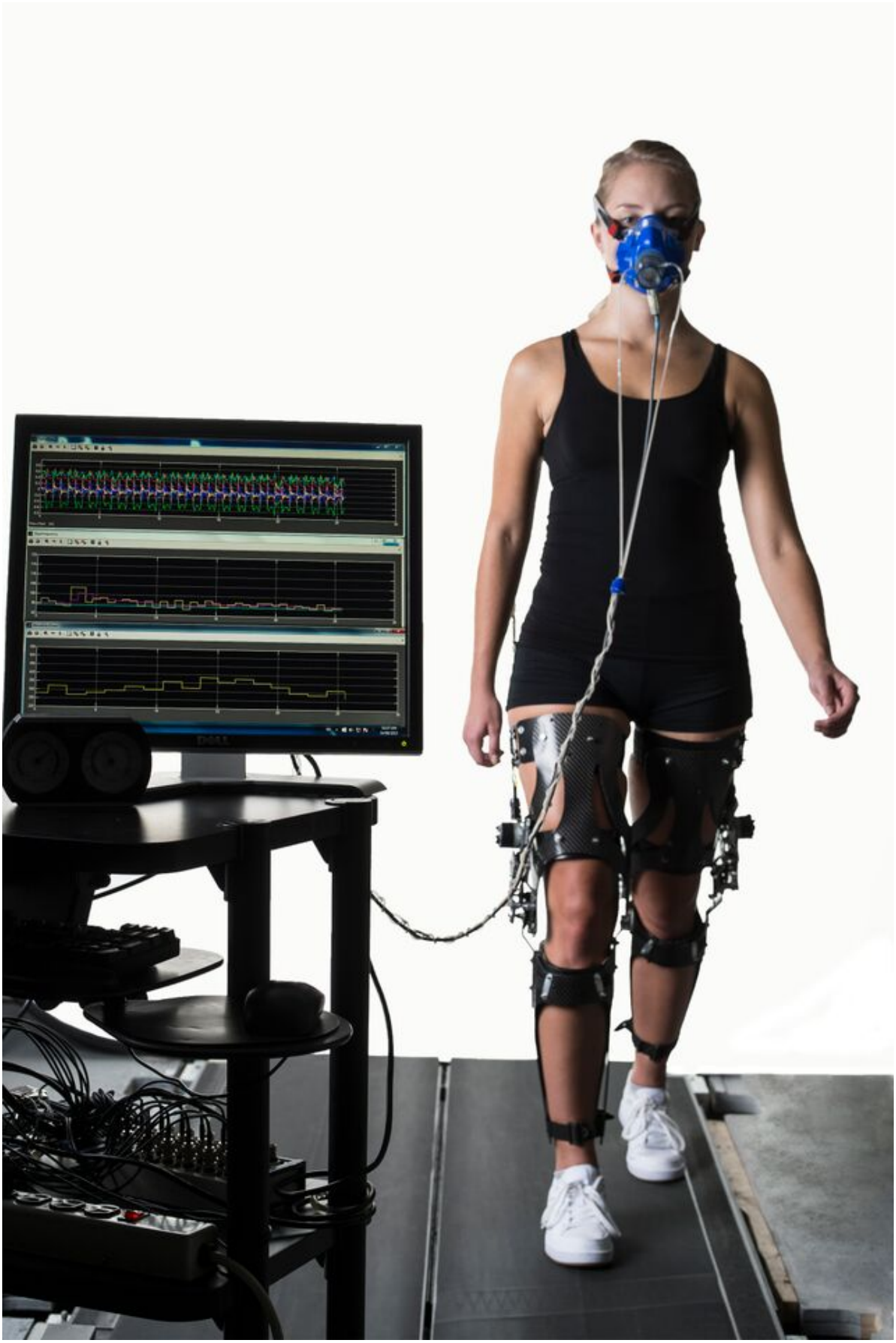
You'd have to be smart to walk this lazy—and people are

September 10 2015



Women walking in exoskeletons with data collection station in the foreground. Credit: Greg Ehlers

Those of you who spend hours at the gym with the aim of burning as many calories as possible may be disappointed to learn that all the while your nervous system is subconsciously working against you. Researchers reporting in the Cell Press journal *Current Biology* on September 10 have found that our nervous systems are remarkably adept in changing the way we move so as to expend the least amount of energy possible. In other words, humans are wired for laziness.

The findings, which were made by studying the energetic costs of walking, likely apply to most of our movements, the researchers say.

"We found that people readily change the way they walk—including characteristics of their gait that have been established with millions of steps over the course of their lifetime—to save quite small amounts of energy," says Max Donelan of Simon Fraser University in Canada. "This is completely consistent with the sense that most of us have that we prefer to do things in the least effortful way, like when we choose the shortest walking path, or choose to sit rather than stand. Here we have provided a physiological basis for this laziness by demonstrating that even within a well-rehearsed movement like walking, the nervous system subconsciously monitors energy use and continuously re-optimizes movement patterns in a constant quest to move as cheaply as possible."

There is a bright side to this, lead author Jessica Selinger adds: "Sensing and optimizing energy use that quickly and accurately is an impressive feat on the part of the nervous system. You have to be smart to be that

lazy!"

Donelan, Selinger, and their colleagues wanted to understand why people move the way they do, given that there are countless ways to get from point A to point B. This is partly a question of evolution and learning. But, the researchers wanted to know, to what extent can our bodies adapt movement based on real-time physiological inputs?

To find out, the researchers asked people to walk while they wore a robotic exoskeleton. This contraption allowed the researchers to discourage people from walking in their usual way by making it more costly to walk normally than to walk some other way. More specifically, the researchers made it more difficult for participants to swing their legs by putting resistance on the knee during normal walking, whereas the researchers eased this resistance for other ways of walking.

"We think of our experiment like dropping someone into a new world with all new rules," Selinger says. "Any walking strategies that may have developed over evolutionary or developmental timescales are now obsolete in this new world."

This scheme allowed the researchers to test whether people can sense and optimize the cost associated with their movements in real time. And it turns out we can.

Women walking in exoskeletons with transparent overlays of different time points in the stride cycle. Credit: Greg Ehlers

The experiment revealed that people adapt their step frequency to

converge on a new energetic optimum very quickly—within minutes. What's more, people do this even when the energy savings is quite small: less than 5%. The findings show that the energetic costs of our activities aren't just an outcome of our movements, but in fact play a central role in continuously shaping them.

The researchers say they now plan to explore questions about how the human body measures the energetic costs associated with particular ways of moving. They are also keen to know how the body solves what is a very complex optimization problem.

"Walking requires the coordination of literally tens of thousands of muscle motor units," Donelan says. "How do we so quickly discover the optimal combinations?"

More information: *Current Biology*, Selinger et al.:"Humans Can Continuously Optimize Energetic Cost during Walking" dx.doi.org/10.1016/j.cub.2015.08.016

Provided by Cell Press

Citation: You'd have to be smart to walk this lazy—and people are (2015, September 10) retrieved 25 April 2024 from https://medicalxpress.com/news/2015-09-youd-smart-lazyand-people.html

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.