

Friedrich-Alexander-Universität **Faculty of Medicine** 

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# Increased frontal EEG power upon facial mirror-confrontation correlates with acute dissociation in dissociative disorders

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#### Introduction

- **Heterogeneity** in conceptualisations of dissociation  $\rightarrow$  lack of research on reliable biomarkers
- **Self-perception** (e.g. facial mirror-confrontation): induction of **stress** and acute dissociation in highly-dissociative PTSD patients<sup>1</sup>
- Neuroimaging (high spatial resolution): association of acute dissociation and activation of prefrontal brain areas upon stressinducing paradigms<sup>2-5</sup>
- Higher temporal resolution and better clinical applicability: non**invasive** neurophysiological measures such as **EEG**
- Paucity of research on **EEG in pathological dissociation**

#### Fig. 3 DDNOS MConly **DDNOS MCneg** 68 DDNOS MCpos Healthy controls MConly 66 power (dB) Healthy controls MCneg Healthy controls MCpos Total 60 58 100 20 80 120 40 60 Time (s)

Fig. 3: Time course of total EEG power during facial mirror-confrontation. Total frontal electroencephalography power in dB, plotted against time for the entire duration of mirror-confrontation. The first minute of the signal used for analysis is highlighted in grey, and the first and last 5-s segments are denoted by vertical dotted lines.

DDNOS, people with dissociative disorder not otherwise specified; Mconly, mirror-confrontation only; Mcneg, mirror-confrontation with negative cognition; Mcpos, mirrorconfrontation with positive cognition

## Methods

- **Sample:** 18 patients (17 female) with Dissociative Disorder Not Otherwise Specified (DDNOS), assessed with Mini-SCID-D<sup>6</sup> interviews; 18 healthy controls (HCs)
- paradigm with three facial mirror confrontations: without any accompanying cognition (mirror confrontation, MConly), in combination with negative (MCneg) or positive (Mpos) cognitive accompaniment, 2 min duration each (Fig. 1) **Trait dissociation**: Dissociative Experiences Scale (DES)<sup>7</sup>

#### Discussion

- Between groups findings: lower frontal EEG power might be a biomarker for pathological dissociation
- Difficult to interpret: facial mirror-confrontation induced stress in DDNOS patients, but **no considerable stress in HCs** (no reliable comparison)<sup>1</sup>
- Within DDNOS group: increased frontal EEG power associated with elevated acute dissociation
- Acute dissociation: dissociation subscale of the Responses to Script-Driven Imagery Scale (RSDI, assessing for detachment symptoms)<sup>8</sup>
- **EEG measurement**: BIS-VISTA Bilateral Monitoring System (a) bispectral index monitor; Aspect Medical Systems, Massachusetts, USA; Fig. 2), four-channel system using the power in the 0.5-30 Hz frequency band
- 10s intervals of the first minute of each 2-min MC condition; first and last interval 5s (early signal attenuation) (Fig. 3)
- **Statistical analyses**: Linear mixed models with participants and conditions as random, and interval and group allocation as fixed effects; age and antidepressant use as covariates; group x condition x interval interaction for estimation of full model; group x condition interaction for group comparisons within each condition; betweengroups baseline comparisons of EEG total power: independent t-tests; within DDNOS group: correlation of total EEG power in the first interval with acute and trait dissociation (RSDI and DES)



in line with **previous research** showing a) **higher frontal activity**<sup>2-5</sup> and b) blunted psychophysiological response in acute dissociation<sup>1,8</sup>

#### Limitations

- Four-channel EEG system; limited to pre-calculated parameters, no precise spectral data (advantage: less burdening for stressed DDNOS patients)
- Frequency band of our study **includes alpha band** (higher power = cortical suppression) and delta, theta and beta bands (higher power = cortical activation)
- -> unclear whether increase in total power reflects cortical activation or suppression
- Lower temporal resolution of BIS monitor than usual EEG
- **Poor spatial resolution** of BIS-VISTA EEG, **no source localization**

#### **Future directions**

**Replication** with traditional, higher-density EEG electrode configurations Use of a state scale of dissociation **including dissociative fragmentation** symptoms (additionally to detachment symptoms)



confrontation. **Fig. 2**: **BIS VISTA Monitor**; © Aspect Medical Systems, Inc.

### Results

- **Fig. 3** shows the **time course** of total EEG power during mirrorconfrontation for MConly, MCneg and MCpos in both groups
- **MConly:** no significant difference of total EEG power neither in first nor last interval
- MCneg and MCpos: initial elevation of total EEG power in HCs, but not in DDNOS patients (more pronounced in MCneg)
- DDNOS: positive correlation of self-perception-induced acute dissociation with total EEG power at the beginning of MCneg
- no such association for trait dissociation

Potentially altered neural processing in DDNOS **Total EEG power** as a **potential biomarker** for pathological dissociation

#### References

<sup>1</sup>Schäflein et al. 2018 Eur J Psychotraumatol <sup>2</sup>Felmingham et al. 2008 *Psychol Med* <sup>3</sup>Hopper et al. 2007 *J Trauma Stress* <sup>4</sup>Ludäscher et al. 2010 *J Psychiatry Neurosci* <sup>5</sup>Daniels et al. 2012 *J Clin Psychiatry* <sup>6</sup>Gast et al. 1999 <sup>7</sup>Freyberger et al. 1998 *Psychother Psychosom Med Psychol* <sup>8</sup>Sack et al. 2012 *Eur J Psychotraumatol* 

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