

Nitric oxide and endothelin-1 as vasoactive markers of endothelium dysfunction in persons with vibration disease and metabolic syndrome

Научный руководитель – Кудяева Ирина Валерьевна

Чистова Надежда Павловна

Аспирант

Институт биологии НАН КР, Бишкек, Киргизия

E-mail: chist1nad2pavl3@gmail.com

Detection of endothelial dysfunction, based on the determination of biologically active markers that are involved in maintaining the normal functioning of the endothelium (nitric oxide, endothelin-1), is justified by early diagnosis of cardiovascular diseases and their prevention. For this purpose, a study was conducted in a group of patients with vibration disease (VD) from the combined effects of local and general vibration and metabolic syndrome (MS) (41 patients), the second group - patients with vibration disease from exposure to local vibration and MS (49 patients). Patients are men, age from 40 to 60 years. Statistical processing of the results was carried out using the STATISTICA software package. Data are presented as median and interquartile range.

One of the biologically active substances is considered to be nitric oxide, a neurotransmitter gas formed by the NO-synthase enzyme from the metabolic precursor, the amino acid L-arginine [1], which maintains blood vessels in a state of microdilation. Serum end metabolites include nitrates and nitrites, which can be measured spectrophotometrically during the diazotization reaction. Serum metabolites include nitrates and nitrites, which can be measured spectrophotometrically during the diazotization reaction. The study showed a high content of nitrates and nitrites in patients with VD under the influence of local vibration and MS (24.97 (20.58; 31.87) $\mu\text{mol/l}$, $p=0.001$), statistically significantly higher than in patients in the group with VD from exposure to two types of vibration and MS (20.37 (15.98; 23.51) $\mu\text{mol/l}$), which indicates a shift in the balance towards endothelium-dependent vasoconstriction.

Another vasoactive substance with proconstrictor activity, determined by ELISA, was endothelin-1, the levels of which were 3-4 times higher than the reference value (25 pg/ml). Its concentration in patients with VD from local vibration was 104.01 (88.21; 119.8) pg/ml, which is statistically significantly higher than in patients with VD from exposure to local and general vibration (67.94 (54.42; 82.01) pg/ml, $p=0.05$). Molecules of endothelin-1 in the blood bind to receptors on smooth muscle cells and cause vasoconstriction, therefore, their increased expression has a vasoconstrictor direction. It had noted that metabolic syndrome makes workers more susceptible to vascular damage [2]. Thus, individuals with vibration disease and metabolic syndrome are characterized by high levels of metabolites of nitric oxide and endothelin-1.

Literature

1. Garthwaite J. Glutamate, nitric oxide and cell-cell signalling in the nervous system //Trends in neurosciences. 1991. 14(2). P. 60-67.
2. Krajnak K. et al. Vibration disrupts vascular function in a model of metabolic syndrome //Industrial health. 2009. 47(5). P. 533-542.

Источники и литература

- 1) Garthwaite J. Glutamate, nitric oxide and cell-cell signalling in the nervous system //Trends in neurosciences. 1991. 14(2). P. 60-67.
- 2) Krajnak K. et al. Vibration disrupts vascular function in a model of metabolic syndrome //Industrial health. 2009. 47(5). P. 533-542.