Bipolar disorder is characterized by mood swings that can range from depressive lows to manic highs, and can affect energy, activity levels, and the ability to carry out day-to-day tasks. The standard of care and management is regular clinical appointments to determine if treatment is sufficient and effective. But there are currently no biological markers or measures that accurately and objectively quantify the severity of depression or intensity of mania.

The Solution

University of Michigan researchers, Melvin McInnis, M.D., Emily Mower Provost, Ph.D., Satinder Singh Baveja, Ph.D., and John Gideon, M.S., developed a program called Predicting Individual Outcomes for Rapid Intervention (PRIORI) that uses a smartphone app to record changes in acoustic features of speech (volume, speed, and pitch) as well as patterns of daily smartphone use among patients to predict impending mood changes.

Outgoing speech is recorded, encrypted, and sent to a central processing server for computational analyses of speech acoustics. Smartphone usage is studied to assess any personal interactive patterns reflected by volume of data usage and physical movement.

Acoustic and data patterns are analyzed to assess mood states and predict the likelihood of a manic or depressive episode. This ability would transfer clinical practice to a “prevention” mode from its current “intervention” mode.

The next phase of this research will be a large interactive and interventional clinical trial that will test the efficacy of using this diagnostic app to guide clinical management.
Patent application submitted.

Formation of a commercial enterprise. Will be seeking IDE from the FDA that will allow for clinical testing of an experimental device used to make health care decisions.

Seek venture and SBIR funding.

NIMH Funding at the R01 level for ongoing scientific development.

Engage Investors

Form start-up company to market and support PRIORI.

Seek venture and SBIR funding. NIMH Funding at the R01 level for ongoing scientific development.

**Predicting Individual Outcomes** for Rapid Intervention (PRIORI) uses acoustics to predict changing mood states in patients with bipolar disorder.

**Significant Need**
PRIORI will move bipolar management to "prevention" mode from its current "intervention" mode.

**Compelling Science**
Innovative smartphone app uses acoustic features of speech and smartphone usage patterns to predict the probability of impending mood changes.

**Competitive Advantage**
PRIORI uses biological markers or measures through smartphone usage and speech patterns in order to quantify the severity of depression or intensity of mania in order to predict and treat impending mood changes. The current standard of care consists of regular clinical appointments to determine if treatment is sufficient and effective.

**MTRAC Project Key Milestones**
- 40 new patients recruited and provided with smartphones for the study, and initial assessments completed. All mobile devices optimized for use.
- Completion of study and analysis of data.
- Continued monitoring of patients. Initial data analysis.
- Develop version of PRIORI for iPhone.
- Form start-up company to market and support PRIORI.

**Overall Commercialization**
- Commercialization Strategy
  - Formation of a commercial enterprise.
- Regulatory Pathway
  - Will be seeking IDE from the FDA that will allow for clinical testing of an experimental device used to make health care decisions.

**Intellectual Property**
- Patent application submitted.

MTRAC support and business development guidance has been extremely beneficial in showing us how to move this device from trial to the public realm in order to help people suffering from mood disorders.

Melvin McInnis, M.D.  Emily Mower Provost, Ph.D.
Satinder Singh Baveja, Ph.D.  John Gideon, M.S.