



How Wearable Technology is Helping Scientists Better Understand Patients and Diseases

Tuesday, November 30, 2021



Like many people, Tim McCarthy, PhD, wears a watch that tracks his steps and monitors his activity levels. That watch also represents something else for McCarthy, who is Pfizer's Head of Digital Medicine & Translational Imaging, which is part of Early Clinical Development in the company's Worldwide Research, Development, and Medical Organization. For him, wearable technology could hold the power to better understand patients and diseases to improve healthcare.

McCarthy acknowledges it's still early days for wearables like Fitbit® and Apple Watch®, which contain sensors and are attached to the body. Depending on the type of device, sensors might detect many kinds of things, such as activity, temperature, heart rate, and heart rhythm.

When the data the devices collect is shared with healthcare professionals, including doctors and researchers, the measurements can potentially contribute to a deeper, fuller understanding of a person's activities, movement patterns, and health far, far away from

a doctor's office—all at the patient's convenience and with patient privacy as the cornerstone.

“These devices are easy to wear, and the technology just keeps advancing so you can track all sorts of things,” says McCarthy. Plus, he adds, the use of the device doesn't depend upon a patient to recall their activities, which might be colored by personal opinions or feelings and result in bias in the data that's being collected.

Pfizer has an entire lab dedicated to studying wearable technologies. At the Pfizer Innovation Research Laboratory (PfIRe), located in Cambridge, Mass., researchers test wearable sensors for a variety of applications—such as measuring a person's gait or manner of walking—to gain a deeper understanding of how those measurements compare to traditional methods or measurements. When McCarthy's team is satisfied with the way the devices collect data—as well as comfort and usability of the device—they're able to deploy them to be used in clinical trials.

One Pfizer study involving wearables revolves around atopic dermatitis. This skin condition is the most common type of eczema, causing itching, rashes, and inflammation[1]. “One of the behaviors that occurs with atopic dermatitis is scratching,” says McCarthy. “People have this extremely intense urge to scratch, and it will keep them up at night.” Through wearables, Pfizer is working with researchers at Boston University and University of Rochester to track measurements of when participants, including children, scratch at night and how they sleep, based on objective data captured by the devices.

That's a contrast to past studies, where participants, or their caregivers, would have reported information in a diary about how much they itch and how they slept that night, all based on their recollections. While understanding how a patient feels is important, the scratching, especially at night, can occur without them even realizing it, resulting in a further reminder of their condition.

“This gives us a deeper understanding of disease, because no one really knows whether it's the itchiness or the scratching that starts first,” says McCarthy, “and recording how much you scratch at night, while sleeping is very hard to document accurately as an individual.”

The data has the potential to support whether a particular therapy is helping to alleviate the night-time scratching and sleep disturbances that accompany the condition. “If you can actually show to someone, ‘Look we measured objectively that you're scratching less and you're sleeping better,’ that reassures them to think about probably maintaining the

therapy,” says McCarthy.

Another compelling use that is in development for wearables in clinical trials, says McCarthy, is something called the “six-minute walk test.” This common test measures how far a person can walk in six minutes and, in addition to being a data point for clinical trials, is also often used for patients with heart failure, respiratory disease, and even healthy older adults[2].

“That's a test that is convenient for the clinician to perform, but it's not necessarily patient-centric because you've had to go through the hassle of going to the clinic,” says McCarthy.

Wearable technology, on the other hand, can track how much a person moves daily in the comfort of their own routine, says McCarthy. “That would probably be a much more reflective measure of how you're performing as an individual in daily living tasks,” he says. “It allows you to conduct more routine daily activities, which is very different to being watched in a doctor's office.”

Further, the data collected can give a clinician insights into when a person moves more and less, which could also possibly be an indication of whether or not a therapy or medication is having an effect, says McCarthy.

When he thinks about the future of wearables, McCarthy is excited for what's ahead. In the near term, he believes wearables could advance the understanding of disease, because the devices can measure behaviors associated with different conditions in a continuous manner. “These new insights may help to drive acceptance of more patient-centric endpoints that will help to bring new medicines to patients,” he says.

In the longer term, he expects these devices and tools to increase the interaction and updates between the patient and healthcare provider. “That may ultimately help with the patient journey and management of complex diseases,” says McCarthy.

[1] National Eczema Association. What is Atopic Dermatitis? Available at https://nationaleczema.org/eczema/types-of-eczema/atopic-dermatitis/?gclid=CjwKCAjwkvWKBhB4EiwA-GHjFuQuV5AYxXeebBEkyfIMRBquErUIIbK0RA_Q88ONXieTkxC6We4V7RoCDc0QAvD_BwE. Accessed 10/06/21.

[2] American College of Rheumatology. Six Minute Walk Test. Available at <https://www.rheumatology.org/I-Am-A/Rheumatologist/Research/Clinician-Researchers/Six-Minute-Walk-Test-SMWT>. Accessed 10/06/21.

Originally published, Tuesday, November 30, 2021