THE NEW ARMENIAN MEDICAL JOURNAL
Volume17 (2023), Issue 4 p. 66-70

DOI: https://doi.org/10.56936/18290825-2023.17.f-66

EXPERIMENTAL STUDY OF ERYTHROCYTE ENERGY METABOLISM UNDER INHALATIONS OF NITRIC OXIDE

Martusevich A.K.[1,2]*, Kovaleva L.K.[3], Fedotova A.S.[1], Stepanova E.A.[1], Soloveva A.G.[1]

[1] Laboratory of Medical Biophysics Privolzhsky Research Medical University, Nizhny Novgorod, Russia
[2] Niznhy Novgorod State Agrotechnological University, Nizhny Novgorod, Russia
[3] Kuban State Medical University, Krasnodar, Russia

Received 31.07.2023; Accepted for printing 08.10.2023

Abstract

Biological effects of nitric oxide are multiply, including vasoactive activity, participation in neurotransmission and intercellular communication etc. These effects are associated with endogenous releasing of nitric oxide, but influence of exogenous administration of this substance does not study in details. In particular, systemic action of nitric oxide inhalations is not so clear.

The aim of this work was the investigation of nitric oxide inhalations action on some parameters of energy and oxidative metabolism of healthy rat blood.

Wistar rats were randomly divided into two groups: control group (without any manipulations; n=10) and main group (n=10) with inhalations by nitric oxide-containing gas flow (20 ppm). Lactate dehydrogenase and lactate level were estimated in rat blood samples. In addition, we calculated a number of integral coefficients of energy metabolism, such as substrate provision coefficient and coefficient of energy reactions balance.

Our experiments demonstrate that 10-days course of inhalations of low nitric oxide doses (20 ppm) increases the adaptive potential of healthy rats' organism. One of these positive effects is associated with activation of some components of energy metabolism. First of all, it realized through stimulation of catalytic activity of lactate dehydrogenase, including its erythrocyte pool. Observed metabolic effect provides the basis for pathogenic correction of diseases, associated with hypoxia, oxidative stress and energy deficiency.

Keywords: *nitric oxide, inhalations, energy metabolism, lactate dehydrogenase.*

Introduction

Data about multiply role of nitric oxide (NO) as a universal biological regulator is previously has for modulation of its endogenous synthesis and releasing [*Pisarenko O et al., 2009; Vanin A, 2009; Kalyanaraman B, 2013*]. For NO vasoactive activity, participation in neurotransmission and intercellular communication as well as other biological effects were demonstrated [*Dimmler S, Brune B, 1992; Zhang S, Shyder S, 1992; Almeida A et al., 2004; Manukhina E et al., 2006; Pisarenko O et al., 2009; Vanin A, 2009; Kalyanaraman B, 2013*]. In particular, nitric oxide was identified as a main endothelium relaxation factor [*Pisarenko O et al., 2009; Kalyanaraman B, 2013*].

At other side, results and molecular mechanisms of exogenous NO action on human and ani-

Cite This Article as:

Martusevich A.K., Kovaleva L.K., Fedotova A.S., Stepanova E.A., Soloveva A.G. (2023); Experimental study of erythrocyte energy metabolism under inhalations of nitric oxide; The New Armenian Medical Journal, vol.17(3), p 66-70;DOI: https://doi.org/10.56936/18290825-2023.17.f-66

Address for Correspondence:

Andrew K. Martusevich, PhD
Privolzhsky Research Medical University
10/1 Minin square, Nizhny Novgorod, Russia
Tel. +7-909-144-92-82
E-mail: cryst-mart@yandex.ru