In This Issue

Volume 8, Number 3, March 2023

A brief summary of the articles appearing in this issue of *Biological Psychiatry: Cognitive Neuroscience and Neuroimaging*.

Connectivity Dynamics of Tic Suppression

Most individuals with Tourette syndrome (TS) can voluntarily suppress tics for brief periods of time, but the brain mechanisms underlying tic suppression are poorly understood. Using electroencephalography (EEG), **Morand-Beaulieu *et al.*** (pages 241–250) report that brain connectivity within a specific subnetwork was increased during tic suppression in children with TS, relative to a resting condition. This network encompassed many cortical regions, including some that are part of the default mode network. A possible implication of this result is that children with TS may engage in self-referential processing when suppressing tics.

Treatments: Neural, Behavioral, and Mechanistic Effects

Bumetanide has been repurposed for autism spectrum disorder (ASD) based on its hypothesized central nervous system effects. **Juarez-Martinez *et al.*** (pages 251–261) recently reported beneficial effects of bumetanide on repetitive behavior in children with ASD. Using EEG measures to extend their prior work, the authors now report that bumetanide induces brain activity changes related to clinical improvement in a subset of children who were more responsive to treatment. Further, the authors show that repetitive behavior improvement could be predicted by combining EEG measures and clinical severity using machine learning. These data shed light on the neurophysiological effects of bumetanide and highlight an EEG-assisted strategy that may help support treatment decisions.

Evidence suggests that the renin-angiotensin system may represent a promising target to regulate fear. Using a pharmaco-neuroimaging approach in healthy participants, **Zhang *et al.*** (pages 262–270) report that losartan, an AT_1 receptor antagonist, attenuated dorsolateral prefrontal activity and amygdala–ventral anterior cingulate communication, as well as specifically reduced the functional magnetic resonance imaging response during subjective fear experience. These data suggest a functionally relevant role for the AT_1 receptor in fear experience that should be further investigated as a target to reduce exaggerated fear.

Methylphenidate is a first-line medication for attention-deficit/hyperactivity disorder (ADHD), yet the brain mechanisms by which methylphenidate alleviates symptoms are poorly understood. In this randomized, placebo-controlled, crossover trial, **Mizuno *et al.*** (pages 271–280) demonstrate that methylphenidate increased spontaneous neural activity in reward and cognitive control systems in children with ADHD. Medication-induced changes in the cognitive control network were associated with more stable sustained attention. These findings reveal a novel brain mechanism that may underlie methylphenidate treatment in ADHD and may inform biomarker development for evaluating treatment outcomes.

Deep brain stimulation (DBS) for the treatment of severe obsessive-compulsive disorder (OCD) has shown promise, but increased impulsive behavior is a reported side effect. **Schüller *et al.*** (pages 281–289) assessed patients with OCD during active and inactive DBS using an established decision-making paradigm. With active DBS targeting the anterior limb of the internal capsule/nucleus accumbens, patients showed decreased risk adjustment and increased delay aversion, suggestive of increased impulsivity. Finally, the authors identified neural pathways associated with DBS-induced changes in decision making, advancing our understanding of the cognitive changes associated with DBS therapy for OCD.

Mental Health, Cognition, and Polygenic Risk

Mental illness and cardiometabolic disease are commonly comorbid. Cognitive dysfunction is regularly observed both before and after disease onset, but it is currently unclear how cognitive function in childhood may relate to genetic risk for these diseases. Using computational modeling, **Pedersen *et al.*** (pages 290–299) report that working memory and decision making are associated with polygenic risk for mental illness and cardiometabolic disease in school-age children. These findings identify potential cognitive risk factors for adult-onset disorders that may be present in childhood.

The genetic relationships of various psychiatric and cognitive traits with brain measures remain poorly understood. Analyzing data from a large cohort, **Liu *et al.*** (pages 300–310) report that genetic predispositions to ADHD, educational attainment, smoking initiation, and cognitive ability are more strongly associated with brain structure than with brain function, whereas genetic predispositions to most psychiatric disorders (including schizophrenia and ASD) are more strongly associated with brain function than with brain structure. These findings suggest that there may be distinct neural pathways through which genes influence the development of different traits/disorders.

Face Processing in Fragile X Syndrome

Fragile X syndrome (FXS) is a neurodevelopmental disorder that commonly causes intellectual disability and social dysfunction. In this study, **Li *et al.*** (pages 311–319) used functional near-infrared spectroscopy in girls with FXS and found that they showed hyperactivation in the frontopolar cortex during face processing, relative to a control group. These findings identify a pattern of aberrant neural response

ISSN: 2451-9022

during face processing in girls with FXS, which may have future utility as a potential biomarker.

Classifying Chronic Cannabis Use

Chronic cannabis use is associated with a significant psychiatric burden, including cognitive and social impairments. With the increasing prevalence of cannabis use, reliable and interpretable biomarkers of chronic cannabis use are needed. Here, **Kulkarni *et al.*** (pages 320–330) used machine learning to differentiate chronic cannabis users from nonusers based on task-evoked functional connectivity. The most predictive brain networks correlated with cue-induced cannabis craving, highlighting a neural signature that may contribute to chronic cannabis use.

Sleep Spindle Deficits in Schizophrenia

Schizophrenia is associated with sleep disturbances, including sleep spindle deficits that are linked to symptom severity and worse outcomes. Analyzing polysomnography and EEG data, **Sun *et al.*** (pages 331–342) identified multiple differences in sleep and spindle parameters between patients with schizophrenia and healthy control subjects and between patients when divided into subgroups of those with and without auditory verbal hallucinations. Many of the findings remained in a further subgroup of medication-naïve first-episode patients. These findings provide insight into the specific spindle parameters that may be disrupted in schizophrenia and that may be influenced by symptoms and/or medication.