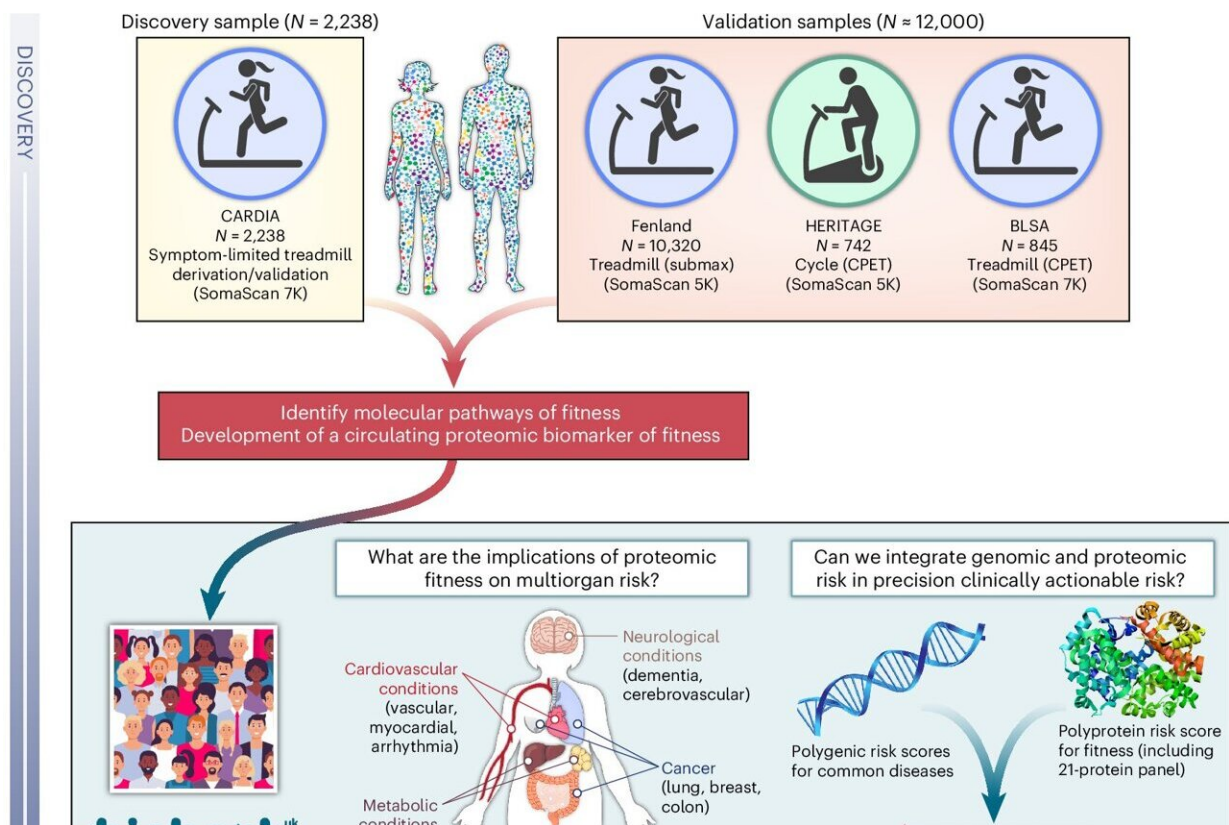


Blood test measuring protein levels could provide snapshot of overall health

July 8 2024, by Olivia Dimmer



Study design. Credit: *Nature Medicine* (2024). DOI: 10.1038/s41591-024-03039-x

Circulating protein levels may serve as a biomarker for cardiorespiratory fitness, an important but previously hard-to-measure component of

overall health, according to [a study](#) published in *Nature Medicine*.

Although cardiorespiratory function can provide a snapshot of holistic health, no standardized method currently exists to measure cardiorespiratory fitness, said Ravi Kalhan, MD, MS, professor of medicine in the Division of Pulmonary and Critical Care, of Preventive Medicine in the Division of Epidemiology, and a co-author of the study.

"As a doctor seeing patients, I can't measure the fitness of a patient sitting in front of me," said Kalhan, also the Louis A. Simpson Professor of Pulmonary Medicine. "We could do various fancy tests, but that's a big undertaking, and not every patient can walk on a treadmill, such as those who are older or have chronic lung disease."

Cardiorespiratory fitness impacts almost every system in the body, from the metabolism to the brain, Kalhan said, so developing a way to measure it would allow physicians to accurately assess general health.

"This is a much more global ascertainment that we were aspiring to measure through biomarkers, as opposed to singular biomarkers that reflect an organ system, like LDL cholesterol," Kalhan said.

In the study, Kalhan and his collaborators employed statistical models to identify circulating proteins that had the biggest impact on overall health in more than 14,000 study participants. The investigators then created a cardiorespiratory fitness score which considered an individual's levels of key circulating proteins, including those implicated in inflammation, neuronal survival and growth, and oxidative stress, among others.

They then validated their scoring system using data from 20,000 individuals in the UK Biobank and found that a favorable score was associated with a [reduced risk](#) of all-cause mortality, according to the study.

To further test their scoring system, the investigators analyzed the circulating proteins of more than 600 people before and after a 20-week exercise program. Study participants' [cardiorespiratory fitness](#) score was found to correlate with the positive effects of exercise on their cardiorespiratory system, according to the findings.

The findings lay the groundwork for a [scoring system](#) which could accurately assess holistic health with a simple [blood test](#), Kalhan said, and may help scientists better understand the link between fitness and health.

"We don't totally know why improving fitness improves health," Kalhan said. "In the long run, this could help us understand the biology of what happens when someone improves their fitness, and then we can understand the mechanism and target specific biologic pathways to improve health."

Building off this development, Kalhan and his colleagues will attempt to apply the protein scoring methodology to other areas of overall health, he said.

"We know a lot about trajectories of health. Someone might be on a declining trajectory, but when we see patients at one time point, it's really hard for us to extrapolate what a trajectory of someone's health may be," Kalhan said. "If we could apply these single-time-point measurements using a blood test that reflects a greater, more difficult-to-ascertain factor of health, that really would be interesting."

More information: Andrew S. Perry et al, Proteomic analysis of cardiorespiratory fitness for prediction of mortality and multisystem disease risks, *Nature Medicine* (2024). [DOI: 10.1038/s41591-024-03039-x](#)

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