



Cystic Fibrosis Research News

Title:

Sweat Test for Cystic Fibrosis: Wearable Sweat Sensor vs. Standard Laboratory Test

Authors:

Dong-Hoon Choi^a, Abigail Thaxton^b, In cheol Jeong^c, Kain Kim^a, Patrick R. Sosnay^b, Garry R. Cutting^d, and Peter C. Searson^{a,c,e}

Affiliations:

^a Institute for Nanobiotechnology, Johns Hopkins University, Baltimore, MD, USA

^b Division of Pulmonary and Critical Care; Department of Medicine, Johns Hopkins Hospital, Baltimore MD, USA

^c Measurement Corps, Johns Hopkins Individualized Health Initiative, Johns Hopkins University, Baltimore, MD, USA

^d Institute of Genetic Medicine, Johns Hopkins University, Baltimore, MD, USA

^e Department of Materials Science and Engineering, Johns Hopkins University, Baltimore, MD, USA

What was your research question?

Sweat chloride remains the gold standard measure for diagnosis of cystic fibrosis and is the leading candidate for clinical management of patients on drug therapy (CFTR correctors and potentiators). The objective of this study was to test the feasibility of using a wearable sensor to measure sweat chloride.

Why is this important?

Testing of sweat chloride concentration is performed in an approved clinic and involves treating a region on the forearm with a chemical to induce sweat, collecting a sweat sample using an absorbent pad or plastic collection device (usually for 30 minutes), transferring the sample to a vial and transportation to a laboratory for analysis. Although universally employed, the current sweat test is time-consuming, requiring sweat amounts that are challenging to collect from infants and young children, and difficult to adapt to applications outside of the clinic.

What did you do?

To address the shortcomings of conventional laboratory testing, we have developed a wearable sensor that can perform real-time measurements of sweat chloride. By attaching

Cystic Fibrosis Research News

cfresearchnews@gmail.com



Cystic Fibrosis Research News

the sensor to the forearm, a wireless transceiver transmits the sensor reading to a smart phone app where the sweat chloride ion concentration is displayed.

What did you find?

In a proof-of-concept trial, we showed that our sensor can provide a sweat chloride measurement within about 15 minutes, eliminating the need to wait for laboratory analysis. Additionally, the sensor provides readings on very small volumes of sweat that cannot be measured by the standard sweat test. Finally, we demonstrated that measurements from our wearable sensor are in agreement with standard laboratory tests in five individuals with cystic fibrosis and five healthy individuals.

What does this mean and reasons for caution?

This study highlights the potential for wearable technology to accurately and efficiently measure sweat chloride. Deployment of a validated sensor will aid diagnosis of cystic fibrosis in any setting and will allow evaluation of an individual's response to the latest CF drugs and may directly aid in improving the effectiveness of treatment.

What's next?

We are continuing to validate our sensor with cystic fibrosis patients and healthy individuals.

Original manuscript citation in PubMed

<https://www.ncbi.nlm.nih.gov/pubmed/?term=Sweat+Test+for+Cystic+Fibrosis%3A+Wearable+Sweat+Sensor+vs.+Standard+Laboratory+Test>