ORGAN SPECIFIC OF RATS ALDEHYDE DEHYDROGENASE FOR BURNS

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The problem of studying of enzymes during thermal lesions has not lost its relevance. Burn disease is always accompanied by development of intoxication caused by numerous toxic metabolites, including aldehydes [4]. It is known that one of the major detoxification enzymes is aldehyde dehydrogenase (ALDH), present in all tissues [1]. Purpose of work is to study the catalytic and kinetic properties of ALDH in various organs of rats with burns.

Material and methods. White rat males of line Wistar with weighing 180-250 g were used in the experiment. Animals were divided into 2 groups: control - (intact rats, n = 10) and experimental - (n = 10). Experimental group rats under ether anesthesia were scalded boiling (20%, 3 sec.). Experimental animals were taken out at 3, 7 and 10 days after injury. ALDH activity was determined by method of B.M. Kerchengolts, L.P. Ilyina [3] in 10% homogenate of tissues (liver, kidney, heart and lungs). Kinetic characteristics of ALDH were calculated: Kt - time to reach ½ Vmax of enzyme reaction (min); Vmax - maximum speed of accumulation of the reaction product (mkmol/min); Vmax/Kt (Ka) - ratio of catalytic efficiency of the enzymatic reaction (mkmol/min^2) [2]. The research results were processed using the t-Student criterion.

Results and discussion. The results showed that the total activity of ALDH in organs of healthy rats (in order of decreasing) distributed: liver → kidney → heart → lungs. It is installed that highest total ALDH activity observed in the kidney, the lowest - in the lung (3 and 7 days after burn) during thermal injury. Specific activity of aldehyde dehydrogenase in kidney increases on day 3 after burn by 21.8% (p=0.0246), on day 10 – by 45.5% (p=0.0123) compared to control animals, indicating that detoxification function of kidney increases. On day 3 after lesion in kidney Vmax decreases by 1.6 times (p = 0.0217) compared to control animals. The increased of ALDH activity in the kidney on the 10th day after the burn is probably due to decrease of the Kt at 2.2 times (p=0.0032).

A statistically significant change of the ALDH specific activity in the heart is revealed only on day 10 after injury (increase by 70.1%), which probably can be explained to the onset of the third phase of the endogenous intoxication, which is characterized by the penetration of toxic compounds in cells especially those organs that are not intended for detoxification [4]. In addition, on the 10th day in the heart Kt and Vmax decrease at 2.7 times of a statistically significant.

It is known that heavy thermal injury is complicated by the early development of syndrome of multiple organ failure [4]. Results of the study showed that the specific activity of ALDH during the

burn significantly reduced only in the liver and lungs (the 3rd day after injury: 56.2% in the liver and by 36.1% in the lungs, day 7: 78 1% in the liver and by 55.5% in the lungs, day 10: 41.4% in the liver). Falling specific and total activity of ALDH in liver and lungs in rats with thermal injury, probably is associated with an increase in the content of highly toxic compounds, in particular, the average molecular weight of molecules, which bind to the enzyme, its conversion into a new conformational state, characterized by low affinity of the enzyme to reaction substrate [1]. It is found that Kt in liver on the 3rd day after the burn increases at 3.5 times (p=0.0023), the 7 th day - 6.6 times (p=0.0008), on the 10th day – at 1.7times (p=0.0275) compared to control animals. During the thermal injury in the liver is noted decrease Ka: 3 day - 1.3 times, at 7 days - 1.6 times (p=0.0271), on day 10 - 2.3 times (p=0.0083).

Conclusion. Thus, thermal injury leads to a change of the specific activity and redistribution of total activity of ALDH which depend from the organ and the after-burn time. It is established that under the influence of thermal injury catalytic and kinetic properties of ALDH vary that it is important to take into account when developing methods to combat intoxication.

References

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