

ABSTRACT

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Title of diploma thesis: Changes of internal organs after percutaneous exposure to sulfur mustard

Sulfur mustard is a chemical warfare agent belonging to the group of blistering agents. The theoretical section of the thesis is mainly focused on the description of acute toxic effects, the mechanism of action, and deals with the current possibilities of poisoning therapy.

The experimental section is focused on monitoring the effect of sulfur mustard poisoning in the liver, lung, and kidney of female C57BL/6J mice after the percutaneous administration. This work aimed to evaluate markers of oxidative stress and histopathological changes of the selected organs at 3, 5, and 7 days after the poisoning. Ferric reducing antioxidant power (FRAP) and thiobarbituric acid reactive substances (TBARS) methods were used to determine markers of oxidative stress. Histopathological changes were evaluated microscopically using the hematoxylin-eosin staining method. The airness of the lung parenchyma was also assessed by computer image analysis. First, the LD₅₀ of sulfur mustard was experimentally determined (109.2 mg/kg). Organ changes were then assessed after administration of 25%, 50%, 75%, 100%, and 150% LD₅₀. TBARS values showed a decrease in all monitored organs depending on the specific dose and time. Contrarywise, FRAP levels increased in most cases, which indicates a developed compensatory response of the organism. Depending on the dose of mustard and time after exposure, we observed changes in the histopathological picture. The lung tissue appeared to be the most sensitive, while the kidneys seemed the most resistant to the mustard gas effects. The results of the diploma thesis show that mustard induces dose- and time-dependent changes in the parameters of oxidative stress and histopathological picture in the liver, lung and kidney tissue of mice after percutaneous intoxication. C57BL/6J mice appear to be a suitable model for further experimental research.

