

Cystic Fibrosis Research News

Title:

SWEAT INDUCTION USING PILOCARPINE MICRONEEDLE PATCHES FOR SWEAT TESTING IN HEALTHY ADULTS.

Lay Title:

Simplified method for cystic fibrosis sweat testing using microneedle patches is effective in human study.

Authors:

Jonathan Yuxuan Chen^{a,b}, Song Li^c, George L. Silva^{d,e}, Joshua D. Chandler^{d,e}, Mark R. Prausnitz^{a,c,*}, Lokesh Guglani^{d,e,*}

Affiliations:

^aThe Wallace H. Coulter Department of Biomedical Engineering at Georgia Tech and Emory University, Georgia Institute of Technology, Atlanta, GA 30332, USA

^bGlobal Center for Medical Innovation, Atlanta, GA 30318, USA

^cSchool of Chemical and Biomolecular Engineering, Georgia Institute of Technology, Atlanta, GA 30332, USA

^dDepartment of Pediatrics, Emory University School of Medicine, Atlanta, GA 30332, USA

^e Center for CF & Airways Disease Research, Children's Healthcare of Atlanta, Atlanta, GA 30322, USA

What was your research question?

The main aim of this study was to find out if a microneedle patch made of pilocarpine, a drug that induces sweating, can be equally effective in producing adequate sweat for the cystic fibrosis (CF) sweat test in healthy adults when compared to the standard method of performing the sweat test using the pilocarpine iontophoresis method.

Why is this important?

The current method of sweat testing relies on use of electrical current to drive pilocarpine into the skin to make the sweat glands produce sweat on the forearms. Our new method uses tiny microneedles made of pilocarpine on a sticker patch that allows the pilocarpine to enter the skin without requiring any additional equipment. This simplification of the sweat testing technique has the potential to improve access to sweat testing globally with lower costs, easy operability and a no risk of skin burns when compared to the standard method of sweat testing.

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What did you do?

Our team created tiny microneedles made from pilocarpine as part of a sticker patch which can be easily applied to the skin on the forearms to produce sweat. The microneedles dissolve in the skin within minutes allowing pilocarpine to reach the sweat glands without needing the electrical device in current use. We compared this new method to the standard technique of sweat testing in 50 healthy adults where one forearm was used for the standard method and the other for microneedle patch for each subject. A placebo patch was used to monitor for any skin irritation from the patch.

What did you find?

We found that the microneedle patch method produced the same amount of sweat as the standard method of sweat testing. The study participants did not feel any significant pain or discomfort during microneedle patch application, and the skin redness at both placebo and pilocarpine patch sites was less than that caused by the standard method. There were fewer inadequate sweat collections with the microneedle patch method and there was a small difference in sweat chloride levels between the two methods. Most of the participants favoured the microneedle patch method over the standard iontophoresis method.

What does this mean and reasons for caution?

This new method could help simplify the technique of sweat testing and make this test more widely accessible due to lower cost and simplified procedures. It could also enable point-of-care testing with further modifications to the design of the microneedle patch with incorporation of additional sensors. It is important to be cautious about the differences in the sweat chloride concentrations that were observed with this method and the reasons for this systematic difference need to be explored further. Additional studies will be needed in infants and young children to assess feasibility of this new method.

What's next?

We are planning larger studies that include infants and young children with CF. Besides optimizing microneedle patch design, we are developing an integrated device capable of sweat induction, collection and measurement to provide point-of-care results to clinicians within minutes, thus improving their ability to monitor response to CF therapies.

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