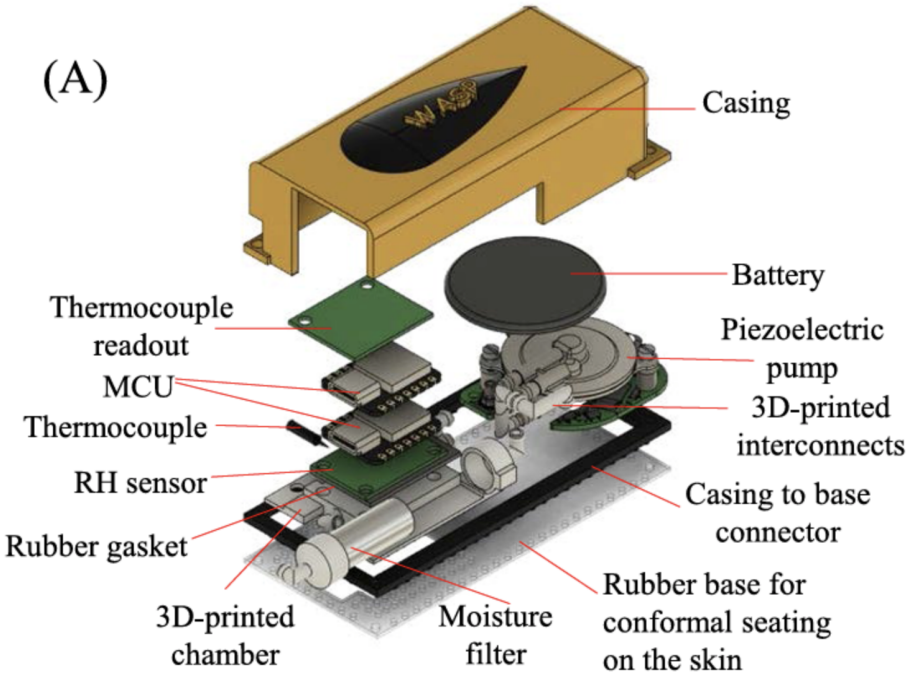
INNOVATION PARTNERSHIPS
UNIVERSITY OF MICHIGAN

TEWL Device for Monitoring of Severe Allergic Reactions

TECHNOLOGY NUMBERS: 2023-240, 2025-566, 2022-036

Accelerate Blue Foundry - 2025 (Life Sciences)



OVERVIEW

A wearable device that enables precise, non-invasive, continuous monitoring of transepidermal water loss (TEWL), offering major opportunities for real-time clinical diagnostics—most notably, early detection and prevention of severe allergic reactions in children undergoing food allergy testing.

DESCRIPTION

Transepidermal water loss (TEWL) describes the amount of water vapor permeating through the skin membrane. Distinct from sweat (which is secreted from sweat glands), TEWL measurements evaluate the integrity of the skin itself.

This technology continuously measures moisture leaving the skin by enclosing a small area inside a chamber with two adjustable air inlets—one supplying dry air, the other delivering ambient air matching surrounding humidity levels. Commercially available TEWL devices consist of a handheld probe and a bulky benchtop instrument. They are designed for single measurement use, and very expensive (~$10,000). The new device has been miniaturized to be smaller with a size similar to a wristwatch, worn comfortably, and used for continuous monitoring. The new design uses a simple manual or electronic switch to quickly adjust internal

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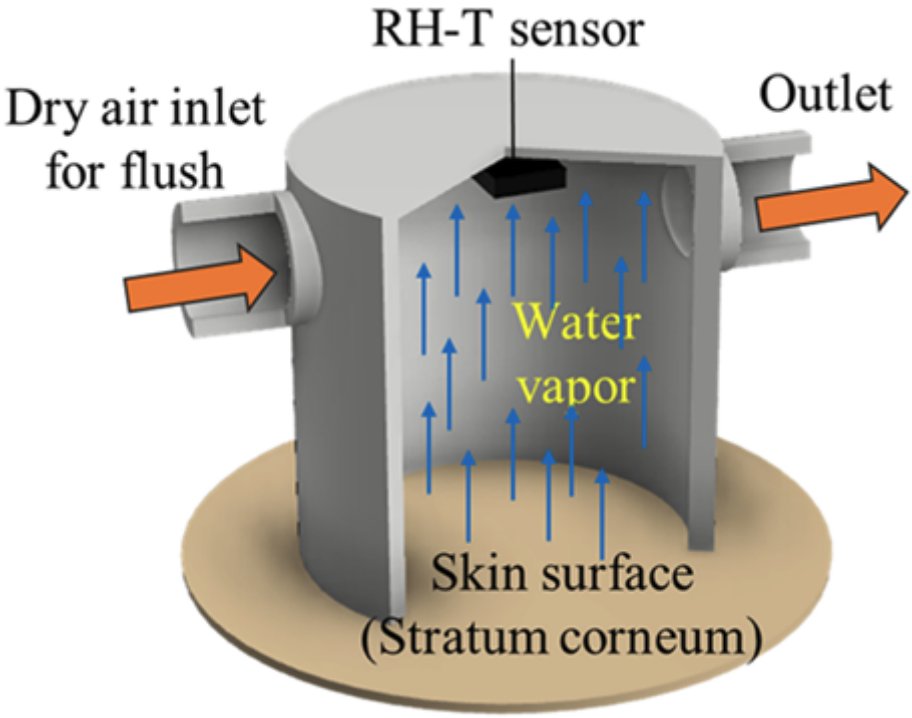
conditions for more accurate and responsive readings. Key improvements include: preventing air turbulence and unwanted moisture build-up, enabling both rapid switching between test modes, and supporting extended, comfortable skin monitoring, much lower costs (<$500).

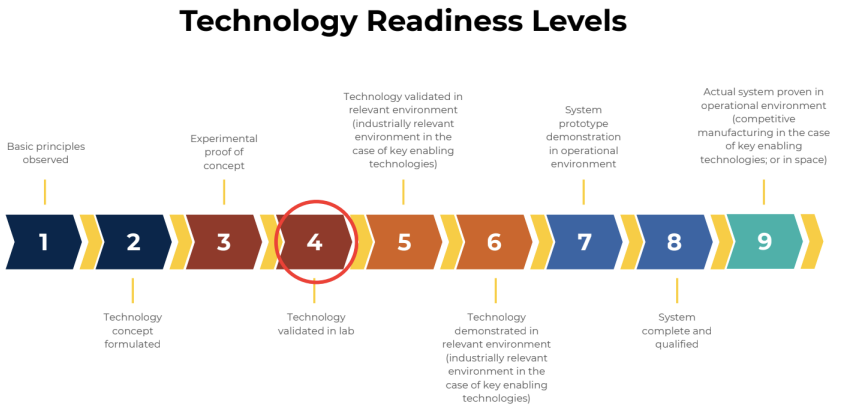
A recent discovery by the UM team is that the early stages of anaphylaxis can be detected by changes in TEWL. This opens up a number of opportunities for a continuous TEWL monitoring device, such as early detection and prevention of severe allergic reactions in patients (usually children) undergoing food challenges in allergy clinics.



VALUE PROPOSITION

- **Fast, Accurate Monitoring**: Rapidly controls chamber humidity for faster, more reliable measurements and real-time skin barrier assessment.
- **Wearable and Comfortable**: Compact, low-power design avoids skin discomfort and device bulkiness, supporting continuous use—even for infants and young children.
- **Versatile Diagnostic Potential**: Easily toggles between modes to (1) assess general skin integrity and (2) detect early physiological changes, such as those signaling allergic reactions before symptoms are visible, which is important clinically for oral food challenges and other allergy monitoring purposes during allergy tests.

TECHNOLOGY READINESS LEVEL



INTELLECTUAL PROPERTY STATUS

Patent applications pending.

MARKET OPPORTUNITY

There is a significant demand in pediatric allergy clinics, dermatology, and telemedicine for an objective, wearable, and non-invasive tool capable of early detection of severe allergic reactions such as anaphylaxis, where current testing methods are risky and subjective. High-value opportunities also exist in monitoring skin barrier health for diseases like eczema, supporting drug development, and at-home wellness tracking. TEWL-based early warning and monitoring could dramatically increase the safety and frequency of critical food allergy testing, improving treatment and reducing misdiagnosis and healthcare costs.

The prevalence of food allergies in young children is rising globally, with over 200,000 emergency department visits for food-induced anaphylaxis yearly in the U.S. alone, underpinning the urgent clinical need and commercial market growth for advanced, real-time skin monitoring solutions.

- This project has participated in customer discovery through an internal medical device development program at the University of Michigan.

REFERENCES

- "WASP: Wearable Analytical Skin Probe for Dynamic Monitoring of Transepidermal Water Loss"
- "Transepidermal water loss rises before food anaphylaxis and predicts food challenge outcomes"