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### Reading the mind of the avatar

Nijman, Saskia; Veling, Willem; Geraets, Chris Neeltje Wil; Aleman, Andre; Pijnenborg, Gerdina Marieke

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populations. A hypothesis of “dorsal-to-ventral gradient of hypo- to hyper-connectivity with the prefrontal cortex” has been postulated for schizophrenia spectrum disorders (Fornito *et al.*, 2013). Because antipsychotic drug treatment could alter striatal resting-state functional connectivity in patients with schizophrenia (Sarpal *et al.*, 2016), the effect of antipsychotic medications needs to be carefully considered in studies examining striatal functional connectivity.

**Methods:** The present study examined the cortico-striatal functional connectivity in patients with early stage schizophrenia. Thirty-five patients with first-episode schizophrenia (mean duration of illness 15.9 mo, SD = 13.2) and 37 age- and gender-matched healthy controls were recruited. All of them completed resting-state magnetic resonance imaging scan. Using a seed-based functional connectivity approach, we examined the functional connectivity of 6 seeds of the striatum in each hemisphere, including the nucleus accumbens, the ventral caudate, the dorsal caudate, the dorsal caudal putamen, the dorsal rostral putamen, and the ventral rostral putamen.

**Results:** The results showed decreased connectivity between the dorsal caudate and the superior frontal gyrus, the dorsal caudal putamen, and the left dorsolateral prefrontal cortex (DLPFC), as well as between the insula and the dorsal rostral putamen. Altered lateralization index of the dorsal caudate and the ventral rostral putamen was found in patients with schizophrenia. We also found a positive association between the connectivity of the right dorsal caudal putamen with the DLPFC and the duration of untreated psychosis in months in schizophrenia patients.

#### SU102. GENOMIC CHARACTERIZATION OF HUMAN CIRCULATING MONOCYTES TRANSDIFFERENTIATED INTO NEURONAL-LIKE CELLS AND ITS USE FOR SCHIZOPHRENIA

Adam Lescallete, Yuka Imamura, and Alfredo Bellon\*  
*Penn State Hershey Medical Center*

**Background:** Mounting evidence indicates that schizophrenia is a developmental illness with a strong but still misunderstood genetic background. Even large genome-wide association studies have not been successful at identifying the genetic underpinnings of this complex mental illness. Here we present the initial steps we are taking to study gene expression from a new perspective.

**Methods:** We have developed a new protocol to transdifferentiate human blood circulating monocytes into neuronal-like cells by combining growth factors and conditioned media. Unlike other models such as induced pluripotent stem cells, our model does not involve viral insertions or reprogramming, which can become a confounder in an illness with a strong but still misunderstood genetic component.

**Results:** We have thoroughly characterized these neuronal-like cells through various approaches including; flow cytometry, electrophysiology, Western blots, immunofluorescence, and pharmacological techniques. These neuronal-like cells resemble human neurons early in development, express a variety of neuronal genes, as well as several neuronal proteins, and also present electrical activity. In addition, when these neuronal-like cells are exposed to either dopamine or colchicine, they respond similarly to neurons by retracting their neuronal arborizations. Most recently, we utilized microfluidic single cell capture and single cell mRNA sequencing technologies to explore genome-wide gene expression in 17 transdifferentiated neuronal-like cells. This technique allowed us to identify approximately 200 neuroprogenitor genes and close to 180 neuronal genes that Pollen *et al.* consider as biomarkers for each of these cell types. These results are opening the possibility to study changes in gene expression during essential neurodevelopmental processes such as neurite formation directly in patients' cells. We are convinced that this new approach could bring some light into the genetic abnormalities present in schizophrenia.

**Conclusion:** Human circulating monocytes can be consistently transdifferentiated into neuronal-like cells that resemble human neurons during development. These cells also express a variety of neuroprogenitor and neuronal

genes and thus provide a window into the study of neurodevelopment directly in patients with schizophrenia.

#### SU103. THE EFFECT OF BILATERAL TRANSCRANIAL DIRECT CURRENT STIMULATION ON TONE MATCHING TASK PERFORMANCE AND MISMATCH NEGATIVITY IN SCHIZOPHRENIA

Walter Dunn\*, Jonathan K. Wynn<sup>2</sup>, Yuri Rassovsky<sup>3</sup>, Allan Wu<sup>4</sup>, Marco Iacoboni<sup>4</sup>, Gerhard Hellemann<sup>4</sup>, and Michael F. Green<sup>4</sup>  
<sup>1</sup>*VA Greater Los Angeles Healthcare System/UCLA*; <sup>2</sup>*VA Greater Los Angeles Healthcare System, VISN 22 MIRECC*; <sup>3</sup>*Semel Institute for Neuroscience and Human Behavior, UCLA*; <sup>4</sup>*Gonda Multidisciplinary Brain Research Center, Bar-Ilan University*; <sup>4</sup>*University of California, Los Angeles*

**Background:** Schizophrenia (SZ) is an illness characterized by early sensory processing deficits, both in the visual and auditory domains. These deficits are treatment targets of interest as they contribute to higher order cognitive dysfunction and are correlated to patient functional outcomes. Current treatments have largely focused on management of positive symptoms. However, interventions targeting early sensory processing may help improve cognitive deficits and alleviate clinical symptoms of the disorder. Transcranial direct current stimulation (tDCS) is a noninvasive neuromodulatory technique that has been shown to reduce hallucinations and improve working memory in SZ. However, its effects on early auditory processing in SZ have not yet been examined. In the current study, we examined the effects of tDCS on a behavioral measure (Tone Matching Task, TMT) and a neural measure (mismatch negativity, MMN) of early auditory processing in people with SZ.

**Methods:** Twelve people with SZ were randomized into a single-blind, within-subject cross-over study, whereby each subject received bilateral anodal, cathodal, or sham tDCS 1 week apart in counterbalanced order (active tDCS: 30 min, 2 mA). Active stimulation was delivered through 2 electrodes of the same polarity on the scalp over the left and right temporal region overlying the auditory cortices. The reference electrode was placed on the right arm. Subjects were assessed for MMN and TMT in each session after receiving stimulation. TMT data were analyzed using a generalized linear mixed model with a logistic link function; MMN data were analyzed with a repeated measures analysis of variance.

**Results:** For TMT, there was a significant main effect of tDCS condition ( $F = 3.58, P < .03$ ). Cathodal stimulation significantly improved TMT performance compared to the sham condition ( $P < .01$ ); anodal stimulation showed a trend to improve TMT performance compared to sham ( $P < .09$ ). For MMN, there were no significant changes in MMN amplitude between any of the 3 tDCS conditions.

**Conclusion:** The improvement in TMT performance after bilateral cathodal stimulation is the first demonstration that a single tDCS session can improve a behavioral measure of auditory processing. The improvement of TMT performance provides evidence that tDCS may modulate a domain of illness related to patient functioning in schizophrenia.

#### SU104. READING THE MIND OF THE AVATAR: DYNAMIC INTERACTIVE SOCIAL COGNITION VIRTUAL REALITY TRAINING (DISCOVER) FOR PEOPLE WITH A PSYCHOTIC DISORDER

Saskia Nijman\*, Wim Veling<sup>2</sup>, Chris Geraets<sup>2</sup>, André Aleman<sup>3</sup>, and Gerdina (Marieke) Pijnenborg<sup>4</sup>  
<sup>1</sup>*GGZ Drenthe*; <sup>2</sup>*University Medical Center Groningen*; <sup>3</sup>*BCN Neuroimaging Center and University Medical Center Groningen*; <sup>4</sup>*University of Groningen*

**Background:** Individuals who have a psychotic disorder often find it difficult to recognize emotions, read others' mental states, and assess social situations. These social cognitive deficits are highly predictive of problems in daily life functioning. Meta-analyses show that social cognition can be improved by social cognition training (SCT) approaches; however, long-term effects appear to be limited. Given that training of cognitive functions is best executed in a manner that resembles and is integrated with participants' daily lives as much as possible, a plausible explanation is that the stimuli and techniques that are typically used in SCT do not sufficiently resemble real-life social interactions. Several key characteristics of real-world interactions are absent from these stimuli, most notably interaction with the material.

**Methods:** To improve transference of SCT to daily life functioning and interaction, we have therefore developed a SCT which utilizes Virtual Reality (VR). VR is highly realistic, eliciting genuine psychological reactions, and highly interactive: the environment and the virtual people ("avatars") in it react to the actions of the participant. At the same time, VR is customizable and controllable, allowing for training that is tailored to the individual.

**Results:** A new form of SCT, utilizing VR (called "DiSCoVR"), has been developed. DiSCoVR consists of 16 sessions, provided over the course of 8 weeks, in which the following social cognitive domains are trained: (1) Emotion perception; (2) Social perception and Theory of Mind (ie, understanding the context and interdependence of emotions, thoughts and behavior); and (3) Social interaction training (ie, understanding the other person and choosing an adequate response). These domains are trained in VR, supplemented by coaching from a therapist, and homework assignments. DiSCoVR is currently being piloted amongst 25 mental health service clients and 25 healthy controls in the northern Netherlands. In this pilot, we primarily test the acceptability and feasibility of the intervention. Furthermore, effects of the intervention on several domains of social cognition are investigated. Moreover, social behavior in VR is studied using heart rate and eye tracking data, comparing healthy controls and clients.

**Conclusion:** We will present a theoretical framework for DiSCoVR. Moreover, we will demonstrate the intervention and provide preliminary results of the ongoing pilot study.

### SU105. MECHANISMS OF YOGA IN SCHIZOPHRENIA: FOCUS ON MIRROR NEURON ACTIVITY

Sneha Karmani\*, Ramajayam Govindaraj, Harleen Chhabra, Shalini Anji, Pooja More, Urvakhsh Mehta, Shivarama Varambally, and Ganesan Venkatasubramanian  
*National Institute of Mental Health and Neuro Sciences*

**Background:** Schizophrenia is associated with positive symptoms, negative symptoms, and deficits in neurocognition as well as social cognition. Deficits in social cognition are more closely linked to functional outcome than general/nonsocial cognitive deficits. The "mirror-neuron system" is the substrate for social cognition and is shown to have diminished activation in schizophrenia. Of late, yoga been identified as a therapy across many psychiatric disorders, including schizophrenia. Recent understanding of mechanism of yoga in improving negative symptoms of schizophrenia could be due to enhancement of mirror neuron activation (MNA).

**Methods:** Schizophrenia patients were offered add-on yoga therapy with ongoing medication. Subjects in yoga group underwent supervised yoga therapy for 1 month (20 sessions, 1-h duration). The control group included schizophrenia patients who received treatment as usual. Both groups were assessed on PANSS and socio-occupational functioning scale (SOFS) at the beginning and end of 1 month. Mirror neuron activity was assessed using functional Near Infra-Red Spectroscopy (fNIRS) with experimental task (action observation and action execution) before and after 1 month. Statistical analysis was done using R software.

**Results:** There was a significantly greater increase in left ventral premotor cortex MNA in yoga therapy group ( $n = 7$ ) when compared with control group ( $n = 7$ ) (Mann-Whitney  $U = 5.0$ ;  $P = .013$ ).

**Conclusion:** The current study provides preliminary evidence for response to yoga therapy in schizophrenia patients. Observation and imitation of yoga practices may cause changes in the activation of mirror neurons. Future studies need to systematically evaluate the same.

### SU106. INVESTIGATING THE SHORT- AND LONG-TERM BENEFITS OF EXERCISE IN EARLY PSYCHOSIS

Joseph Firth\*, Rebekah Carney<sup>1</sup>, Paul French<sup>2</sup>, Rebecca Elliott<sup>1</sup>, and Alison Yung<sup>1</sup>

<sup>1</sup>University of Manchester; <sup>2</sup>University of Liverpool

**Background:** Exercise has previously been shown to reduce symptoms of schizophrenia in long-term patients, along with improving their physical health and cognitive functioning. However, the effects of exercise in first-episode psychosis (FEP) have not been widely investigated.

**Methods:** Twenty-eight people with FEP participated in 10 weeks of supervised exercise twice weekly, using activities tailored to their own choice. Participant engagement was measured, and various aspects of physical health, mental health, and cognitive functioning were assessed. Participants were assessed at baseline, 10 weeks, and then 6 months after the supervised intervention, and compared to a group of patients with FEP who did not receive an exercise intervention.

**Results:** Over the 10-week intervention, participants achieved 107 minutes (mean average) of moderate-to-vigorous exercise per week. Furthermore, at 10 weeks (ie, immediately postintervention), there were improvements in total symptoms, negative symptoms, waist circumference, verbal memory, social cognition, and social functioning (all  $P < .05$ ). After 6 months, 55% of participants had continued to exercise. Psychiatric assessments at the 6-month follow-up showed that positive and negative symptoms were still significantly lower than preintervention scores. However, post hoc analyses revealed that only those who had maintained regular exercise over the 6 months had continued to show significantly reduced symptoms, whereas those who had ceased exercising had regressed to baseline scores. Previously observed benefits of exercise for social functioning were also maintained at the follow-up, although improvements in waist circumference and cognition were lost.

**Conclusion:** Future research should aim to establish sustainable methods for maintaining regular exercise and explore the effectiveness of "step-down" support following supervised interventions in order to improve physical health outcomes and facilitate psychosocial recovery in FEP.

### SU107. DISRUPTED CONTINUITY OF SUBJECTIVE TIME IN THE MILLISECONDS RANGE IN THE SELF-DISTURBANCES OF SCHIZOPHRENIA: CONVERGENCE OF EXPERIMENTAL, PHENOMENOLOGICAL, AND PREDICTIVE CODING ACCOUNTS

Aaron Mishara\*, and Anne Giersch<sup>2</sup>

<sup>1</sup>The Chicago School of Professional Psychology; <sup>2</sup>INSERM

**Background:** The impression of time continuity is a pervasive and given property of our subjective life. However, it appears to be compromised in schizophrenia patients who experience what has been labeled "self-disturbances" (Ichstörungen). Both experimental and phenomenological approaches suggest that gaps in continuity of self-experience in schizophrenia patients reflect a disruption of temporal processing on different time scales. We hypothesized