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The activity of free lysosomal enzymes of rabbit's pulmonary trunk wall during experimental diabetes

Based on the examined issues in our department, it was stated that the activity of free lysosomal enzymes of rabbit`s renal artery wall, which is a muscular vessel, changed in the course of experimental diabetes (1). Therefore we decided to evaluate the activity of those enzymes in the wall of pulmonary trunk, which is an elastic vessel.

MATERIAL AND METHODS

Material and methods were like in the previous study (2). The activity of enzymes in the experimental group was tested with ANOVA. If $p<0.05$, there was stated statistic significance of the differences in measured activity of enzymes between experimental groups ($p<0.01$, very strong significance). For each effect, whose influence on the average was significant, differences between groups were tested using Duncan Test. Not statistically different averages between groups were indicated with the same capital letter.

RESULTS

Table 1 presents the activity of free lysosomal enzymes of rabbit's renal artery wall in the course of experimental diabetes. According to Table 1, the activity of free acid phosphatase in the group with diabetes was higher than in the control group. It reached the highest value in the third week of diabetes (it was higher by 661.9% than in the control group, which is statistically significant). During next weeks of the experiment a decrease in the activity of this enzyme was observed.

The activity of β-galactosidase, after initial decrease, increased during the disease and reached the highest level in the group with 3-month diabetes. It was higher by 1,016% than in the control group, which is statistically significant. In the group of rabbits with 6-month diabetes the activity of this enzyme was also higher than in the control group.

The activity of N-acetyl-B-D-glucosaminidase (NAGL) also increased during the experiment, reaching the greatest value in the group with 3-month diabetes. It was higher by 468.4% than in the control group, which is extremely statistically significant. In the group with 6-month diabetes it was higher by 224.7% than in the control group.

Regarding the activity of cathepsin B in the course of diabetes, after an initial decrease, there was observed an increase of its value with maximum in 3-month diabetes group. It was higher by 379.4% than in the control group.

The activity of cathepsin D increased in the group with 3- and 6-week diabetes statistically significantly and then showed a decreasing tendency by 43%.

Table 1. The activity of free fractions of lysosomal enzymes of rabbit's pulmonary trunk wall during experimental diabetes estimated in μmol/1mg protein/1hour of incubation

Fraction of enzymes	Control group	3-week diabetes	6-week diabetes	3-month diabetes	6-month diabetes
Acid phosphatase	0.7002 ±0.2225A	4.6352 ±1.6652B	3.1848 ±1.1520C	2.9789 ±0.8873C	1.4725 ±0.5283A
β-galactosidase	0.4447 ±0.1162A	0.2513 ±0.0615A	0.6941 ±0.1532A	4.5182 ±1.2520B	1.3531 ±0.0515A
NAGL	5.711 ±2.6150A	5.957 ±2.5970A	6.246 ±2.9980A	26.752 ±11.3752B	13.831 ±4.6825A
Cathepsin B	5.589 ±1.5285A	2.774 ±0.9890A	6.652 ±1.6252A	21.204 ±8.5525B	15.656 ±4.5282B
Cathepsin D	199052 ±60525A	226942 ±70652B	254842 ±80225B	112452 ±50125A	110092 ±52236A
Cathepsin L	155331 ±50225A	186673 ±62525A	149066 ±48186A	30488 ±6828B	14987 ±4178B
Lipase	1.8218 ±0.6185A	1.7404 ±0.5992A	2.4682 ±0.7415B	2.6977 ±0.7865B	2.6780 ±0.7628B
Sulphatase	0.1633 ±0.0522A	0.1662 ±0.0531A	0.3119 ±0.0852A	0.5131 ±0.0954A	1.1531 ±0.1118B

The activity of cathepsin L initially also increased and then decreased to reach the lowest value in the group with 6-month diabetes. It was by 93.5% lower in comparison with the control group.

Regarding the activity of lipase, after initial decrease, it increased in the course of the disease and in the group with 6-month diabetes it was 147% higher in comparison with the control group, which is statistically significant.

The activity of sulphatase showed an increasing tendency in the course of diabetes to reach value greater by 7,065% after 6 months in rabbits with diabetes in comparison with the control group.

Comparing the activity of free lysosomal enzymes in the wall of pulmonary trunk to the activity of this enzymes in the renal artery wall, the activity of free acid phosphatase was higher in the pulmonary trunk wall and was the highest in the 3-week diabetes group. Also the activity of free B-galactosidase and NAGL were higher and they were the highest in the 3rd month of diabetes. The activity of cathepsin B was higher too, and reached the highest level in the 3-month diabetes group. The activity of free lipase was lower in the pulmonary trunk wall and it was the highest in the 6th month of diabetes. The activity of free sulphatase was lower, too, with the exception of the 6-month diabetes group.

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SUMMARY

The activity of free lysosomal enzymes of rabbit's pulmonary trunk wall was marked in the course of experimental diabetes. The activity of acid phosphatase increased during the experiment in groups with diabetes. The activity of β-galactosidase and NAGL increased in the similar way. An increase of the activity of cathepsin B was observed only to the 3rd month and then it decreased significantly in the 6th month of the experiment. The activity of cathepsin D and L also increased only initially and decreased in the 3rd month of diabetes. The activity of lipase and sulphatase increased in the course of diabetes to reach the highest value in the 6th month.

Aktywność wolnych enzymów lizosomalnych ściany pnia płucnego u królika w przebiegu cukrzycy doświadczalnej

Oznaczono aktywność wolnych enzymów lizosomalnych w ścianie pnia płucnego u królika w przebiegu cukrzycy doświadczalnej. W przypadku kwaśnej fosfatazy wzrastała ona w trakcie choroby. Podobnie zachowywała się aktywność β-galaktozydazy i NAGL. Aktywność katepsyny B wzrastała do trzeciego miesiąca cukrzycy, by obniżyć się w szóstym miesiącu. Aktywność katepsyny D i L początkowo wzrastała, by spaść w trzecim miesiącu choroby. Aktywność lipazy i sulfatazy zwiększała się w przebiegu cukrzycy, osiągając maksimum w szóstym miesiącu.