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## BACKGROUND

- High-frequency rTMS (HF-rTMS, > 5Hz) known to induce corticospinal excitability facilitation and motor changes <sup>1</sup>.
- Other factors known to have an influence on rTMS after-effects: pulse configuration, stimulation duration, stimulation intensity <sup>1,2</sup>.
- Little is known about the intensity-dependent effect of HF-rTMS protocol.
- **OBJECTIVE:** To examine the intensity-dependent modulation effects of a high-frequency rTMS protocol, administered at different suprathreshold intensities, in an able-bodied individual.

## METHODS

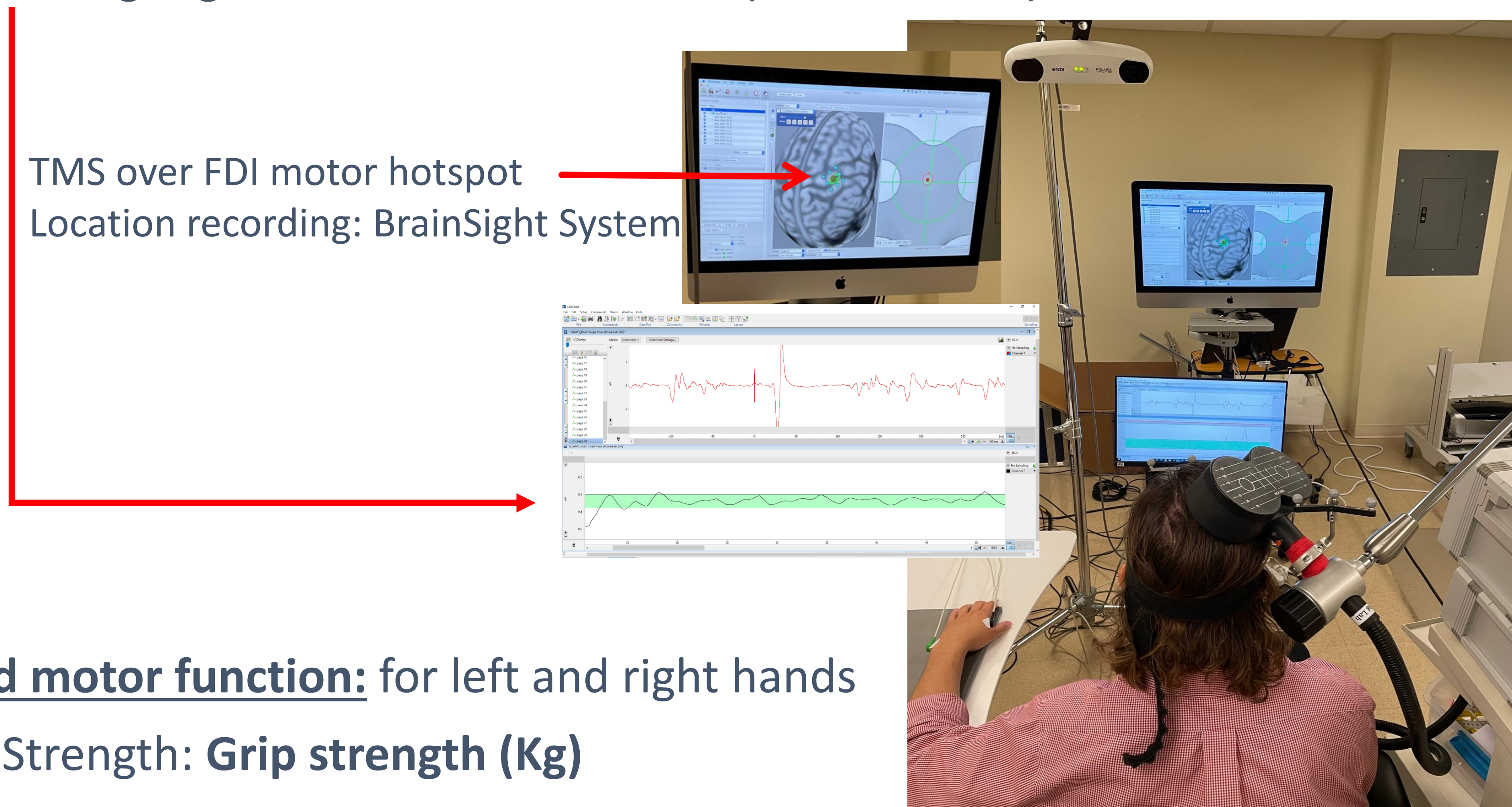
- One able-bodied (AB) male, 32 years old, right-handed.
- rTMS session (MagPro X100, figure-of-eight coil) : 10 trains – 75 biphasic pulses – 60s ITI - 15 Hz – suprathreshold intensity :
  - Session 1: 105% RMT
  - Session 2: 110% RMT
  - Session 3: 115% RMT
  - Session 4: 120% RMT
- **Targeted muscle :** non-dominant, left first dorsal interossei (FDI) muscle.

## TESTING PROCEDURE

Before and immediately after each session:

**Corticospinal excitability (CSE) change :** 30 TMS biphasic pulses at 120% MT - Motor Evoked Potential (MEP) amplitude (mV) changes from baseline value.

- At rest : rMEP
- During slight active FDI contraction (10-25% MVC): aMEP



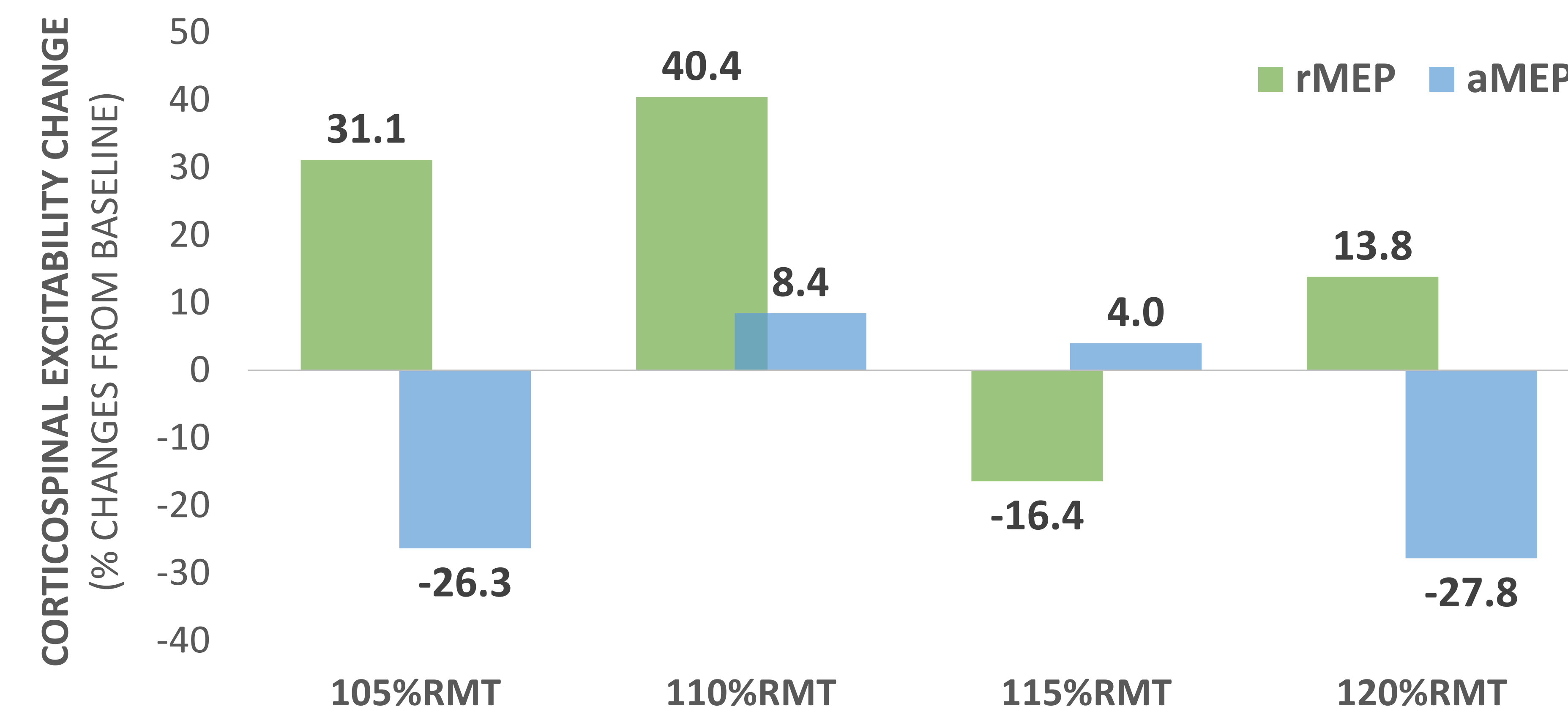
**Hand motor function:** for left and right hands

- Strength: Grip strength (Kg)
- Dexterity: Box and Block Test (BBT) scores

After each rTMS session: acute TMS side-effect questionnaire.

## RESULTS

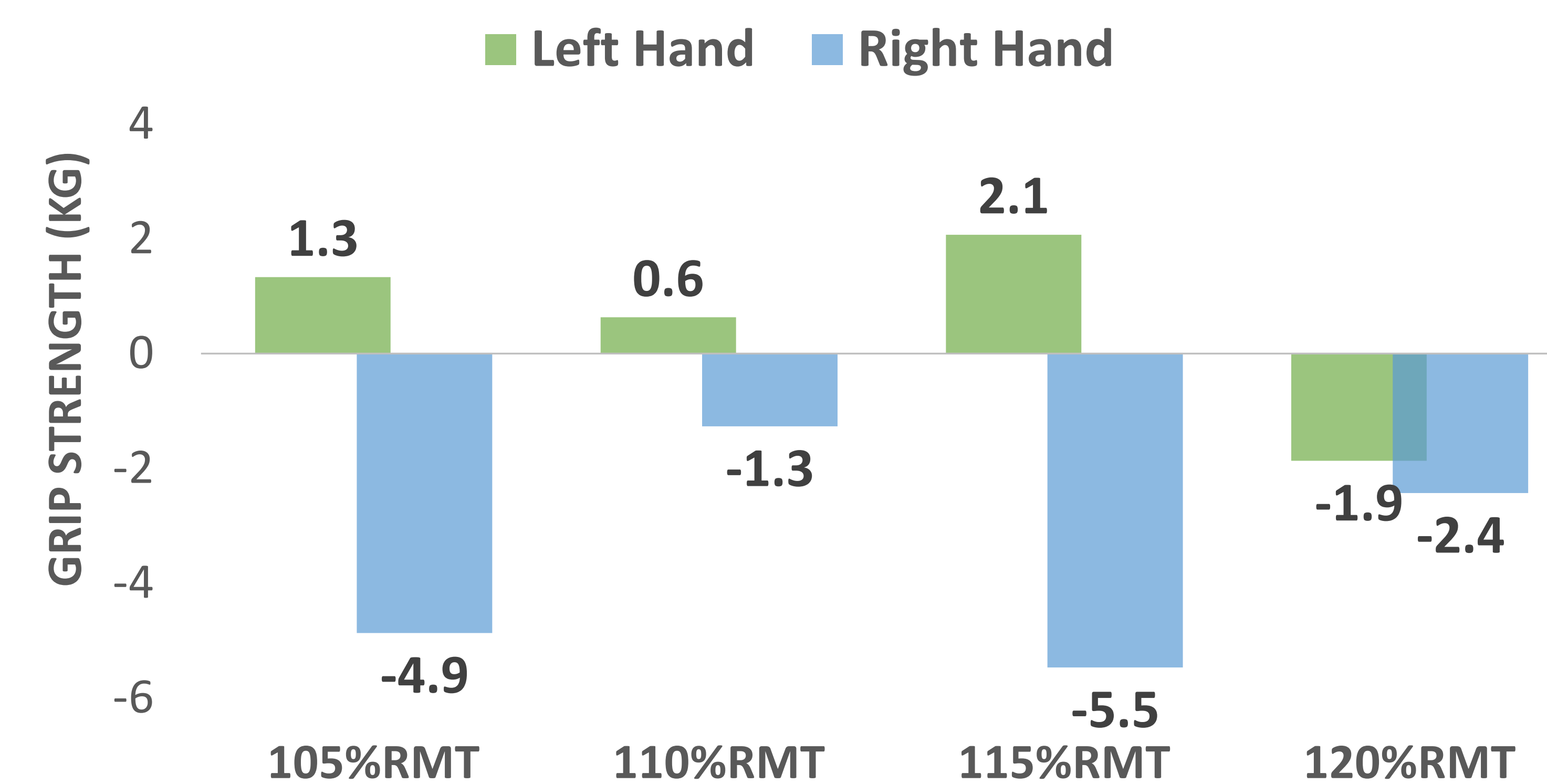
- No side effects reported → feasibility and tolerability of the HF-rTMS protocols.
- Very-high intensity (115 and 120%RMT) rTMS induced excessive hand movements that built-up across the session.
- **Corticospinal excitability changes:**



◀ Fig.1. CSE changes as measured with resting (rMEP) and active (aMEP) MEP difference from baseline for the four sessions.

- ✓ No linear relationship between rTMS intensity and CSE changes
- ✓ Most notable increase of CSE at rest : S1 (105%RMT) and S2 (110%RMT)
- ✓ No change to decrease of CSE during FDI active contraction
- ✓ Session 2 at 110%RMT:
  - Moderate movements produced
  - ↗ CSE at rest and slightly during active contraction

- **Hand motor function:**

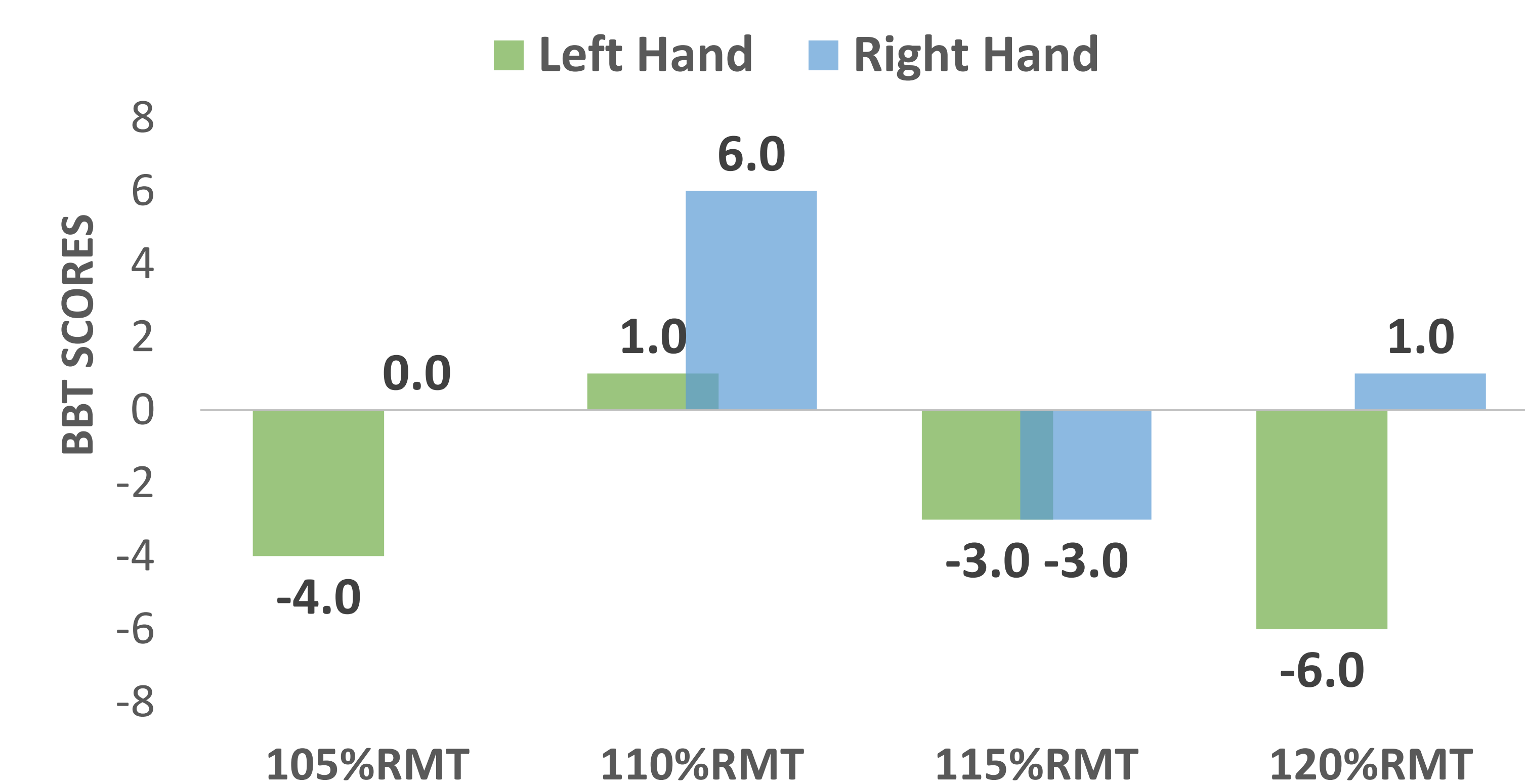


▲ Fig.2. Pre to post changes of grip strength (Δgrip) measured in Kg for both targeted (left) and non-targeted (right) hand.

- ✓ Left, targeted hand: slight ↗ of grip strength, except at very high intensity (120%RMT).
- ✓ Right, non-targeted hand: mostly ↘

Fig.3. Pre to post changes in dexterity (ΔBBT) of both targeted (left) and non-targeted (right) hand as measured with BBT scores difference from baseline.

- ✓ Session 2 at 110% RMT: scores increase for both hands.



## DISCUSSION & FUTURE WORK

- No linear relationship between rTMS intensity and observed after-effects.
- rTMS differential effect on resting and active CSE <sup>3</sup>.
- Preliminary observation: rTMS at 110% RMT is feasible and tolerable, with most notable CSE and motor changes in AB.
- More AB individuals are to be included.

## REFERENCES

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2. Jung, S. H., Shin, J. E., Jeong, Y. S., & Shin, H. I. (2008). Changes in motor cortical excitability induced by high-frequency repetitive transcranial magnetic stimulation of different stimulation durations. Clinical Neurophysiology, 119(1), 71–79. <https://doi.org/10.1016/j.clinph.2007.09.124>.
3. Touge, T., Gerschlagel, W., Brown, P., & Rothwell, J. C. (2001). Are the after-effects of low-frequency rTMS on motor cortex excitability due to changes in the efficacy of cortical synapses? Clinical Neurophysiology, 112(11), 2138–2145. [https://doi.org/10.1016/S1388-2457\(01\)00651-4](https://doi.org/10.1016/S1388-2457(01)00651-4)