Neural correlates of tDCS & repeated stimulations

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tDCS single session – first study

- Randomized double blind sham controlled cross-over
- Direct current; 2 mA; 20 min
- 55 patients included (25 VS/UWS; 30 MCS; 35 chronic; 25 TBI; 43±18y)

- **CRS-R improvement for MCS** (43% responders) - no change for UWS

- 57% non-responders & temporary effects

Thibaut et al., Neurology, 2014
Neural correlates – Aim

Can functional brain activity & grey matter atrophy predict tDCS clinical response?

➔ Characterize functional (FDG-PET) and structural (voxel-based morphometry – VBM) brain pattern of responders
Neural correlates – Method

- Data from study 1 – chronic MCS
- FDG-PET – MRI(VBM)
- 8 tDCS responders (4 TBI, mean age: 38±19y)
- 13 tDCS non-responders (8 TBI, mean age:36±14y)
- SPM: responders & non-responders versus controls

Thibaut & Di Perri et al., under revision
Neural correlates – Results

FDG-PET

A. tDCS responders < controls

B. tDCS non-responders < controls

C. tDCS responders ≠ non-responders

D. Electric field/current density

- hypometabolic
- preserved

p<0.05

Thibaut & Di Perri et al., under revision

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Neural correlates – Results

Voxel-Based Morphometry

- atrophy in responders > controls
- atrophy in non-responders > controls

Thibaut & Di Perri et al., under revision
Repeated stimulations – Aim

Single stimulation: effects ± 60 min (Nische & Paulus, 2001) ➔ short-lasting improvements, back to initial state

1. Increase the duration of the effect
2. Increase the number of responders

Daily stimulations for 5 days (Antal et al, 2010)
Repeated stimulations – Method

• Randomized sham controlled double blind cross-over

• 16 patients included in chronic MCS (12 TBI; mean age 47±16 y)

• CRS-R after tDCS (d1-5) & 1 week later (d12)

session 1: real or sham

session 1: sham or real

Thibaut et al., submitted
Repeated stimulations – Results

Treatment effect: delta CRS-R day 5 & day 12

- **Day 5**
  - Effect size: 0.43
  - * p<0.05

- **Day 12**
  - Effect size: 0.57
  - * p<0.05

Thibaut *et al.*, submitted
Perspectives: Clinical use

- Feasibility of tDCS for daily use
  - By relatives/caregivers
  - Repeated tDCS 4 weeks
THANK YOU