# Cerebellar tDCS and Lokomat: effects on post-stroke recovery

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## Objective/Hypothesis

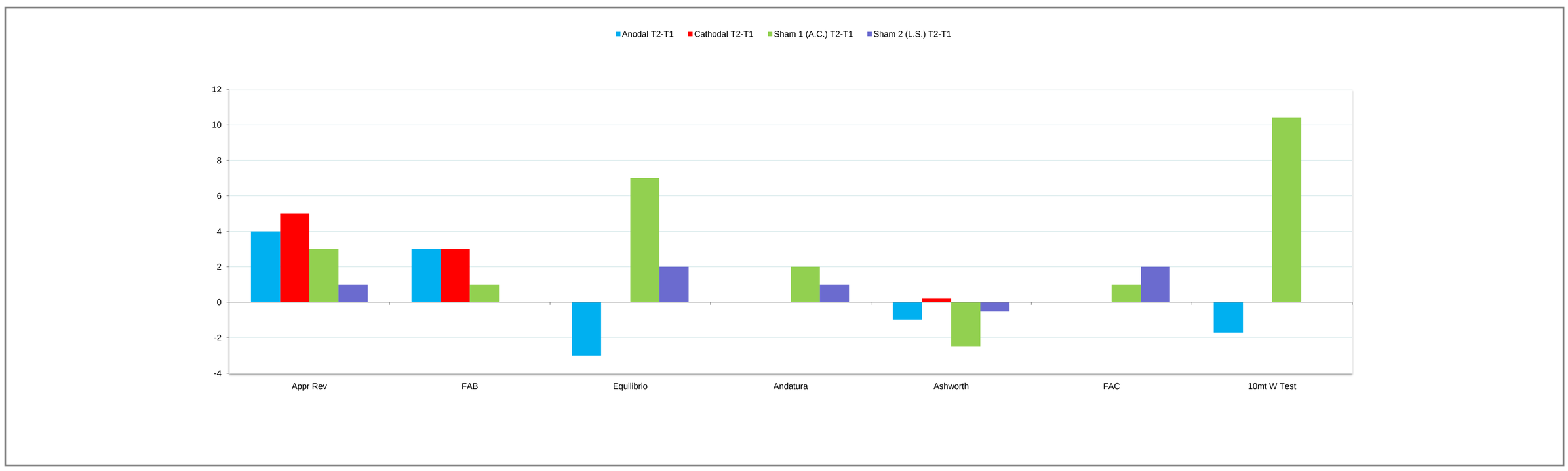
Studies on motor recovery underline the efficacy of a motor intensive training in rehabilitation that involves noninvasive neuromodulation in poststroke gait disorders (Chieffo et al, 2016). Furthermore, growing evidence shows the role of the cerebellum in motor learning. In particular, previous studies show that changes in cerebellar excitability, measured with transcranial magnetic stimulation (TMS), are strongly related with behavioral adaptation during walking. Our hypothesis is that combination of cerebellar tDCS (TcDCS) and Lokomat can improve functions of motor learning, promoting the recovery of locomotion in post stroke patients. In addition, we propose to assess which of the two polarities (anodal or cathodal) is more useful to the recovery of locomotion.

## Materials and methods

4 hemiplegic stroke patients in chronic stage (at least 6 months after stroke) participated in the study. All the partecipants underwent TcDCS during Lokomat rehabilitation sessions, for 15 sessions of treatment. Patient 1 received anodal stimulation, Patient 2 received cathodal stimulation and Patients 3 and 4 received sham stimulation. tDCS was delivered in observation of Ferrucci et al., 2014 stimulation protocol.

## Results

All the partecipants were evaluated before (T0) and after (T1) 5 weeks of training sessions with clinical and cognitive scales. The comparison of the patient's scores shows an improvement in motor performance only in patients 3 and 4. Furthermore, at T1 Patient 1 got worse in motor scales. However, Patients 1 and 2 improved in neuropsychological test that measures motor learning while patients 3 and 4 showed no improvement. In particular, Patient 2 has the highest score in Reversal Motor Learning.




## Conclusions

The results don't support the hypothesis of better outcome in the combined approach. We speculate that this improvement in Reversal Motor Learning in Patients 1 and 2 may be due to cerebellum stimulation. Galea et al. 2011, also demonstrate that stimulation of cerebellum improves motor pattern acquisition and the stimulation of Primary motor cortex (M1) increases the pattern retention. Interestingly, the patient after cathodal stimulation has the best outcome in motor learning, and this is in contrast with the previous studies (Galea et al, 2011).
In conclusion, these preliminary data are still insufficient, but they may indicate the efficacy of ctDCS in motor learning without improvement in gait recovery.

## References

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