BIOCHEMICAL INDICATORS OF PULMONARY FRESHWATER MUSCLUS OF THE VITBA RIVER IN THE VITEBSK DISTRICT

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Vitba is a river in the Vitebsk region, the left tributary of the Zapadnaya Dvina river. Length – 33 km. The river originates from the village of Poddubye within the Vitebsk Upland. The catchment area is 275 kmI. The catchment on the northwestern slopes of the Vitebsk Upland. At the border of the city, the river is 4.8 km long. The riverbed is winding, with a width of 20-30 m, in the lower reaches - up to 60 m. Recreation areas have been created on the banks and islands of the river, which include the Frunze Park and a recreation area on the embankment of the Vitba River. On the right bank is the Botanical Garden. The riverbanks are connected by car and pedestrian bridges. The Vitba River has pronounced signs of anthropogenic impact. The presence of recreation areas on its shores exacerbates this effect. On the banks and in the water of the river you can observe a lot of garbage. Black silt was found at the bottom of the river, which indicates a large amount of organic substances in the water. The water has a yellowish tint and a slight swamp smell, which are the initial signs of eutrophication of the reservoir.

The purpose of the study was to assess the ecological state of the Vitba River in the Vitebsk region by indicators of carbohydrate, nitrogen metabolism and the state of the antioxidant system of pulmonary freshwater mollusks.

Material and methods. The experiments were performed on 108 pulmonary freshwater mollusks, divided into two groups: 54 individuals of Lymnaea stagnalis and 54 individuals of Planorbarius corneus. Mollusks gathered in spring (April-May), summer (July) and autumn (September-October) from Lake Sokorovskoye in the Beshenkovichi District. Hemolymph parameters were determined using the reagent kits NTPK “Analysis X”. The concentration of glucose in hemolymph was determined by the glucose oxidase method using Deacon Diazis kits. Determination of protein concentration (mg / g tissue) was performed according to the Lowry method. The content of DNA and RNA (mg / g of tissue) was determined by the method of Blober and Potter. Glycogen was determined by the Krisman method. The products of lipid peroxidation were determined (TBK-positive substances (TBK-PV), a test with 2-thiobarbituric acid was used. Catalase activity (1.11.1.6) was detected by reaction with ammonium molybdate. The amount of reduced glutathione was determined by the reaction of interaction of GSH with 5.5 '-dithio-bis-2-nitrobenzoic acid [1]. Mathematical processing of the results was carried out by the methods of parametric and non-parametric statistics using the statistical software package Microsoft Excel 2003, STATISTICA 6.0.

Findings and their discussion. Mollusks from the Vitba river in the Vitebsk region are characterized by the following metabolic parameters (tables 1, 2).

Table 1 – Metabolism in hemolymph and hepatopancreas *Planorbarius corneus* from r. Vitba of Vitebsk region ($M \pm m$)

Indicator	Season of the year		
	Spring (n=9)	Summer (n=9)	Autumn (n=9)
Total protein (hemolymph) (mg /ml)	37,04±0,52[1]	24,15±0,32	33,31±0,46[1]
Total protein (hepatopancreas) (mg /g)	189±7,1[1,2]	135±7,3	256±8,2[1]
DNA (mg /g)	1,44±0,11[2]	1,67±0,09	1,83±0,10[1]
RNA (mg /g)	10,20±0,58[1,2]	7,44±0,35	5,46±0,35[1]
Urinary acid (mkmol /l)	137,99±5,23[1,2]	119,56±3,45	92,14±2,02[1]
Urea (mmol /l)	6,54±0,06[1]	8,15±0,08	6,02±0,06[1]
Glucose (mmol /l)	1,90±0,072[1,2]	1,21±0,022	0,73±0,045[1]
Glycogen (mg /g)	17,58±0,133[1,2]	20,88±0,244	24,05±0,208[1]
TBK-PV (mkmol /g)	8,04±0,55[1,2]	4,36±0,25	5,24±0,33[1]
Reduced Glutathione (mkmol /g)	11,43±0,15[1,2]	7,22±0,08	8,94±0,07[1]
Catalase (mkmol /min/g)	82,4±1,4[1,2]	31,2±1,2	52,3±1,3[1]

Note - [1]p <0,05 compared with the summer period of collection of mollusks; 2p <0.05 compared with the autumn period of collection of mollusks.

The total protein content in the hepatopancreas of both species of mollusks in the spring and autumn periods of collection exceeded summer values by 1,4 and 1,9 times, respectively. The concentration of total protein in hemolymph *Pl. corneus* and *L. stagnalis* collected in summer was 1,4 times less than mollusks collected in spring and autumn. The urea content in the hemolymph of mollusks collected in summer exceeded the spring and autumn values by 1,2 times. The DNA level in the hepatopancreas of the horn and common pond reel increases from spring to autumn by 1,2 and 1,4 times, respectively. The glycogen content in the hepatopancreas of two species of mollusks increases from spring to autumn by 1,2 times. Compared to the autumn harvest season, Pl. corneus increased RNA content in the spring and summer periods of collection in 1,9 and 1,4 times, in L. stagnalis – 1,6 and 1,2 times (tables 1, 2).

Table 2 – Metabolic parameters in hemolymph and hepatopancreas *Lymnaea stagnalis* from the r. Vitba of Vitebsk region ($M \pm m$)

Indicator	Season of the year		
	Spring (n=9)	Summer (n=9)	Autumn (n=9)
Total protein (hemolymph) (mg /ml)	14,03±0,22[1]	11,35±0,16	15,87±0,25[1]
Total protein (hepatopancreas) (mg /g)	271±7,6[1,2]	186±8,8	323±21,7[1]
DNA (mg /g)	1,74±0,04[1,2]	2,09±0,04	2,49±0,03[1]
RNA (mg /g)	9,07±0,42[1,2]	7,06±0,16	5,74±0,24[1]
Urinary acid (mkmol /l)	74,47±1,48[1,2]	45,56±2,33	25,46±0,64[1]
Urea (mmol /l)	5,93±0,17[1]	7,14±0,11	6,05±0,03[1]
Glucose (mmol /l)	0,93±0,006[1,2]	0,60±0,035	0,41±0,037[1]
Glycogen (mg /g)	23,11±0,174[2]	26,21±0,182	27,42±0,612
TBK-PV (mkmol /g)	9,32±0,47[1,2]	3,56±0,24	5,18±0,26[1]
Reduced Glutathione (mkmol /g)	11,64±0,13[1,2]	8,04±0,05	9,12±0,08[1]
Catalase (mkmol / min /g)	88,4±2,3[1,2]	41,4±1,3	56,6±2,6[1]

Note - 1p <0.05 compared with the summer period of collection of mollusks; 2p <0.05 compared with the autumn period of collection of mollusks.

The concentration of uric acid is increased in the spring and summer periods of collection at the ordinary coil by 1,2 and 1,5 times, respectively, at the common pond - by 2,9 and 1,6 times compared with the autumn collection period. Compared with the spring and summer periods of collection, two species of mollusks reduced the glucose content in the autumn period of collection by 2,3 and 1,6 times, respectively. Pl. corneus increased the content of TBA-PV and reduced glutathione in hepatopancreas in the autumn and spring periods of collection by 1.6 and 1,2 times, respectively, in L. stagnalis 2,6 and 1,5 times TBA-PV and 1,4 times reduced glutathione compared to the summer harvest. Catalase activity compared to the summer harvest at Pl. corneus increased by 2,6 and 1,7 times, in L. stagnalis – by 2,1 and 1,4 in the spring and autumn periods of collection (tables 1, 2).

Conclusion. The data on the metabolism of light freshwater mollusks are related to the environmental data of the Vitebsk region and its coastal zones. Strong anthropogenic load negatively affects the metabolism of mollusks, activates oxidative stress in mollusks. It is about rivers from a river and a river.

1. Laboratory biochemical studies: guidelines for laboratory work for students of the Faculty of Biology, specialty 1-02 04 04 “Biology. NAP ”/ E.O. Danchenko, A.A. Chirkin, O.M. Balaeva-Tikhomirova, T.A. Tolkacheva. – Vitebsk: VSU named P.M. Masherov. – 2017. – 41 p.

THE INFLUENCE OF ANTIBIOTICS CIPROFlOXACIN ON THE CONTENT OF MALONDIALDEHYDEIN IN A HEPATOPANCREAS *LYMNAEA STAGNALIS*

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The study of changing biochemical values and molluscs in realtime has a significant meaning for the ecological monitoring. Considering that molluscs are susceptible to the smallest changes occurring in the water ecosystems, they turn out to be the most suitable objects to study and conduct research on. Observing them allows to ensure a high-quality and timely implementation of cleaning measures, assessing the impact of antropogenic factors such as threats to the environment and preventing human diseases. Medical preparations affect the environment negatively. Thus, antibiotics contribute to the development of pathogens resistant to them. One of the most significant environmental factors is the interference into aquatic ecosystems of various toxicants, which can negatively affect the life of organisms. The first to respond to changing environmental factors is the antioxidant system. Its key indicator is the content of malondialdehyde (MDA).