

Carrie Bearden's Grand Challenge:

The mood disorder commonly known as depression is the largest cause of disability worldwide and it is a growing problem. Acknowledging the devastation to society and the urgency with which the issue needs to be tackled, in October 2015, Chancellor Gene Block announced the UCLA Grand Challenge on Depression.

The challenge has a single goal: to erase the burden of depression by the end of the 21st century through the collaborations of UCLA neuroscientists and scholars drawn from a wide spectrum of the public and private sectors in a shared research endeavor.

Carrie Bearden, PhD, is a Professor in the Department of Psychiatry and Biobehavioral Sciences, and Psychology. She holds the BRI's Joanne and George Miller and Family Endowed Term Chair which supports researchers in the fight to understand and treat depression, and she is leading one of the first wave of studies addressing this Grand Challenge.

Bearden's study entitled, "A Framework for Large-Scale Screening of Mood Disorder Risk in the UCLA Community" is a revolutionary screening program that will pave the way to understanding the precipitants of depression, as well as biomarkers that may make it possible to predict onset of subsequent depression, and guard against it. It will also provide addiction researchers with a model for future studies that ask similar questions.

Despite the scope of the problem of depression, scientists have little understanding of the mechanisms at work, which may explain why anti-depressant medications only work in half of the people who take them.

In order to understand the factors that contribute to depressive cycles, Bearden and colleagues are developing an online program that will screen over 2000 members of the UCLA healthcare community, including patients and students. Participants will first answer a specially designed series of questions relating to symptoms of depression.

"When you do this first screening, you'll be given feedback. It could be that your answers don't show any risk of depression, or that you are reporting a few symptoms that indicate a certain level of risk for depression."

Bearden anticipates that the initial screening will identify about 200 people who are either currently depressed or in an at-risk range. This subset, as well as a randomly selected subset of those at lower risk, will be recruited for a longer term study that will involve lab-based measures and ongoing tracking of metrics like sleep and activity levels using wearable devices.

"The ultimate goal is to understand predictive biomarkers, and collect behavioral measures without having to ask the participant personal or direct questions."

Lab-based measurements will include collection of blood, cortisol, and brain imaging. Such data is essential in investigating the biological processes at work in depression.

"The pathophysiology of depression really needs to be understood. There is evidence that reward circuitry is compromised in patients with mood disorders, but we don't understand the mechanisms very well at all, particularly the cyclical nature of the illness. So far, it seems that there are multiple neurotransmitters involved, but there is some evidence that nucleus accumbens activity is reduced in depression. Disruption of this nucleus accumbens-ventral tegmental circuit is probably relevant to anhedonia, or lack of pleasure, which is a hallmark symptom of depression."

The Life and the Death of Depression

The study will also measure activities and social contacts in participants' day-to-day life. In close collaboration with the UCLA Wireless Health Institute, which will design new applications for devices to track participant activities, Bearden anticipates access to a slew of new information. The chance to take measurements of these biomarkers at various stages in the escalation or abatement of mood disorders will be an invaluable opportunity to gain new insight into the biology of depression.

Data gathered through wireless transmission will inform scientists about symptoms such as social isolation patterns and mood, while retaining personal privacy. "Smart watches and smart phones will capture behavioral measures by tracking activities such as the number of calls you make, the number of texts you send, your GPS location showing how far you are from home, sleep patterns, and how much exercise you get. Obviously privacy is a big issue here, so we won't be recording exactly where the person is going but we'll have summary level statistics."

Bearden is particularly interested in sleep patterns as a potential major biomarker of an impending depression. "My prediction is that you would see increasing sleep variability and sleep disruption predicting a mood episode. I expect that this would coincide with a decline in social contact. Those sorts of changes would correspond to increasing mood symptomatology." All of which can be measured using wearable devices.

If there are signs of depression based on transmitted information, the study will offer online interventions –a computerized version of face-to-face therapy. "There is great promise for this mode of therapy. It offers patients easy access to treatment. They can do it in their home, on their own time," Bearden said. In cases of signs of higher risk for serious depressive episodes, the data will trigger a clinician warning offering a stepped up, personal level of care. This component of the project is part of the Depression Grand Challenge Innovative Treatment Center led by close collaborator, Michelle Craske, PhD.

By using remote data collection, and offering online cognitive behavior therapy, the program hopes that participants who suffer from depression will feel less of a stigma when reporting on symptoms.

"A major thing we want to address with the Grand Challenge is stigma. We've come a long way, but there's still a lot of work to be done in terms of reducing stigma surrounding any kind of mental illness or brain disorder, and depression in particular has a lot of misunderstandings. So having a treatment that's a self-help form of treatment normalizes and reduces the stigma."

This study will be one of the first of its kind. "We're starting this with ages 18 and up, but I anticipate we'll have a wider age range of participants in the years to come."

Bearden's career has been characterized by an interest in pediatric and adolescent development. "Eventually, I think that pediatric clinics and adolescent medicine is going to be exactly where we really want to unroll this screening. It's going to have a lot of value in terms of people who are in the sub-threshold or at-risk range who haven't yet developed a full blown mood disorder episode. Our hope is that in the future, we'll be tracking people throughout their lives. The information we will get will transform depression prevention and treatment."

Imagine – the ability to identify a pre-teen at high risk for severe depression, and having the therapeutic tools to prevent her from ever experiencing a depressive episode. What once seemed to have been a fantasy is becoming a tangible possibility, thanks to studies like Bearden's, and the UCLA Grand Challenge.