and may contribute to behavioural states of depressed mood and anxiety.

'Integrative Neuroscience' and Psychiatry: Identifying Cognitive, Affective and Brainwave Markers of Psychiatric Disorder

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Overview

Multidisciplinary efforts have begun to encourage a freer exchange of information – resulting in a more 'integrative neuroscience' across disciplines and theoretical models in psychiatry. This symposium outlines the potential insights into major psychiatric disorders from the first entirely standardized and centralized database, which brings together cognitive, affective, brain function and genetic measures. It contains 5000 healthy subjects (6–100 years) and growing psychiatric groups. With these multimodal and standardized data sets, we have identified objective markers that distinguish each disorder and that predict real-life functional outcomes. In this symposium, we outline markers for first-episode schizophrenia, attention deficit hyperactivity disorder, depression and Alzheimer's dementia.

11-01

Identifying cognitive, affective and neural synchrony markers which predict real-world functional outcome in first-episode schizophrenia: an integrative neuroscience approach

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Background: In addition to psychotic symptoms, first-episode schizophrenia (FES) is characterized by profound difficulties in cognition and social and emotional functions.

We examined whether cognitive markers predict real-world functional outcome in FES and whether this prediction is enhanced by social-cognitive markers. We also examined the relationship between these markers and lack of neural synchrony in FES, in the context of our integrative neuroscience model of impaired neural coordination of salient and task-relevant information in this condition.

Method: We tested patients with FES (within 3 months of service contact) using the standardized Brain Resource International Database cognitive battery and tests of social and emotional function (including DASS, NEO-FFI). Neural synchrony was extracted from EEG recorded to corresponding tasks. Assessments of symptoms and functional outcome included PANSS, SOFAS, and World Health Organisation Quality of Life Scale.

Results: General cognitive markers predicted negative symptom severity, with the greatest contribution from poor verbal function, then visuospatial executive functions. Poorer executive function also predicted poorer social and occupational outcome and quality of life. This predictive relationship was significantly improved by the addition of the social-cognitive marker, excessive negativity bias. These combined markers were also related to an excess of high-frequency neural synchrony in EEG recordings.

Conclusion: These findings show that 1) markers of general cognitive dysfunction predict real-world functional outcome in FES, 2) predictive power is enhanced by taking social and emotional aspects of cognition into account and 3) impairments in neural binding and coordination of salient stimuli may underlie these functional difficulties.

11-02

Identifying affective markers within an integrative neuroscience model of depression

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Background: Our integrative model of depression focuses on disturbances in affective and cognitive function, which contribute to clinical depression. Endophenotypes for depression include disturbances

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in emotion processing and in inhibitory executive functions. If these disturbances are trait like in nature, consistent with endophenotype status, we might expect them to be present in subclinical depression. Following a dimensional view of depression, our objective was to identify emotion perception and cognitive markers of subclinical depression while controlling for the effects of age and gender.

Method: Subjects from the Brain Resource International Database (BRID) were tested on the standardized BRID protocols, which included assessment for level of depressed mood and performance on the computerized tests of social (facial emotion recognition) and general cognition.

Results: Regression analyses showed that higher subclinical depression was significantly predicted by both social cognition (lower accuracy for recognizing fearful expressions, as well as slower reaction time for recognizing expressions of happiness and anger) and general cognition (reduced inhibition on the go-no-go test). These findings were observed over and above the effects of age and gender. When considered together, the combination of poor fear recognition and poor inhibition made the greatest contribution to level of depression.

Conclusions: Our results provide support for an integrated model of depression, in which difficulties in both emotion processing and inhibition are defining features. Dysregulation of frontolimbic circuits may contribute to disturbed processing of salient signals of emotion and the inability to inhibit automatic responses.

11-03

Identifying cognitive and affective markers within an integrative neuroscience model of ADHD

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Background: Attention deficit hyperactivity disorder (ADHD) is a common neurodevelopmental disorder, often allied with conduct and emotional problems. Our integrative model of ADHD explores fronto-limbic-striatal networks and arousal regulation to understand poor inhibitory function in ADHD. This model provides the basis to develop new and objective assessment tools that complement subjective clinical scales in diagnostic and treatment decisions. Our objective was to identify the combination of cognitive and brain function markers that distinguish ADHD. We also evaluated these markers in response to stimulants treatment.

Methods: About 175 patients with ADHD (6–16 years) tested before and after stimulant treatment were compared with 175 matched controls using the standardized Brain Resource protocols. Testing included batteries of cognitive tests and psychophysiological measures of brain function [EEG, event-related potentials (ERPs)] in response to cognitive- and emotion-related tasks.

Results: Multivariate analyses showed a profile of cognitive and brain function markers that distinguished ADHD (90% sensitivity, 71% specificity, 0.76 positive predictive power, 0.88 negative predictive power). This profile comprised errors of impulsivity and intrusion, with raised slow-wave EEG, altered ERPs during inhibition and emotion processing, and autonomic dysregulation. While cognitive, EEG and inhibition-related ERP markers 'normalized' following stimulants, the emotion ERP marker did not. Autonomic markers distinguished subgroups of treatment responders.

Conclusions: These findings support an integrative model of ADHD, in which impulsivity and poor inhibition are associated with dysregulation of brain function and arousal. The markers provide a platform for objective assessment to support diagnostic and treatment decisions. This work is being extended to examine whether these markers capture comorbid features of ADHD and differential response to nonstimulants.

11-04

Identifying cognitive and affective markers within an integrative neuroscience model of Alzheimer's dementia

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Objective: Alzheimer's disease (AD) is a neurodegenerative dementia subtype characterized by widespread and continuing cognitive deficits encompassing abilities in memory, language and executive function that exceed the decline observed

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