

Monitoring the body's fat burning by sampling breath

February 10 2021



The measurement setup. Credit: Tohoku University

Your breath holds the key to monitoring fat burning, and now a research group from Tohoku University has created a compact and low-cost device that can measure how our body metabolizes fat.

The device uses an ultraviolet lamp to gauge exhaled [acetone](#) gas, which is produced in the blood through the metabolic reaction of fat.

"Precise measurements of acetone gas concentration allows us to determine the body's ability to metabolize fat and develop exercise methods for efficient fat burning," says Professor Yuji Matsuura from Tohoku University's Graduate School of Biomedical Engineering, who led the research group.

The details of their study were published in the journal *Sensors* on January 12, 2021

Matsuura and his team focused on [ultraviolet light](#), which due to its extremely short wavelength is strongly absorbed by acetone gas. They succeeded in measuring the acetone concentration with high accuracy: 0.03 ppm—while the acetone concentration is about 1 ppm in exhaled air.

To do this, they trapped exhaled air in a thin tubular optical fiber—called a hollow optical fiber—that had been exposed to vacuum ultraviolet light produced from an ultraviolet lamp. The group measured the degree to which the light is weakened as a result of the absorption of acetone gases to ascertain the acetone gas concentration.

When putting the device to use the group discovered that [fat burning](#) rates gradually increased after exercise. In contrast, the rate remained constant during exercise, indicating that a substantial part of fat metabolization occurs after exercise.

Until now, a large mass spectrometer was required to monitor fat metabolization. The new device, however, comprises only three components: a lamp, a hollow optical fiber, and a small spectrometer making it compact and low cost.

"The present research may also lead to non-invasive diagnosis methods for diabetes, since [diabetic patients](#) have high concentrations of acetone gas in their breath," added Matsuura.

More information: Yudai Kudo et al. Vacuum Ultraviolet Absorption Spectroscopy Analysis of Breath Acetone Using a Hollow Optical Fiber Gas Cell, *Sensors* (2021). [DOI: 10.3390/s21020478](https://doi.org/10.3390/s21020478)

Provided by Tohoku University

Citation: Monitoring the body's fat burning by sampling breath (2021, February 10) retrieved 26 April 2024 from <https://phys.org/news/2021-02-body-fat-sampling.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.