



Hydroxybutyrate, a marker of adequate lipolysis and autophagy in fasting patients

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Introduction/objective: Lipolysis and autophagy are key mechanisms to control accumulation of fatty acid leading to chronic inflammation. We investigate which E-VOC could be the most relevant marker to detect the efficiency of fasting in ambulatory patients.

Material and methods: Data were collected during consultations for Small Intestinal Bowel Overgrowth. A breath test was performed by X-PID 9500[®] in 203 fasting (10 h) patients.

Results: Low hydroxybutyrate (HB) levels after 10 hours of fasting was associated with an increased risk of colonic polyps or vagal disturbances (6.3% versus 23.1%; $p < 0.001$; see table below).¹

Low HB and consequently increased High Molecular Weight Exhaled Volatile Organic Compounds (E-VOCs) are found in patients with overweight,² cancer,³ COVID-19,⁴ or depression.⁵

HB may be a marker of lipolysis and autophagy.⁶ Altered autophagy may favour the accumulation of fatty acids in viscera leading to chronic inflammation.⁷

	≥50 years of age	<50 years of age	H2	H2S	Acetic acid	Propionic acid (%)	HB > median	Butyrate acid > median	E-VOCs 12 to 45s
Colonic polyps	23 16.9%	8 11.9%	13.1 +/- 11.6	0.12 +/- 0.04	0.04 +/- 0.02	7 22.6%	6 19.4%	3 33.3%	31 100%
31 cases								9 values	
No colonic polyp	103 83.1%	59 88.1%	12.3 +/- 8.2	0.13 +/- 0.05	0.05 +/- 0.02	43 25.0%	89 51.7%	18 51.4%	65 37.8%
172 cases								35 values	
P values	Not applicable	Not applicable	>0.05	>0.05	>0.05	>0.05	<0.001	<0.01	<0.001

Conclusion: HB appears to be the most appropriate global marker to evaluate the ability of fasting to trigger lipolysis and autophagy. It may also help to cross-select patients before offering a fast.

We suggest that HB measurement could be used to manage the duration and the efficacy of fasting. HB levels may also help to evaluate synergistic approaches associated with fasting (sport, food complements, heat and sweating, etc.).

References:

- Donatini B, et al. (2022) Exhaled Volatile Organic Compounds in Patients with Colonic Polyps. J Case Rep Study 10(3): 301.
- Donatini B, et al (2020). J Case Rep Stud 8(3): 308.
- Donatini B, et al (2020). J Case Rep Stud 8(3): 303.
- Donatini B, et al (2020). Annal Cas Rep Rev ACRR-167. doi: 10.30127/2574-5747/ACRR: 1000167.
- Leclercq S, et al. (2020). Cell Rep 33:108238. doi: 10.1016/j.celrep.2020.108238.
- Yu H, et al. (2022). J Dairy SciS0022-0302(22)00324-1. doi: 10.3168/jds.2021-21287.
- Møller N (2020). J Clin Endocrinol Metab 105:dga370. doi:10.1210/clinem/dga370