Using Biomarkers to Identify and Treat Schizophrenia

July 11, 2012 |

Researchers say lab-based tests may be boon to both clinicians and researchers

In the current online issue of *PLoS ONE*, researchers at the University of California, San Diego School of Medicine say they have identified a set of laboratory-based biomarkers that can be useful for understanding brain-based abnormalities in schizophrenia. The measurements, known as endophenotypes, could ultimately be a boon to clinicians who sometimes struggle to recognize and treat the complex and confounding mental disorder.

"A major problem in psychiatry is that there are currently no laboratory tests that aid in diagnosis, guide treatment decisions or help predict treatment response or outcomes," said Gregory A. Light, PhD, associate professor of psychiatry and the study's first author. "Diagnoses are currently based on a clinician's ability to make inferences about patients' inner experiences."

Diagnosing and treating schizophrenia is a particularly troubling challenge. The disorder, which affects about 1 percent of the U.S. population or roughly 3 million people, is characterized by a breakdown of normal thought processes and erratic, sometimes dangerous or harmful, behaviors.

"Schizophrenia is among the most severe and disabling conditions across all categories of medicine," said Light, who also directs the Mental Illness, Research, Education and Clinical Center at the San Diego VA Healthcare System.

The precise cause or causes of schizophrenia are not known, though there is a clear genetic component, with the disorder more common in some families.

Clinicians typically diagnose schizophrenia based upon inferences drawn from the patient's inner experiences. That is, their ability to describe what's happening inside their minds.

"But even the best clinicians struggle with diagnostic complexities based on sometimes fuzzy clinical phenomenology," said Light. The clinical challenge is compounded by the fact that "many schizophrenia patients have cognitive and functional impairments," said Light. They may not be able to reasonably explain how or what they think.

Light and colleagues investigated whether a select battery of neurophysiological and neurocognitive biomarkers could provide clinicians with reliable, accurate, long-term indicators of

brain dysfunction, even when overt symptoms of the disorder were not apparent. These markers ranged from tests of attention and memory to physiological assessments of basic perceptual processes using scalp sensors to measure brain responses to simple sounds.

The researchers measured the biomarkers in 550 schizophrenia patients, and then re-tested 200 of the patients one year later. They found that most of the markers were significantly abnormal in schizophrenia patients, were relatively stable between the assessments and were not affected by modest fluctuations in clinical status of the patient.

Light said further research is required, including whether the endophenotypes can differentiate other psychiatric disorders, be used to anticipate patient response to different kinds of drugs or non-pharmacological interventions or even be used to predict which subjects are at high risk of developing a psychotic illness.

"We believe this paper is an important step towards validating laboratory-based biomarkers for use in future genomic and clinical treatment studies of schizophrenia," Light said.

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Funding for this research came, in part, from National Institute of Mental Health grants MH042228, MH079777 and MH065571 and the Department of Veterans Affairs.

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