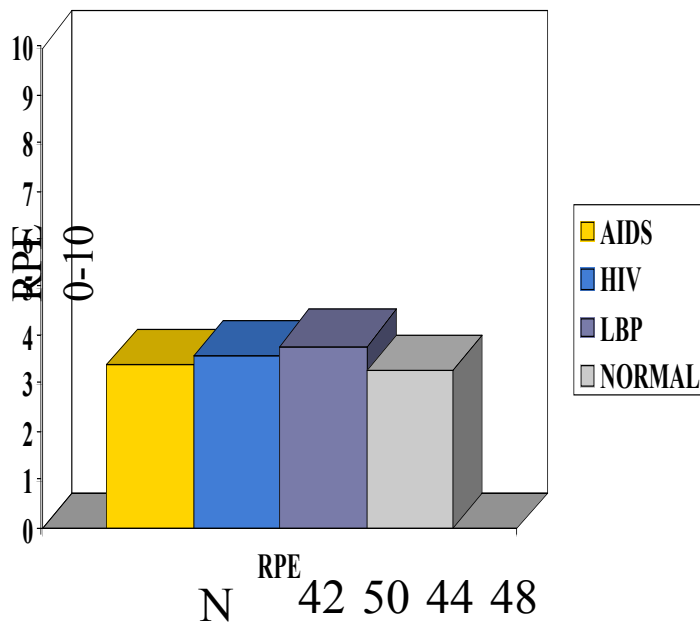




# Perceived Effort and Walk Distance

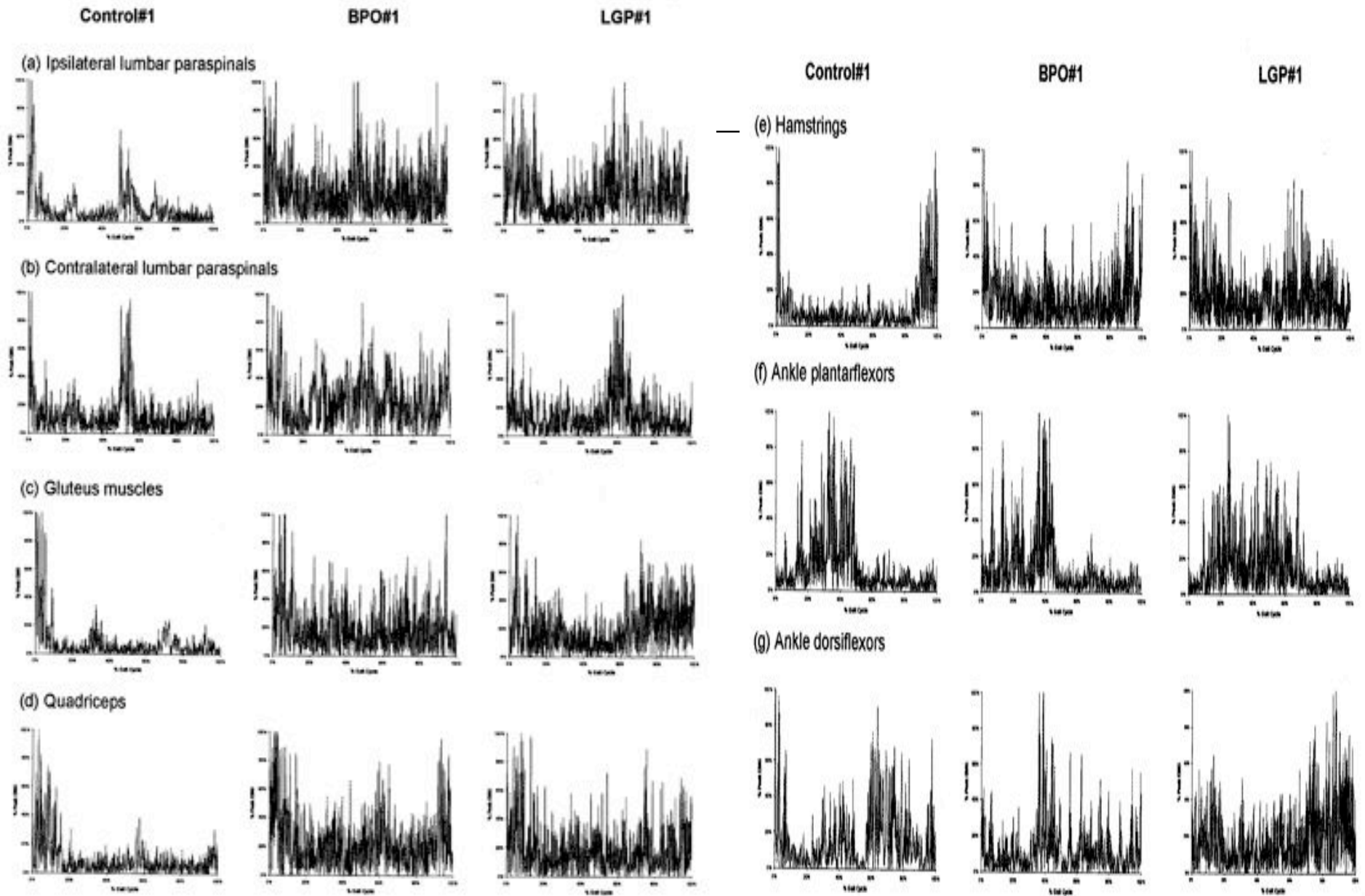
Moving slowly is relatively energy inefficient

(Lee & Simmonds 2002)



\* p < .05

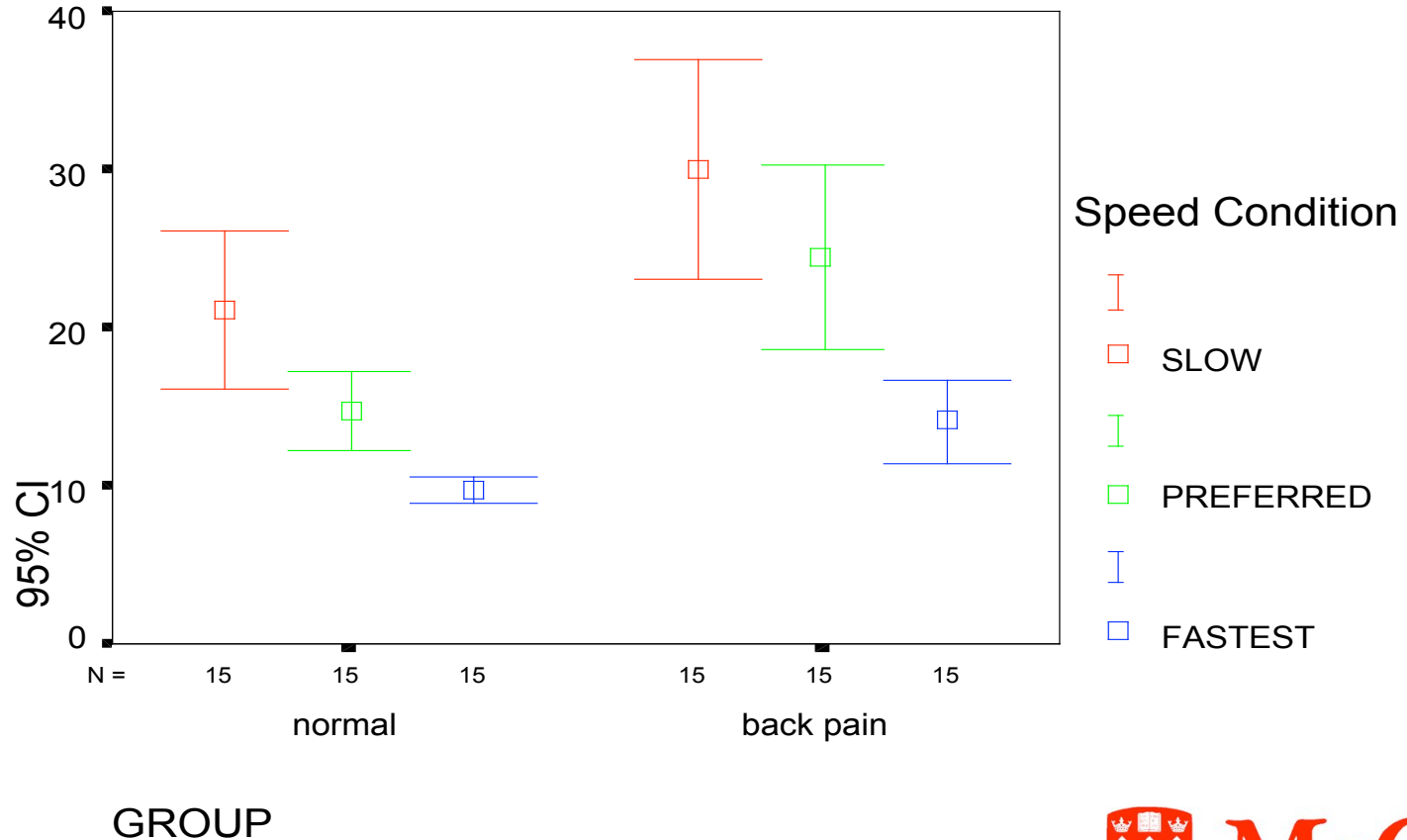
Figure 5.4 Comparison of rectified & normalized EMG patterns in one gait cycle of the test leg in the PWSC (1<sup>st</sup> set of participants)



# Slower at all speeds?

## Repeated Sit-to-Stand

n= 30 LPB & age and gender matched controls



# Expected vs. actual Pain

Preliminary study

sit-to-stand task across three speed conditions  
(slow, preferred, fastest)

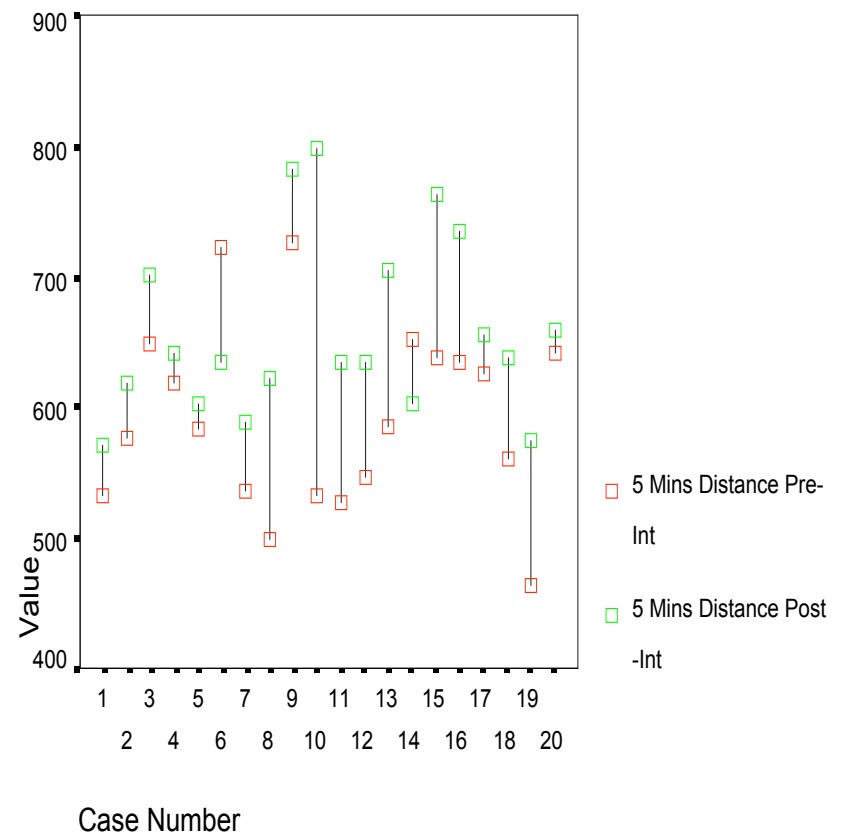


# Speed Targeted Intervention

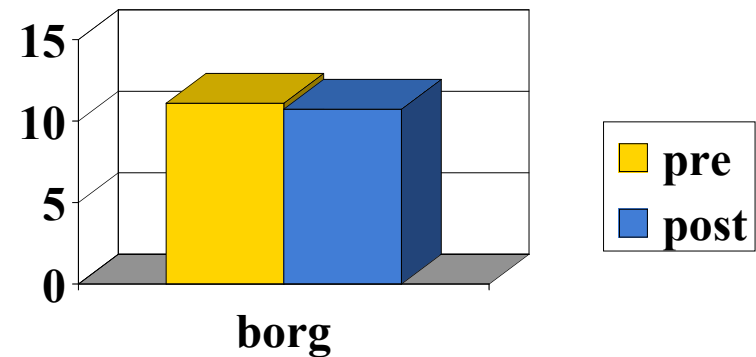
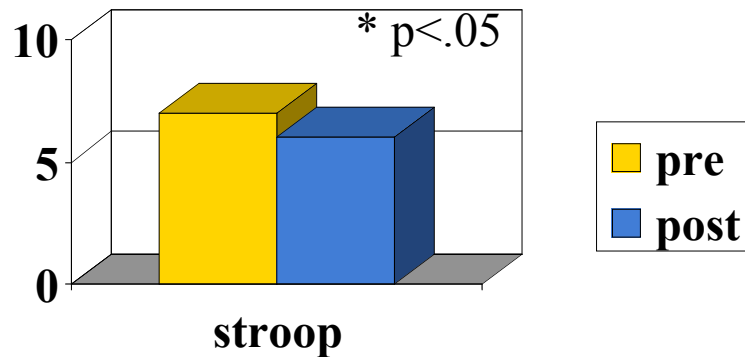
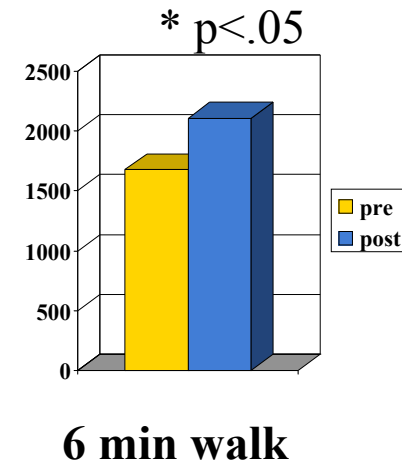
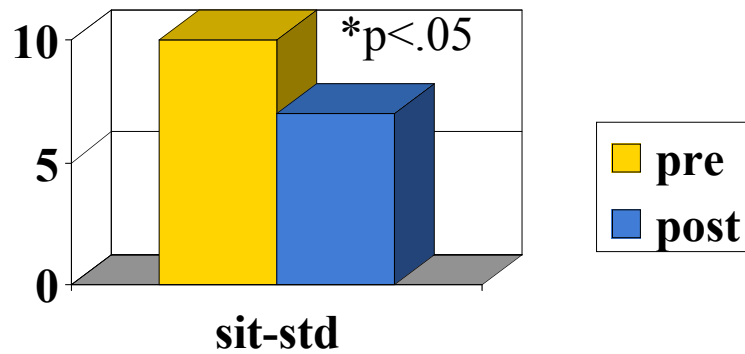
## 5-minute Distance Walk

Wingate “sprint” protocol  
3 minute walk at preferred speed  
30 second walk as fast as possible  
3 minute walk at preferred speed

Repeat number of reps → training challenge



# Brisk walk Elderly (Modified Wingate)



# Management: Specific Exercise or lifestyle?

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- ❑ Speed targeted Rx
- ❑ Tai Chi
- ❑ Dance
- ❑ Yoga
- ❑ Walking

**What will the individual do?**

**Exercise is better than rest BUT  
no difference between exercise regimens!!**

