INCREASED VARIABILITY IN SUB-ACUTE COMPARED TO CHRONIC STROKE PATIENTS WHEN INVESTIGATING SHORT-LATENCY INTERLIMB COORDINATION.

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INTRODUCTION

- A conditioning volley elicited to the ipsilateral tibial nerve (iTN) has been demonstrated to inhibit the electromyography (EMG) activity of the contralateral soleus (cSOL) with an onset latency of 37–41 ms (Stubbs and Mrachacz-Kersting, 2009).
- It is likely that the stimulus to the iTN represents a large mechanical disturbance to the ipsilateral leg.
- During walking, inhibition of the cSOL may act as a protective response from the ipsilateral leg to inhibit the cSOL muscle activity before larger responses from supraspinal areas either increase (to step over the disturbance) or decrease (to stop forward progression to the disturbance) the muscle activity.

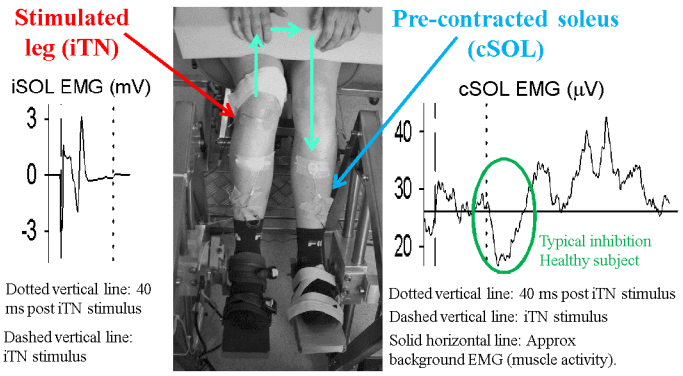
AIMS

1. To observe if the short latency crossed spinal response from the iTN to cSOL is altered in patients and is:
   - Different between **sub-acute (SA; ≤ 6 months) vs. chronic (CHR; > 6 months)** patients.
   - Different from the **paretic (P) to non-paretic (NP) and NP to P limbs.**
2. To assess changes if the changes in the response are **related to clinical measurements**.

MATERIALS AND METHODS

21 mildly affected hemiparetic stroke patients; 21 controls

Experimental set up



- iTN was stimulated at 85% M-max of the ipsilateral soleus.
- cSOL was pre-contracted to 5–15% of the maximum voluntary contraction (MVC). For the patients, the cSOL contraction level for NP and P was 5– 15% of the MVC of the P soleus.
- Root mean square (RMS) of the cSOL were assessed in pre-defined response windows (45–60 ms post iTN stimulation) and were expressed as a percentage of the baseline RMS.

Clinical measurements

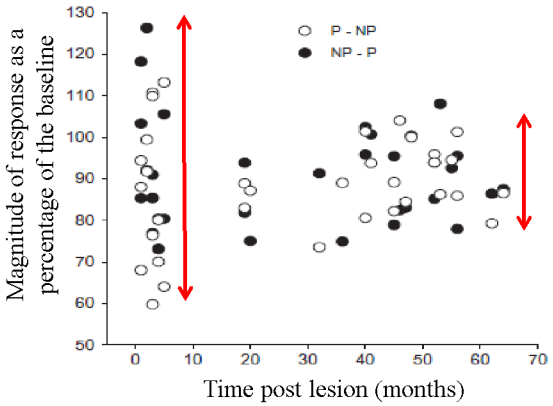
Ashworth scale (AS), 10 meter walk time (10MWT) and Fugl Meyer lower limb assessment (FMLL).

RESULTS

1. VARIABILITY

SA stroke patients have greater inter-subject variability in response magnitude (from both the P to NP and NP to P limbs) than CHR stroke patients and controls.

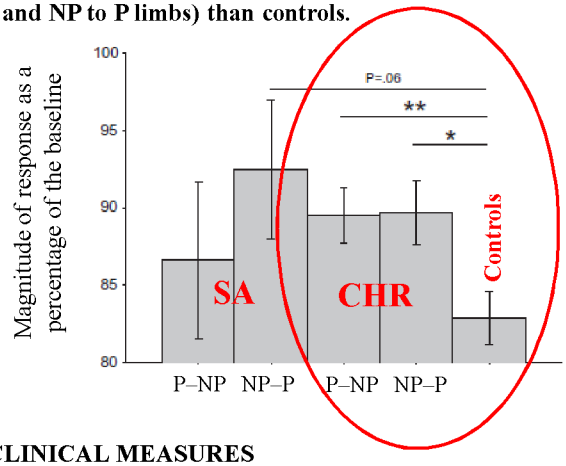
Figure 1: Response magnitude vs. time post lesion (single subjects)



There was no difference in the inter-subject variability of the response magnitude between CHR patients vs. controls

2. MAGNITUDE

CHR stroke patients have less prominent inhibition (from P to NP and NP to P limbs) than controls.



3. CLINICAL MEASURES

There was NO relationship between clinical measurements and response magnitude/variability in either SA or CHR patients.

DISCUSSION & CONCLUSIONS

- Short-latency crossed spinal responses are impaired differently in SA and CHR stroke patients.
- This shows the rapid reorganisation of spinal reflex pathways in the SA phase that stabilise as patients become CHR.
- This may result in inappropriate interlimb coordination in both SA and CHR patients resulting in **FALLS**

REFERENCES
Stubbs PW, Mrachacz-Kersting N. Short-latency crossed inhibitory responses in the human soleus muscle. J Neurophysiol 102: 3596 –3605, 2009.