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Research Articles

Effect of single inhalation of hypochlorous acid on the activity of cysteine cathepsins in rat blood plasma

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Abstract

Objective

Gaseous hypochlorous acid HOCl(g) is a promising agent for continuous complex disinfection of premises, but the toxic effect of its inhalation has been practically not studied. In this study, the effect of inhalation of 0.75 and 1.79 ppm HOCl(g) on the activity of cysteine cathepsins B, H and L, and alpha-1 antitrypsin in the blood plasma of rats was studied to assess the extent of lysosome damage as an element of oxidative stress.

Materials and methods

the inhalation exposure was carried out in the ‘whole-body’ mode during a single 4-hour treatment of animals of two age groups in inhalation chamber equipped with a specially designed evaporative unit. Biochemical parameters were analyzed 2 h and 24 h after the procedure.

Results and discussion

it was found that the activity of cathepsin L did not change in any of the animal groups, while the activities of cathepsins B and H significantly increased. Inhalation had the greatest effect on cathepsin H, which increased by 1.6–6.4 times in different groups, and the reaction of young animals was more intense. Alpha-1 antitrypsin levels were also elevated both 2 and 24 h after exposure, but age-dependent differences were not significant. In all cases, an increase in the deviation of biochemical parameters from the norm was noted with an increase in the HOCl(g) concentration.

Conclusions

HOCl(g) inhalation at the concentrations used causes pronounced oxidative stress in animals. More detailed biochemical, histological and immunohistochemical studies are needed to assess the toxic consequences of such exposure.

Keywords:

- **Hypochlorous acid**
- **inhalation**
- **inhalation toxicity**
- **cysteine cathepsins**
- **alpha-1 antitrypsin**
- **oxidative stress**
- **air disinfection**

Disclosure statement

No potential conflict of interest was reported by the author(s).

Data availability statement

Additional data can be provided by authors upon request.

Additional information

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