

 An official website of the United States government
[Here's how you know.](#)

FULL TEXT LINKS



Gen Physiol Biophys. 2019 May;38(3):237-244. doi: 10.4149/gpb_2018048.

Transcutaneous carbon dioxide attenuates impaired oxidative capacity in skeletal muscle in hyperglycemia model

Tomohiro Matsumoto ¹, Masayuki Tanaka, Ryosuke Nakanish, Mihi Takuwa, Takumi Hirabayashi, Kohei Ono, Takuya Ikeji, Noriaki Maeshige, Yoshitada Sakai, Toshihiro Akisue, Hiroyo Kondo, Akihiko Ishihara, Hidem Fujino

Affiliations

PMID: 31184310 DOI: [10.4149/gpb_2018048](#)

Abstract

Hyperglycemia impairs oxidative capacity in skeletal muscle. Muscle oxidative capacity is regulated by peroxisome proliferator-activated receptor- γ co-activator-1 α (PGC-1 α). Transcutaneous carbon dioxide (CO₂) enhances PGC-1 α expression in skeletal muscle. Therefore, the aim of this study was to clarify the effects of CO₂ therapy on muscle oxidative capacity impaired by streptozotocin (STZ)-induced hyperglycemia. Eight-week-old male Wistar rats were randomly divided into 4 groups: control, CO₂ treatment, STZ-induced hyperglycemia, and STZ-induced hyperglycemia treated with CO₂. STZ-induced hyperglycemia resulted in a decrease of muscle oxidative capacity and decreased PGC-1 α and cytochrome c oxidase subunit 4 (COX-4) expression levels; while, application of transcutaneous CO₂ attenuated this effect, and enhanced the expression levels of endothelial nitric oxide synthesis (eNOS). These results indicate that transcutaneous CO₂ improves impaired muscle oxidative capacity via enhancement of eNOS and PGC-1 α -related signaling in the skeletal muscle of rats with hyperglycemia.

[PubMed Disclaimer](#)

Related information

[GEO Profiles](#)

[MedGen](#)

[PubChem Compound \(MeSH Keyword\)](#)

LinkOut - more resources

Full Text Sources

[Institute of Molecular Physiology and Genetics, Slovak Academy of Sciences](#)

Medical

[MedlinePlus Health Information](#)

