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EFFECT OF QUERCETINE ON OXYGEN CONSUMPTION UNDER HYPOXIA

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Abstract: Quercetin reduces oxygen consumption in animals, reduces the effects of hypoxia on the body and prolongs life. Thus, quercetin increases the stability of cell and mitochondrial membranes, reduces physiological and biochemical processes in cells, shifts the body from an active metabolic state to a passive metabolic state.

Keywords: quercetin, hypoxia, rat, mouse, oxygen consumption, liver, mitochondria, active form of oxygen.

Introduction: Hypoxia is a common disease and one of the most serious problems of the whole world health system. The number of people suffering from this disease is increasing year by year in all corners of the globe. Many herbal remedies have been developed to treat and prevent this disease. Recently, in the development of hypoxia and ischemia, much attention has been paid to the problem of finding physiological ways of transporting energy, lipids, calcium and correcting the formation and exchange of reactive oxygen species in tissues and cells.

Nowadays, quercetin is used in the treatment of various diseases. [Karimova R.I., i dr., 2010;]. Studies have shown that quercetin has anti-inflammatory properties. [Boots A.W., et al., 2008; Loke W.M., et al. ,, 2008; Rotelli A.E., et al., 2009; Kleemann R., et al., 2011], which improves metabolism and prevents obesity [Ahn J., et al., 2008], against atherosclerosis [Kleemann R., et al., 2011; Rogerio A.P., et al., 2010], has been widely used in the treatment of diseases such as asthma of allergic etiology [Rogerio A.P., et al., 2007; Rogerio A.P., et al., 2010].

Quercetin is a natural biochemical substance found in many plants and is a potent inhibitor of R-glycoprotein. Quercetin reduces oxygen consumption in animals, prolongs life by reducing the effects of hypoxia and some toxins on the body. Thus, quercetin increases the stability of cell and mitochondrial membranes, reduces physiological and biochemical processes in cells, shifts the body from an active metabolic state to a passive metabolic state.

The urgency of the problem. In this regard, the study of the effect of quercetin on the body's oxygen consumption, some physiological and biochemical processes in mitochondria, as well as the factors that lead to the destruction of the organism is an urgent problem.

Purposes and objectives are, under the influence of quercetin, firstly to determine the oxygen consumption of animals, and secondly to determine how changes in the life expectancy of animals under anti-hypoxic conditions.

Items and methods. To prepare the quercetrin solution, 10 ml of ethanol was added to 10 ml of glycerin and 80 mg of quercetin was added to it. White male rats weighing 180-200 g and white mice weighing 40-40 g were selected for the experiment. The animals were divided into 6 groups: the first was controlled, the second - 16 mg per kg body weight, the third – 32 per kg body weight, the fourth – 48 per kg body weight, the fifth – 64 per kg body weight, the sixth - 80 mg per kg body weight quercetin was injected into the abdominal cavity.

Gas oxygen exchange was determined by polyarographic method [Almatov et al., 2013]. To do this, the animals were placed in hermetic chambers. A Clark electrode is placed in the chamber, which is sensitive to the oxygen content in the environment.

Results and their analysis. The changes in oxygen consumption (as the standard exchange rate) after delivery of quercetin in different concentrations to the body of rats and mice are given in Table 1.

Table 1

Effect of quercetin on oxygen consumption in animals (M ± m; n = 6-8).

Quercetin, mg/kg body weight	Rat		Mouse	
	Oxygen consumption, mM O_2/min kg			
0	1372±140	100	3886±410	100
16	1165±136*	84,9	3085±424*	79,4
32	1040±130***	75,8	2720±387**	70,0
48	915±124****	66,7	2273±336****	58,5
64	801±82****	58,4	1838±275****	47,3
80	540±67****	39,4	1267±186****	32,6

Note: here the reliability level is defined as follows: * R <0.05; ** R <0.02; *** R <0.01; **** R <0.001.

The results showed that the standard metabolism in animals decreased under the influence of quercetin, and this process increased in proportion to the increase in the amount of quercetin. If quercetin was administered to rats at 16, 32, 48, 64, and 80 mg per kg body weight, and 60 minutes later the standard exchange rate was measured at 15.1; 24.2; 33.3; Decreased by 41.6 and 60.6%, respectively. Changes in this description were also observed in the mouse. The standard exchange rate in mice was 20.6 compared to the control value; 30.0; 41.5; 52.7 and decreased by 64.4%.When changes in rats and mice were compared, quercetin significantly reduced the standard exchange in mice compared to rats.

Consequently, quercetin significantly reduces the transport of oxygen to the body, which depends on the heart rate, minute volume of blood, and blood oxygen capacity. It transforms from active metabolic state to passive metabolic state. Hence, the effect of quercetin at the organism level is manifested by a reduction in energy and nutrient expenditure, i.e., the transfer of oxygen and substrates to an economical expenditure system.

In our opinion, warm-blooded animals can be transferred from the active metabolic state to the passive metabolic state through quercetin isolated from plants. Thus, quercetin regulates the processes of assimilation and dissimilation in the body, regulates metabolic processes, that is, the activity of the central nervous system, like other organs, and slows down during the transition from an active metabolic state to a more passive metabolic state. Therefore, quercetin helps to restore various pathological processes in the body.

References:

1. Каримова Р.И., Балтина Л.А., Куковинец О.С., Абдуллаев М.И. Синтетические трансформации кверцетина./ “Химия и медицина” Тезисы докладов VIII всероссийской конференции с международным участием (6-8 апреля 2010 г. Уфа, Россия. Уфа:Гилем. 2010. С.53-53.

2. Boots A.W., Wilms L.C., Sweneen E.L., Kleinjans J.S., Bast A., Haenen G.R. In vitro and ex vivo anti-inflammatory activity of quersetin in healthy volinteers. Nutrition. // 2008. V. 24. P. 703-710.

3. Loke W.M., Proudfoot J.M., Stewart S., McKinley A.J., Needs P.W., Kroon P.A., Hodgson J.M., Croft K.D. Metabolic transformation has a profound effect on anti-inflammatory activity of flavonoids such as quersetin: Lack of association between anthioxidant and lipoxygenase ingibitory activity. // Biochem. Pharmacol., 2008. V. 75. P. 1045-1053.

4. Rotelli A.E., Aguilar C.F., Pelzer L.E. Structural basis of the anti-inflamatory activity of quersetin: inhibition of the 5-hidroxytriptamine type 2 receptor. // Eur. Biophys. J., 2009. V. 38. P. 865-871.

5. Kleemann R., Verschuren L., Morison M., Zadelaar S., van Erk M.J., Wielinga P.Y., Koostra T. Anti-inflammatory, anti-proliferative and anti-atherosclerotic effects of quersetin in human in vitro and in vivo models/ // Atherosclerosis. 2011. V. 218. P. 44-52.

6. Ahn J., Kee H., Rim S., Park J., Ha T. The anti-obesity effect of quersetin is mediated by the AMPK and MARK signaling pathways. // Biochem. Biophys. Res. Commun., 2008. V.373. P. 545-549.

7. Kleemann R., Verschuren L., Morison M., Zadelaar S., van Erk M.J., Wielinga P.Y., Koostra T. Anti-inflammatory, anti-proliferative and anti-atherosclerotic effects of quersetin in human in vitro and in vivo models/ // Atherosclerosis. 2011. V. 218. P. 44-52.

8. Rogerio A.P., Kanaschiro A., Fontaneri C., da Silva E.V., Lucisano-Valim Y.M., Soares E.G., Faccioli L.H., Anti-inflammatory activity of quersetin and isoquersetin in experimental murine allergic asthma. Inflamm. Res., 2007. V. 56. P. 402-408.

9. Rogerio A.P., Dora C.L., Andrade E.L., Chaves J.S., Silva L.F., Ltmos-Senna E., Calixto J.B. Anti-inflammatory effect of quersetin-loaded microemilsion in the airways allergic inflammatory model in mice. Farmacol. Res., 2010. V. 61. P. 288-297.

10. Алматов К.Т., Юсупова У.Р., Абдуллав Г.Р. ва б. Организмнинг нафас олиши ва энергия хосил қилишини аниқлаш. - Тошкент. - 2013. - 103 б.

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HAS THE TRANSITION TO DIGITAL EDUCATION ACCELERATED DUE TO THE PANDEMIC?

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Abstract: The coronavirus pandemic has affected the education system as well as all sectors: kindergartens, schools and higher education institutions have been closed en masse. According to UNESCO, 1.7 billion students worldwide today are deprived of offline education due to the suspension of classes. The closure of universities in more than 100 countries has left 90 percent of the world's students sitting at home.

This is not the first time humanity has been exposed to the virus. Since the creation of the world, mankind has faced various similar trials. Mankind will fight against various calamities, overcome them, and start his life anew. Life goes on like this. However, this time the catastrophe - the spread of the coronal infection - has surpassed previous epidemics in terms of coverage, reaching the level of a pandemic and claiming many lives, requiring serious action.

Sixty percent of states all around the world has switched to an online education system.

The People's Republic of China, a hotbed of the pandemic, closed all schools and universities on March 26 and established online education from February 17 to handle the situation. Teachers mainly communicate with their students through the software Wechat. Then the Iranian government has suspended the teaching process in kindergartens, schools and universities in several regions.