Circular RNAs for the Diagnosis and Treatment of Brain Disorders

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Technology description

CircRNAs as biomarkers to effectively and efficiently identify psychiatric disorders in patients during early stages of the disease.
The properties of the circRNA not only allow for early diagnosis, but hold potential for the development of quick and direct diagnosis of psychiatric disease through the use of blood samples and patient-derived cultures. With this, a tool is given to directly diagnose SCZ, BD and other types of mental disease.

Background

Psychiatric disorders such as schizophrenia (SCZ) and bipolar disorder (BD) have an average age of onset during late adolescence and young adulthood. Together, these diseases affect more than 3.5% of the US population. With growing concerns surrounding mental health not only is it important to detect and diagnose these psychiatric disorders during their early stages, but also to monitor therapeutic efficacy and uncover better therapeutic alternatives. Moreover, the identification of proper early biomarkers for such diseases can serve as a valuable tool in evaluating a patient’ s risk of acquiring a psychiatric disease before the disease presents symptoms. Current RNA biomarker approaches are based on detecting linear RNA expression in adult tissue or blood. However, linear mRNAs are prone to degradation and most have very low half-lives (a few hours), thus making their expression unstable and transient, especially in blood/serum samples, which contain high levels of enzymes that break down linear RNA. Circular RNAs are produced from the backsplicing and covalent joining of exons and/or introns and are by far the most resistant to degradation RNA molecules with half-lives of several days. Thus, circRNAs can serve as robust biomarkers in both tissue and blood. Based on our work, specific circRNAs altered in the brain of subjects with psychiatric disorders, can also be found to be altered in induced pluripotent stem cell (iPSC)-derived neuronal cultures produced by patient fibroblasts, which is a popular model to study early brain development that can also be used for monitoring risk for psychiatric disorders. As a result, the development of a very stable biomarker that can be used to diagnose psychiatric disorders through both blood samples and patient-derived cultures would be a useful development in the early diagnosis and overall treatment of psychiatric disorders such as SCZ and BD.

Technology Description

A researcher at the University of New Mexico has identified a relationship between circular RNA’s (circRNA) and psychiatric disorders such as BD and SCZ. The relationship and correlations found between circRNA, BD and SCZ can be used in order to further develop circRNAs as biomarkers to effectively and efficiently identify psychiatric disorders in patients during early stages of the disease, or before the onset of the disease, help examine therapeutic efficacy, and design novel drug targets. The properties of the circRNA not only allow for early diagnosis, but hold potential for the development of quick and direct diagnosis of psychiatric disease through the use of blood samples and patient-derived cultures. With this, a tool is given to directly diagnose SCZ, BD and other types of mental disease.

Video

Simons Center for the Social Brain Colloquium Presentation

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Application area

Fast and accurate diagnosis of mental disease with stable biomarkers.
Explores the role of circRNAs in brain function and disease.
Allows for earlier detection of disease and determining an individual’s risk for developing disease.
Able to identify presence or risk of mental disease through blood sample and patient-derived cultures.

Institution

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