Brain plasticity after implanted drop foot stimulator in chronic stroke

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COMA SCIENCE GROUP

REHAZENTER LUXEMBOURG

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Cyclotron research centre

GIGA

Drop foot stimulator

External control unit
Microcontroller & transmitter

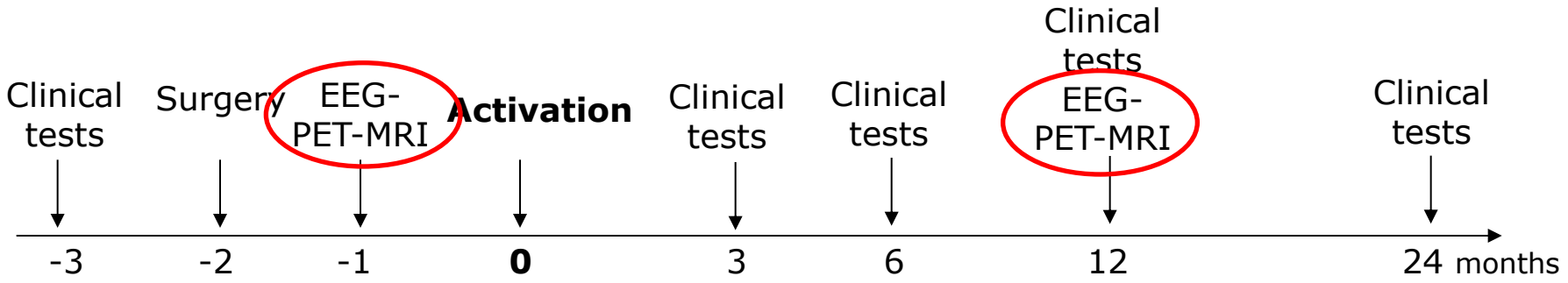
Receptor

4-channels nerve stimulator
Peroneal nerve

Heel switch

Methods

- Chronic stroke patients with drop foot
- Rehazenter Lux (clinical tests) & ULg Be (neuroimaging - EEG – PET – MRI)
- 21 patients included, 7 drop-out (stimulator issue)
- 14 completed the study (5 wo, age: 47±12y, time since insult: 2±1y, 7 lesion on the left)



Clinical improvement

M -1

M +12

PET-scan: Analyses

^{18}FGD-PET-scan at rest

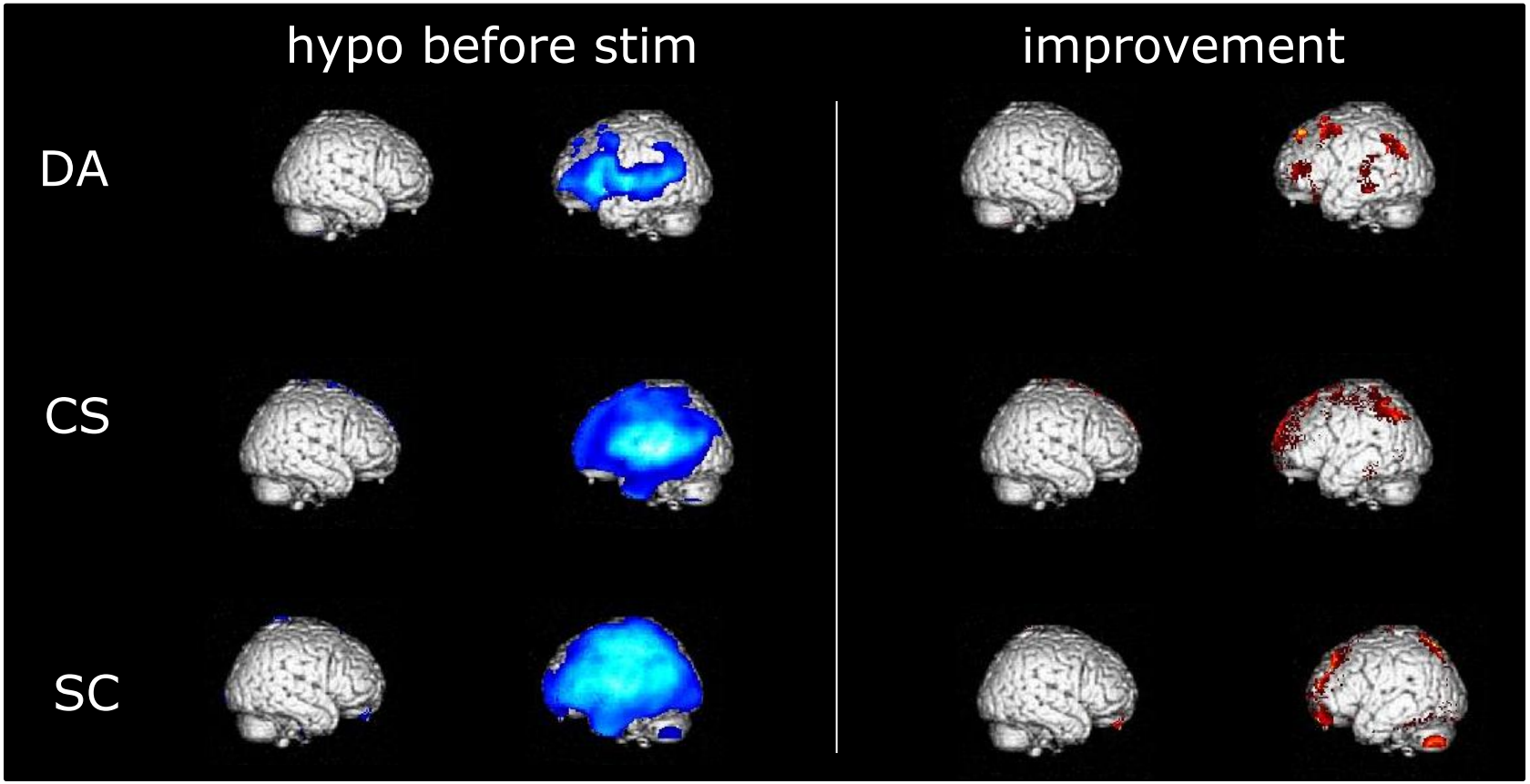
Pre-post : n=14 – right stroke: n=7; left stroke: n=7

7 patients with right lesion were flipped
➔all patients: lesion on the left hemisphere

Normalization with « flipped template »
Smoothing at 12 mm

Results: single subject

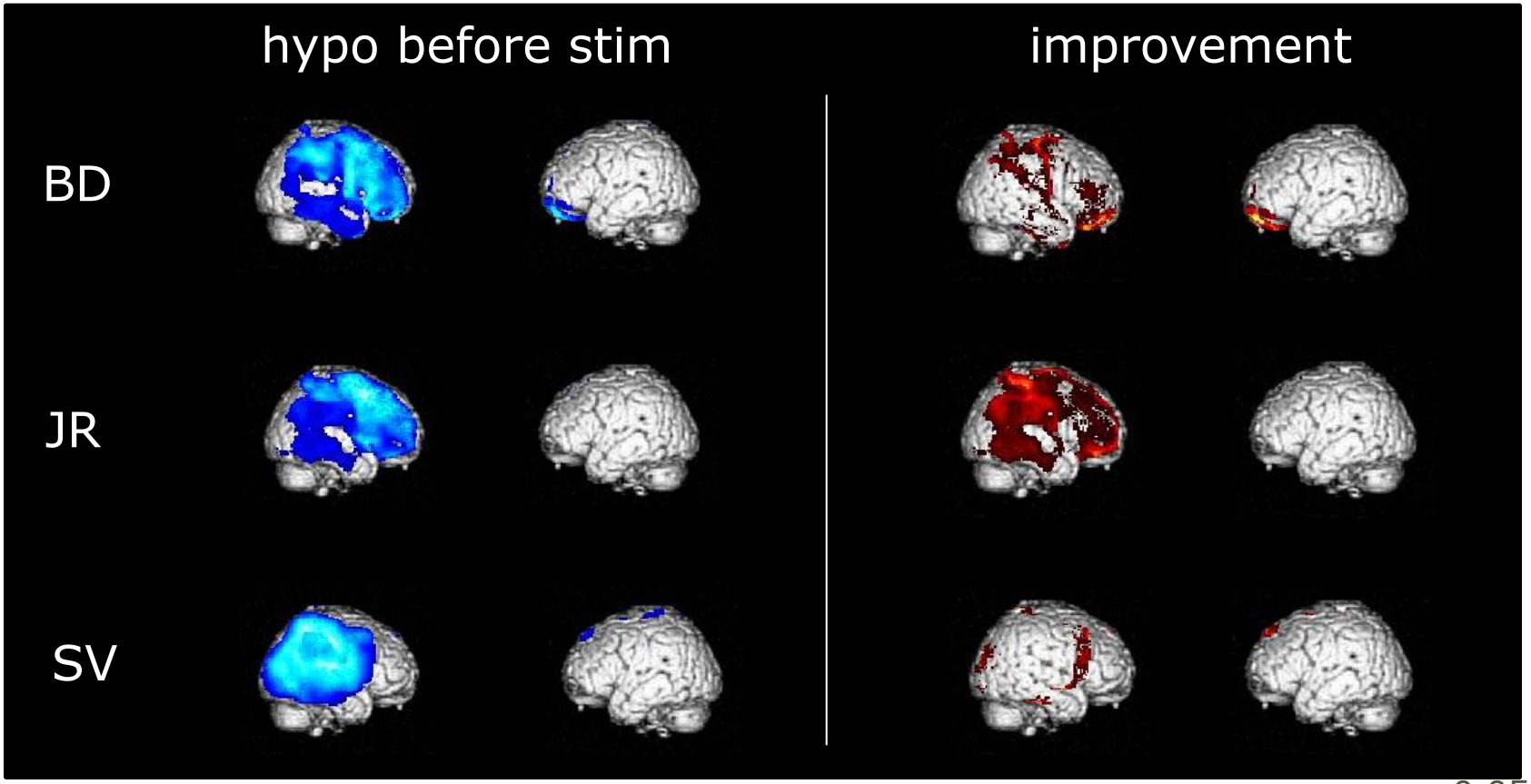
Lesion on the left



0.05 uncorr

Results: single subject

Lesion on the right



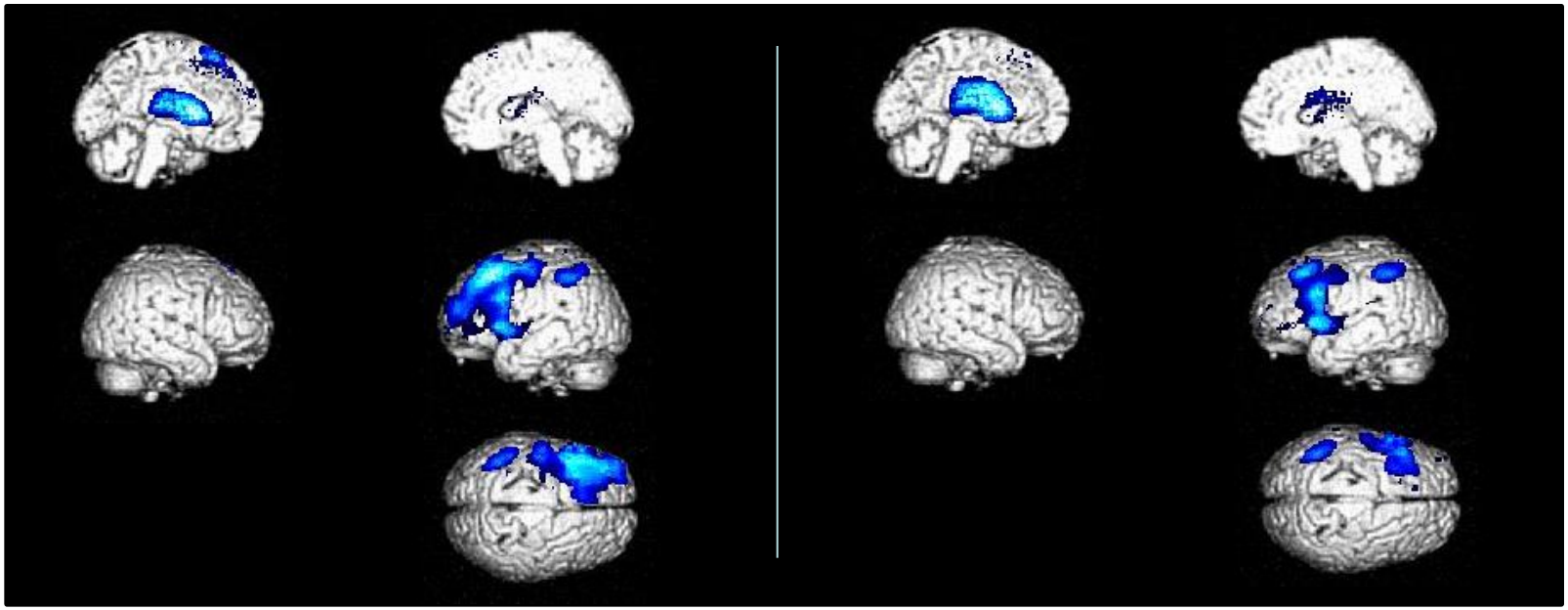
0.05 uncorr

Results: group

Hypometabolic areas

before activation

1 year later

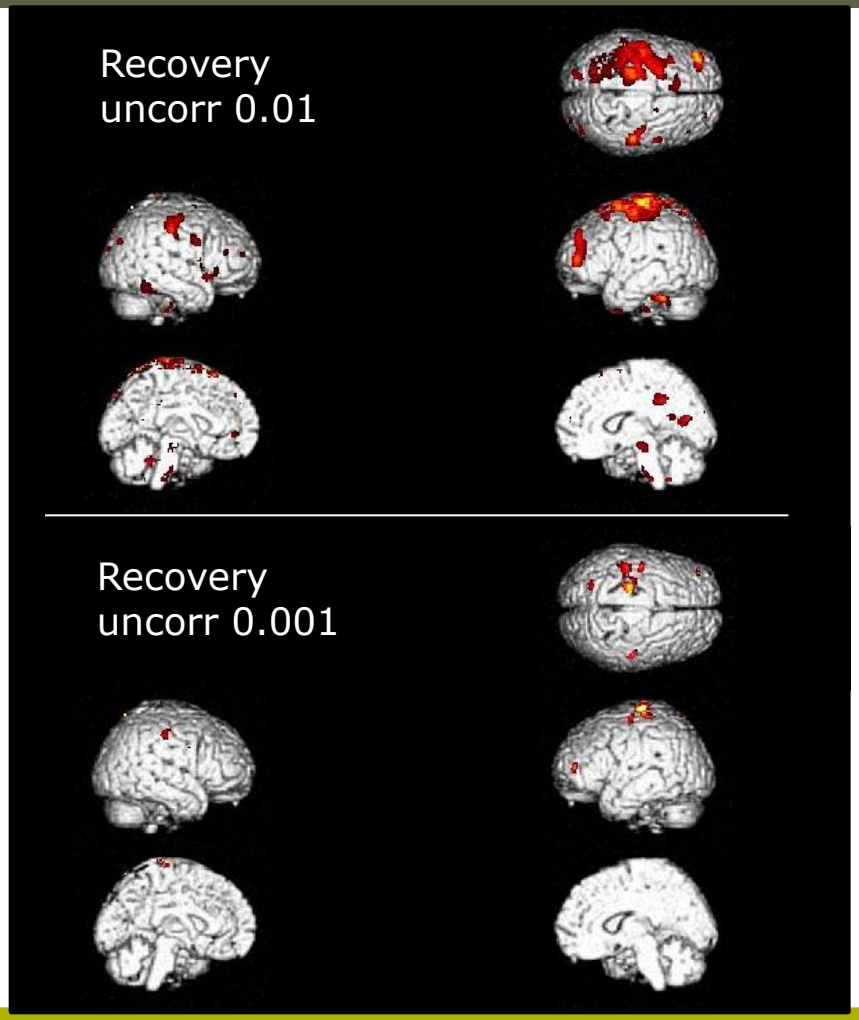


Motor & premotor
Prefrontal & caudate

Motor & premotor
Prefrontal & caudate

0.05 FWE

Results: group

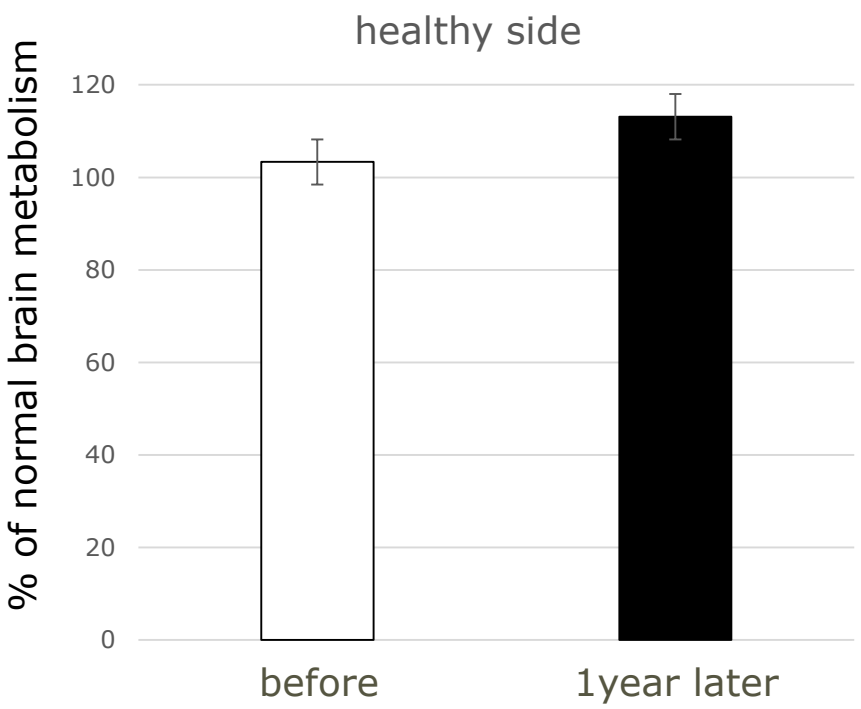


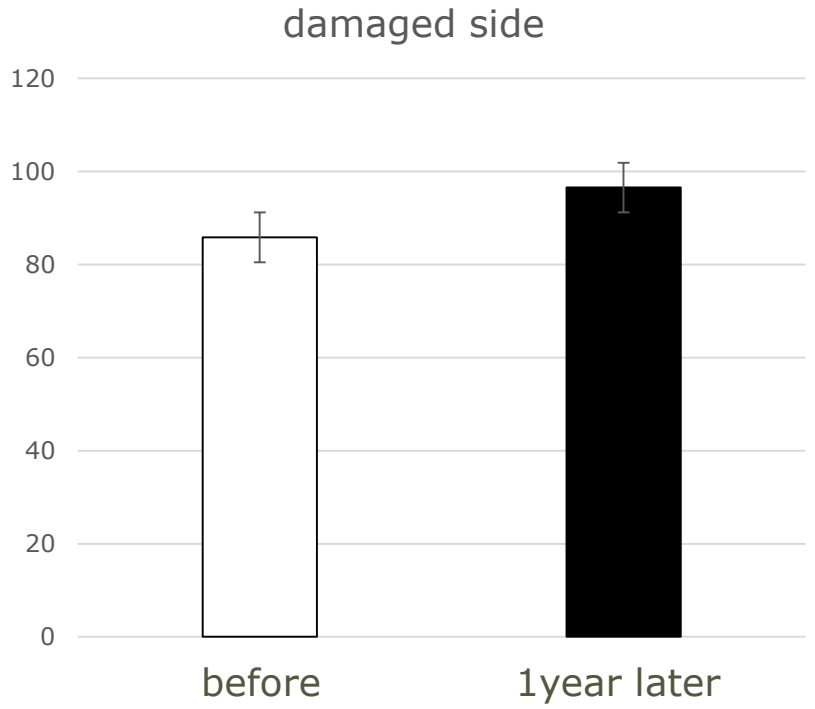
Increase
- motor areas left&right
- Left prefrontal

No decrease

Results: group

Brain metabolism in premotor cortex (B6)



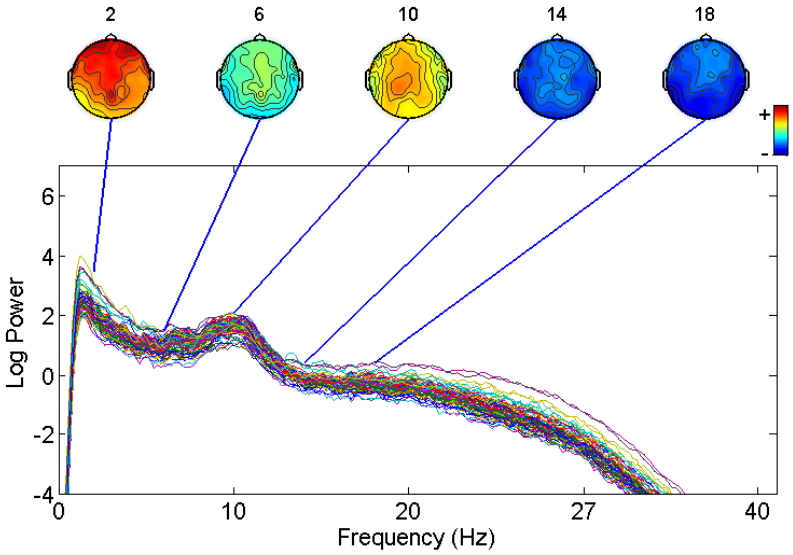


Analyses

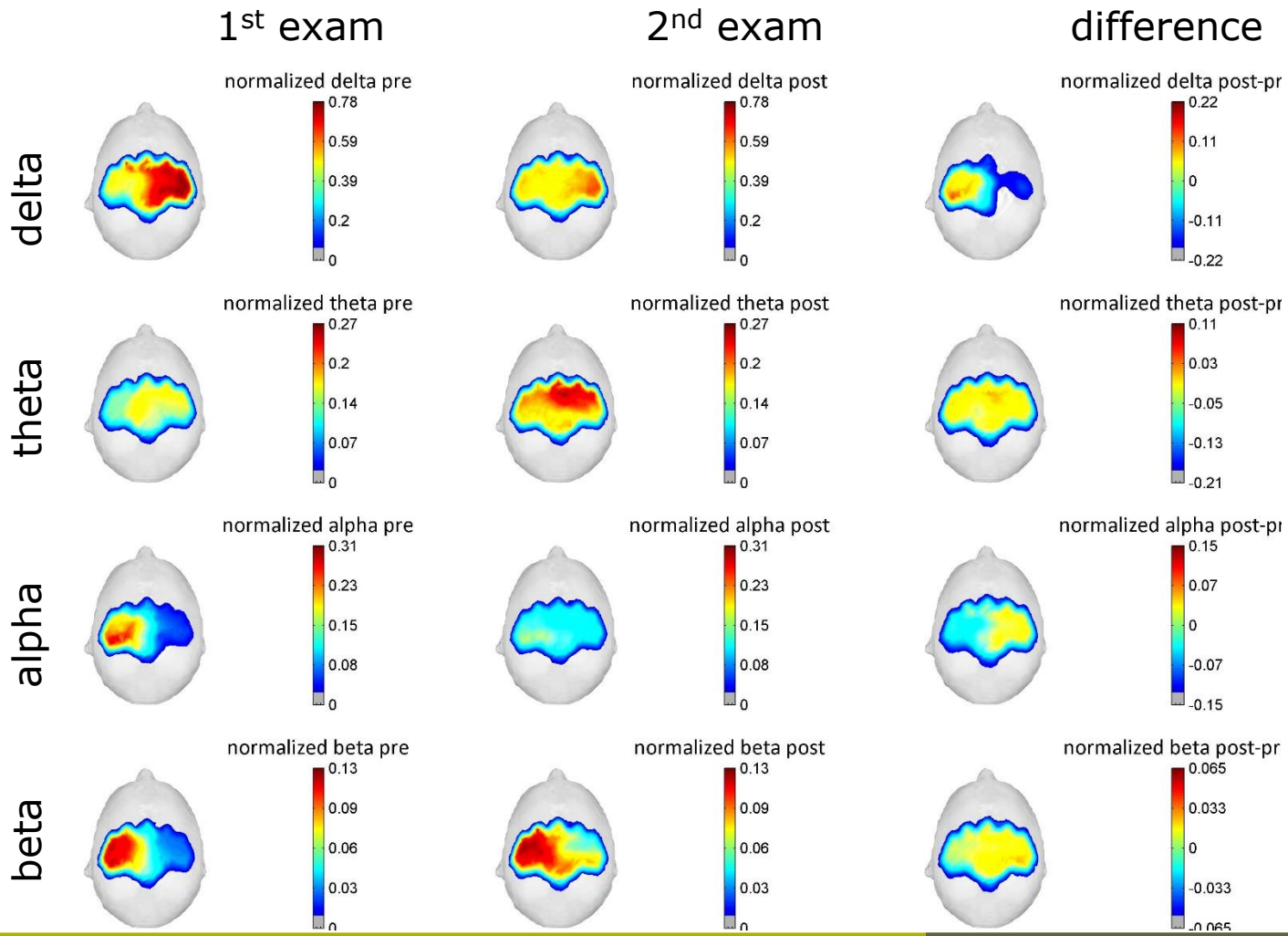
- High density (256 electrodes)
- Resting state for 30 min, EO

- Power spectrum (delta, theta, alpha beta)
- Entropy
- Phase lag index

➔ Motor area



Results: single subject (right stroke)



Motor cortex

↘ delta

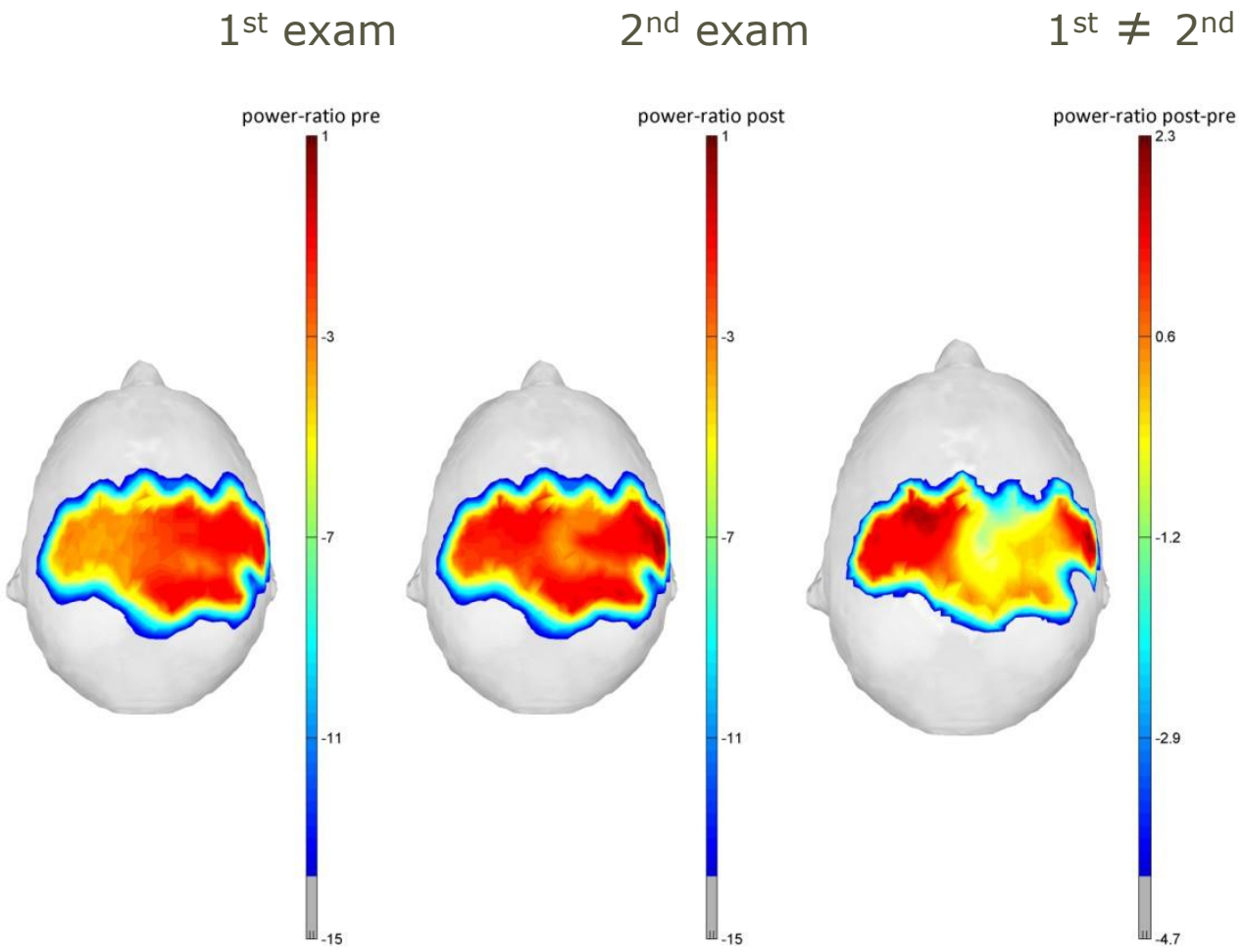
↗ alpha

Results: group

n=9

Motor area

Data flipped
➔Left lesion



Conclusion

Clinical improvements correlates

- ↗ brain metabolism (PET-scan) in motor areas (damaged & contralateral hemisphere)
- ↗ cortical activity (EEG) in motor area (damaged hemisphere)

Plasticity of the damaged area in chronic stroke patients

Thank you!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