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#### P.0025

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#### Neuroimaging of VTA-seed-connectivity to predict outcome in adult ADHD

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ADHD is a developmental psychiatric disorder of childhood that can persist into adulthood. Since dopaminergic stimulants have a high effectiveness in treatment, the importance of the dopaminergic reward system in pathogenesis has long been discussed [1]. As part of the EU project CoCA, we addressed the alteration of the connectivity of the reward system in adult ADHD in two projects. In previous work, we established the validity of a seed-connectivity workflow from the ventral tegmental area (VTA) [2]. Most neuroimaging studies in ADHD simply document differences between healthy controls and cases. However, we wondered whether a fMRI-measurement is able to predict longitudinal outcome in a short to medium time span (three month) as well as longer time span of two years.

First, we investigated in n=30 participants of a clinical trial with fitness and light therapy whether connectivity between dopaminergic core areas (VTA) of the brainstem and the rest of the brain predicts therapeutic outcome. Participants participated in the PROUD trial, a non-pharmacological investigation of aerobic fitness therapy and bright light therapy [3]. Second, we examined n=54 patients of our ADHD consultation 2-3 years after an fMRI measurement by means of a clinical interview with regard to general psychopathology as well as ADHD-specific symptoms. Our hypothesis was, that baseline VTA-connectivity predicts outcome independent of medication.

Patients received clinical interviews (DIVA, IDS-C30, CGI) as well as a variety of self-rating scales. Medication and comorbid disorders were recorded. We used a 3 Tesla Siemens PRISMA scanner to conduct an 8 min resting-state functional magnetic resonance investigation. We conducted paired-t-test for pre-post testing and regression analysis for correlation with individual clinical scores. Multiple testing was accounted for by using a cluster-forming threshold of  $p < 0.001$  and  $pFDR < 0.05$  for cluster. Analysis was done in SPM12 and the CONN toolbox V20b. Most patients in the second group (n=54) received stimulant medication (n=33).

In the PROUD study, VTA-connectivity to the occipital lobe demonstrated was significantly higher at baseline in patients who became better in terms of ADHD symptoms over the course of 3 month. Connectivity to the superior frontal gyrus was lower in those with less symptoms after 3 month.

In the longer study (n=54), patients receiving stimulant medication had higher VTA-occipital lobe connectivity when their psychosocial functioning (GAF) was better after 2 years follow-up. This was reversed in patients without treatment. As this study was not randomized, we speculate that patients receiving medication were more ill and more in need of treatment.

In summary, two longitudinal follow-up studies demonstrate the potential of the VTA-connectivity to predict outcome of a clinical interventions (PROUD-trial) as well as a long-term follow-up over almost 2 years. Future analysis should look into the connectivity change not over this time span and complement the univariate analysis with a machine learning model and a receiver-operating curve. The connectivity between occipital lobe and VTA might be a proxy of attribution of salience to visual stimuli and consecutive attentional processes.

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Conflict of interest

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#### Association between diet and impulsivity in ADHD – results of the Eat2beNice-APPetite study

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**Introduction:** The influence of our diet on mental health is of increasing importance in current research. Study results on the gut-brain axis suggest that the gut microbiome can influence mental processes via neuronal, hormonal and immune signaling pathways [1]. The gut microbiome is largely influenced by our diet. Some studies provide evidence that a "Western diet" rich in saturated fat and sugar may promote mental disorders [2]. There is evidence, that dietary behaviour in individuals with Attention Deficit Hyperactivity Disorder (ADHD) is characterized by an increased intake of sugar and saturated fat [3]. So far, it is unclear whether this dietary pattern contributes to ADHD symptoms such as impulsivity. The aim of this study is to investigate the influence of certain macronutrients such as fats and mono/disaccharides on impulsivity in individuals with ADHD. Using our APPetite-mobile-app [4] enabled us to study dietary behaviour and momentary impulsiveness in everyday life of our participants.

**Methods:** 43 participants with ADHD (mean age  $36.0 \pm 12.3$  years, 21 females) and 186 healthy controls (mean age  $28.5 \pm 7.7$  years, 133 females) without any psychiatric condition were included into the study. Food intake was recorded over a period of three days using the APPetite-mobile-app via a 6 step process: (1) Selection of meal type, (2) Entry of time of meal, (3) Selection of consumed foods and drinks, (4) Specification of consumed amounts, (5) Presentation of reminder for commonly forgotten foods, and (6) Indication of predominant reason for eating. In addition to entering consumed foods in the APPetite-mobile-app, subjects completed an online food log for the last 24 hours (myfood 24) at the beginning of the study. After the data collection period, a detailed analysis of the ingested nutrients was performed for each subject. Trait impulsivity was assessed using the UPPS-P, a self-assessment questionnaire. Momentary impulsiveness was assessed via the mHealth APP by means of the Momentary Impulsiveness scale (MIS). The MIS consists of 4 questions capturing different aspects of impulsivity. The participants were prompted to answer these questions at 8 semi-random times per day between 8 AM and 10 PM. The minimum time between 2 prompts was 1 hour. Thereby participants could not predict the exact time of the next prompt and the assessed situations are a better reflection of the participant's real life.

**Results:** ANOVA revealed higher levels of both, trait and momentary impulsivity in individuals with ADHD compared to controls ( $p < 0,01$ ). After preprocessing of data that was sampled via the mHealth APP is completed, a regression analysis with different macronutrients as predictors and impulsivity as dependent variable will be computed. To assess the association between momentary impulsiveness and dietary intake, generalized linear multilevel modelling will be used. Results of these analyses will be presented.

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