Weill Cornell Medicine

Neuroimaging Biomarkers for Diagnosing Depression Subtypes and Predicting Treatment Response

Lead Inventors:

Conor Liston, M.D., Ph.D.

Associate Professor of Psychiatry, Weill Cornell Medical College
Associate Professor of Neuroscience, Brain and Mind Research Institute, Weill Cornell Medical College
Sackler Associate Professor of Developmental Psychobiology, Psychiatry, Weill Cornell Medical College

Business Development Contact:
Louise Sarup
Interim Technology Licensing Officer
(646) 962-3523
lss248@cornell.edu

Neuroimaging Biomarkers for Diagnosing Depression Subtypes and Predicting Treatment Response

Background & Unmet Need

- Depression is a heterogeneous syndrome that encompasses varied, co-occurring clinical symptoms and divergent responses to treatment
- However, the relationship between dysfunction and abnormal connectivity in the brain and clinical phenotypes is poorly understood
- The association between clinical subtypes and their biological substrates is inconsistent and variable at the individual level, and to-date have not proven useful for differentiating individual patients or informing treatment decisions
- **Unmet Need:** Objective and clinically actionable biomarkers to diagnose subtypes of depression and guide treatment selection

Technology Overview

- **The Technology:** Diagnostic biomarkers for depression biotypes based on whole-brain patterns of dysfunctional connectivity evaluated by functional magnetic resonance imaging (fMRI)
- **The Discovery:** Using fMRI in a large multisite sample (n = 1,188), the inventors demonstrated that patients may be divided into four distinct subtypes defined by patterns of dysfunctional connectivity in limbic and frontostriatal networks
- **PoC Data:** Clustering patients on this basis generated diagnostic biomarkers with high sensitivity and specificity (>80%) for depression subtypes
- Depression biotypes were stable over time and were replicated in an independent cohort
- Biotypes predicted response to targeted neurostimulation therapy for medication-resistant depression more effectively than relying on clinical symptoms

Inventors:
Conor Liston

Patents:
US Patent Application
EP Patent Application

Publications:
Drysdale et al. *Nature*. 2017.

Biz Dev Contact:
Louise Sarup
(646) 962-3523
lss248@cornell.edu

Cornell Reference:
D-7578

Weill Cornell Medicine

Neuroimaging Biomarkers for Diagnosing Depression Subtypes and Predicting Treatment Response

Technology Applications

- Diagnosis of depression subtypes
- Treatment selection based on depression subtype
- Monitoring treatment response over time

Technology Advantages

- Connectivity-based biotypes are clinically meaningful, measurable, and replicable across patient cohorts
- Biomarker-based classifiers detect biotypes with high sensitivity and specificity
- More accurate prediction of treatment response to rTMS than based on clinical features

Supporting Data / Figures

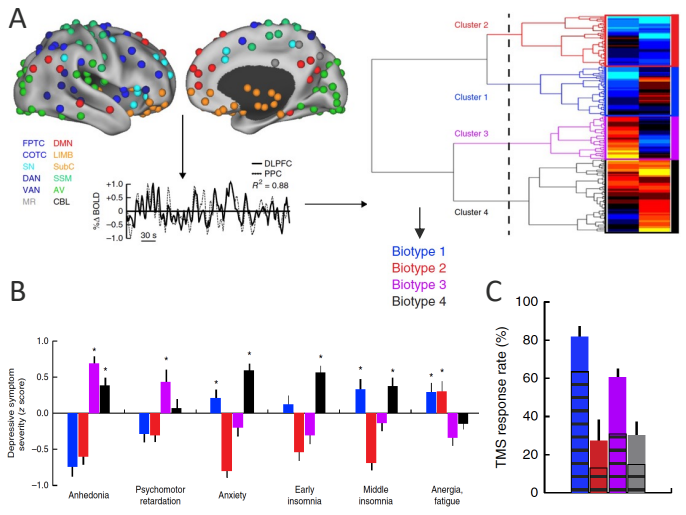

Figure 1: A. Canonical correlation analysis and hierarchical clustering define four connectivity-based biotypes of depression. B. Biotype-specific clinical profiles for six depressive symptoms. C. Differing response rates to rTMS across biotypes.

Inventors:
Conor Liston

Patents:
US Patent Application
EP Patent Application

Publications:
Drysdale et al. *Nature*. 2017.

Biz Dev Contact:
Louise Sarup
(646) 962-3523
lss248@cornell.edu

Cornell Reference:
D-7578

Weill Cornell Medicine

Weill Cornell Medicine