Response Inhibition and Reactive Balance in Older Adults

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Introduction

- Response Inhibition (RI)
  - Suppression of automatic & unwanted actions (Verbruggen & Logan, 2008)

- Cognitive function & balance control linked (Liu-Ambrose, Nagamatsu, Hsu, & Bolandzadeh, 2013)

- RI plays role in balance control (van der Wardt 2015; Saverino, 2016)
Introduction

- Cognitive decline in older adults linked to fall risk (Mirelman et al, 2012)
- Underlying mechanisms of cognitive ability unknown (Bolton, 2015)
- Balance control tests too simple to require RI (Dakin & Bolton, 2018)
- Stop-signal reaction time correlates with compensatory balance response in young adults (Rydalch, Bell, Ruddy, Bolton, submitted to Gait & Posture)
Purpose

Explore the possibility of a relationship between a postural recovery task requiring response inhibition and a seated cognitive task that measures response inhibition in older adults.

Is nature of RI generalizable and similar to results in young adults?
Participants

- 19 participants 50-85yrs of age
- Performed stop signal task followed by reactive balance testing
Stop Signal Task

Fixation

‘Go’ cue

<200ms

GO

75%

>  

NO GO

25%
Reactive Balance Testing

(A) REACH
30% of trials

(B) Vision Occluded
3-4 sec

Goggles Open

200 or 400 ms delay

Perturbation Onset

Postural Response

STEP
70% of trials
Results

SSRT = 254ms (slow)

SSRT = 154ms (fast)
Results

$r = 0.18, p = 0.267$

$r = 0.59, p = 0.011$
SSRT & muscle response in stance leg are correlated

Similar results to young adults

- Slower (Cohen, Nutt, & Horak, 2011; Thelen et al., 2000)

SSRT from seated task compares to whole-body task

- Clinical application
Thank You

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References


Rydalch, G., Bell, H., Ruddy, K., & Bolton, D. A. E. (Submitted to Gait and Posture) Stop-signal reaction time correlates with a compensatory balance response.

