# Exploring the instantaneous effects of tDCS on postural stability to improve stroke rehabilitation

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## INTRODUCTION:

- Postural instability, balance problems and subsequent falls are very common after stroke.
- Restoration of adequate standing balance is a key factor in regaining independence and preventing fall-events.[1]
- Transcranial direct current stimulation (tDCS) is a novel non-invasive technique.
- Proof of principle studies have shown that tDCS applied on the primary sensorimotor cortex can improve motor function in patients after stroke. [2]
- TDCS applied on the cerebellum during training could further optimize motor learning, thereby improving standing balance and functional outcome after stroke.

## OBJECTIVE:

To assess the optimal stimulation paradigm and explore the effects of tDCS during active balance training on posturographical parameters in chronic stroke and healthy subjects, as a preparation for a Randomized Clinical Trial.

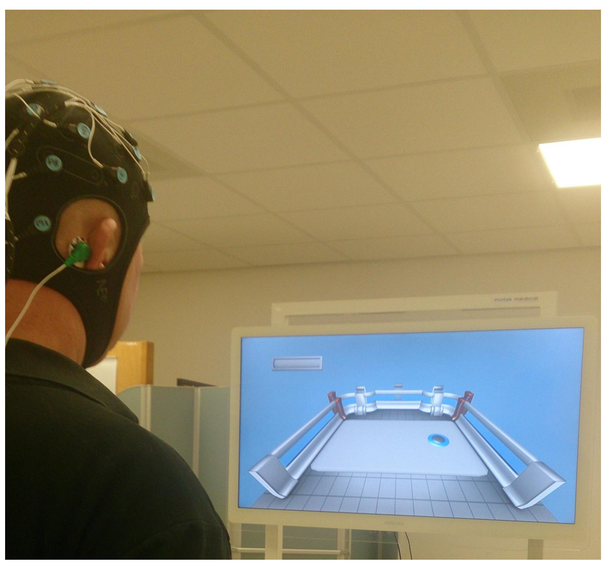


Fig. 1: the training task

## METHODS:

One subject was measured on a forceplate in three different conditions (i.e. eyes open, eyes closed and tandem stance) before and after a single training session.

Training: lateral balance tracking task.

Cerebellum stimulation, 20 minutes:

- anodal tDCS (1.5 mA) ipsi-lesional
- anodal tDCS (1.5 mA) contra-lesional
- sham tDCS

Outcome measure: medio lateral Center of Pressure (COP) velocity.

## RESULTS:

| Patient characteristics | |
|---|---|
| gender | male |
| Age | 56 |
| Bamford classification | LACI |
| Affected side | right |
| Time after stroke | 5.5 years |
| FM-LE (max. 34) | 26 |
| BBS (max. 56) | 53 |

Table 1: FM-LE: Fugl-Meyer lower extremity, BBS: berg balance score, LACI: lacunar infarct

Fig. 2: Velocity COP, tandem stance

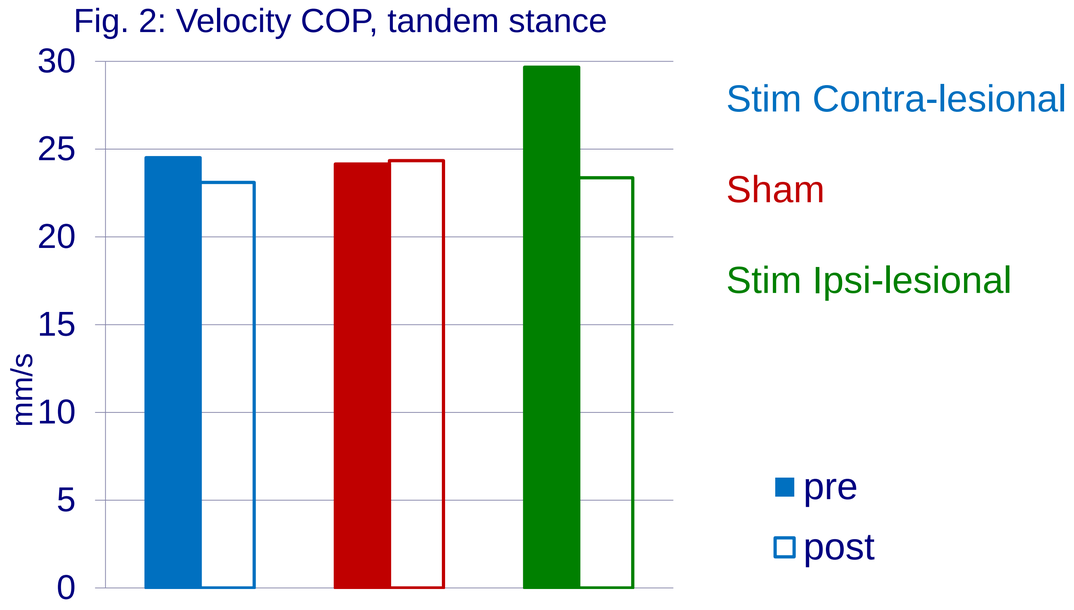
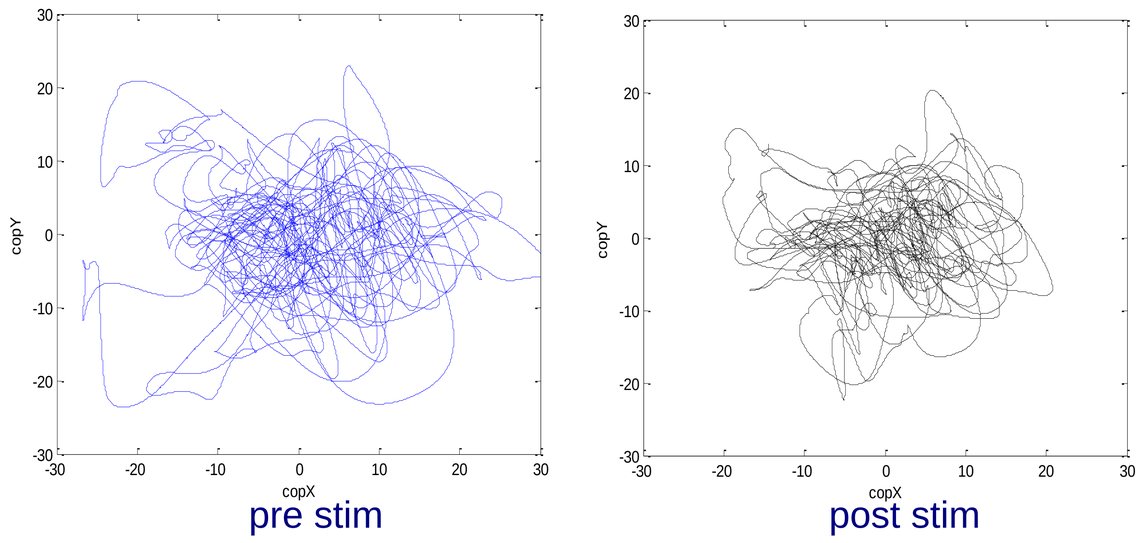



Fig. 3: COP in tandem stance (1 min), pre and post ipsi-lesional stimulation




## DISCUSSION:

The observed changes in COP parameters suggest an improvement in postural stability with ipsi-lesional stimulation. Cerebellar tDCS shows promise as a tool to improve balance stability when combined with a postural training task, encouraging research in chronic and sub-acute stroke patients.

1. Geurts et al., 2005, Gait Posture 22:267-281.
2. Reis, Fritsch, 2011, Curr Opin Neurol 24:590-596.

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