

Point-of-care volatolomics and metabolism tracking

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Wearable and handheld self-testing devices to measure carbon dioxide or acetone in breath represent an active area of point-of-care volatolomics (1, 2). These devices determine if your body is using fats or carbohydrates for fuel and are used for monitoring and tracking metabolism. Breath ketones increase and breath carbon dioxide decreases as the body burns more fats for energy, and as such, these devices are aimed at personalized weight loss/management programs, nutrition plans, and optimizing workouts.

Breath acetone

A recent review has surveyed breath acetone sensing technology and the range of commercially available and experimental breath acetone sensing devices (1). Also, an online article has compared 5 of the major commercial devices (3).

- A. **BIOSENSE®** (<https://mybiosense.com>) (FDA registered Class 1 medical device), is a handheld device that employs Deep Lung Sampling technology. An app tracks ketone trends and facilitates monitoring of different foods and exercise routines on ketone levels and fat metabolism (4,5).
- B. **LEVL** (<https://levlnow.com/>) (FDA registered Class 1 device), is a handheld device and associated small two-port tabletop station for storage and for reading. Results are displayed and tracked via a smartphone app. It measures acetone levels in breath (nanosensor) as part of a weight loss program or for other types of biofeedback (6).
- C. **Ketonix** (<https://www.ketonix.com>) (FDA registered Class 1 device), is a handheld device plus an app, available as a Basic or a Professional version (6). The user blows into the device for a few seconds. A built-in LED changes color based on the breath acetone level (green light = small trace, yellow = moderate trace, and red = high trace).
- D. **Keyto** (<https://getkeyto.com>) is a pen-sized device that connects to a smartphone. The user breathes into the device, and after a 10 second processing period, a breath reading appears on the app screen.
- E. **House of Keto Monitor™** (<https://www.houseofketo.com/>) is a handheld device that takes 20 seconds to measure breath ketones. Results are displayed on a built-in LCD display.

- F. **KHC M3** ketone breath meter (<https://ketohc.com>) is a handheld device that uses a mini-solenoid internal breath pump to ensure accurate and efficient capture of breath for ketones for testing. It takes 10 seconds to measure breath ketones and results are shown on a built-in LCD display.

Breath carbon dioxide

- A. **The Lumen**[®] (<https://www.lumen.me>) is a handheld device that contains a sensor and flow meter. Carbon dioxide concentration is measured by inhaling a fixed volume of air through the device, holding it for 10 seconds, and exhaling fully. Results are displayed on a smartphone app (7-9).
- B. **Breezing Pro**[™] (www.breezing.com) and **Breezing Med**[™] (FDA approved Class II device) (10) are wearable devices that use a disposable mask to facilitate breath collection (10 minutes) and a combined sensor to measure carbon dioxide and oxygen. The devices link to a smartphone and the data obtained from the device can be used to calculate Resting Metabolic Rate (RMR) [Resting Energy Expenditure (REE)] and develop a diet, based on the metabolic needs of a patient (11) or for metabolism tracking (12).

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