The changes of matrix metalloproteinase 2, 9 activity and hyaluronic acid level in rat's heart and serum under cadmium influence

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The changes in the molecular mechanisms of the extracellular matrix degradation under toxic factors are not well known. The main goal of work was the investigation of the MMP2 and MMP9 activity and hyaluronic acid level in the heart and blood serum under cadmium influence at different doses.

The 18 Wister rats divided to 3 groups were used for the experiment. $CdCl_2x2.5H_2O$ in doses 0.1 lg/kg and 1 lg/kg was given to rats intragastrically in drinking water during 36 days. The rats were decapitated under Isoflurane anesthesia according to ethical rules; the heart was quickly removed. The relative activity [in arbitrary units (au)] of pro- and active forms of MMP9 and MMP2, total protein (TP) and hyaluronic acid levels were calculated.

It was shown that low doses of exogenous cadmium (0.1 lg/kg) lead to reduced activity of pro- and active forms of MMP9 in myocardium (7.3 ± 0.6 au/mgTP and 7.1 ± 0.6 au/mgTP compare to the 9.67 ± 0.4 au/mgTP and 9.7 ± 0.5 au/mgTP in the control rats accordingly) and in serum (0.95 ± 0.2 au/mgTP and 0.35 ± 0.05 au/mgTP compare to the 1.54 ± 0.05 au/mgTP and 1.49 ± 0.05 au/mgTP in the control rats accordingly), but pro-MMP2 activity in heart was increased (14.5 ± 1.6 au/mgTP compare to the 9.8 ± 0.6 au/mgTP in the control rats); level of HA was decreased in both tissues (0.69 ± 0.16 lg/ml and 3.63 ± 0.3 lg/ml compare to the 1.0 ± 0.13 lg/ml and 3.91 ± 0.3 lg/ml in the control rats accordingly). High doses of cadmium (1 lg/kg) caused a reliable increase of both gelatinase activity in the myocardium: MMP2 increased from 9.65 ± 0.4 au/mgTP to 14.1 ± 0.8 au/mgTP, proMMP9 – to 12.6 ± 1.5 au/mgTP, MMP9 – to 15.4 ± 1.6 au/mgTP. HA level was increased in serum (4.28 ± 0.1 lg/ml) and decreased in heart (0.49 ± 0.09 lg/ml).

The results indicate the dose-dependent and tissue-specific effect of cadmium on MMP-depended protein degradation and level of hyaluronic acid.