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Study of the effect of cadmium, lead, zinc salts on the rat blood cells

Abstract. Changes were detected in the blood of rats caused by heavy metal compounds. The results show that the salts of heavy metals poisoning demonstrates in damage in the blood cells in the animal body and making weaker their immunity. As a result, various changes occur in animals. In addition, material was collected on immune depressive exposure to heavy metals in the body of rats 25, 50, 75, 100 times more compounds of zinc ions, lead and cadmium. Animal disorders were observed in the nervous system, including tearing, inflammation conjunctive sac and certain groups even with bleeding. Leukogram, which was made by the blood of rats, showed that the poisoning caused by the impact of three types of heavy salts, has led to significant changes in the health and behavior of the animals. When increasing by 100 times more poisoning three compound salts in animal organisms have been found strong signs of poisoning, finally, all experimental rats died within 5-6 days. It is important to note, animals poisoned by 75-100 times the maximum permissible concentration of heavy metal salts of the three compound salts have died. Leukogram of experimental rats showed that, in the blood of rats, poisoned by three salts, during neutrophilia and lymphopenia, leukopenia was found. Neutrophils are characterized by granulated toxicity and gipersigmatic core.

Key words: Rats, blood, neytrofil, heavy metals, leykogramma.

Introduction

Today the decrease and destruction of immune system of an organism are considered as important problems of modern physiology. In scientific-technical and industrial century, the increase of man-made and heavy metals exposure has an influence on psychological health of human. The response of an organism to environment's adverse factors is its increased defensive reaction and as a result changes of blood immunological indexes can be seen in physiological tendency of an organism [1; 2]. In a time of stress blood's leukogram and leukocytal index changes at one definite range that depends on organism's immunological demands [3; 4].

When affected by heavy metals human and animal organisms' adaptive abilities are decreased and organism's protective system is exhausted and weakened by exerting pressure on and disturbing organism's vital functional systems. To restore the individual and cumulative impacts of negative factors of metals such as zinc, lead and cadmium, the search for new biologically active compounds that determine the cellular mechanisms of immune-boosting properties and effects on the body is the basis for the research work. Industrial

development of economy and agricultural chemistry led to a sharp increase in the number of transport vehicles in big cities in recent years and which overall leads to environmental pollution. Not only the production of chemical substances harm human body, but everyday use of household chemicals increase the risk of harm to human health [5].

In many countries, including Kazakhstan, the increased industrial development neglects the responsibility to nature protection and wastes like toxins, heavy metals, pesticides and other harmful substances lead to the environmental pollution. Adverse climatic factors interact with chemicals and further enhance the strength of their insalubrities [6; 7].

Many chronic diseases are considered to be the result of the negative influence of environmental factors on the human body. The occurrence of disease is due to decreased activity of immune system [8; 9].

If allowed concentration is increased, it may produce toxic effects in human and animal body. In all cases, when heavy metals enter the body of an organism it leads to development of various pathologies, gives rise to a distortion of defensive system, which leads to a decrease of organism's functional structures [10].

Leukograms of rats before and after poisoning with zinc, lead, cadmium salts were compared with each other, where at the beginning number medullo-cells was 0.5% but after it is increased up to 15% ($p < 0.001$) (Fig. 1, 2), the same with core segment neutrophils, which before poisoning were 23.5% and after increased up to 30% ($p < 0.01$), no immature neutrophils in peripheral blood were observed (Fig. 2).

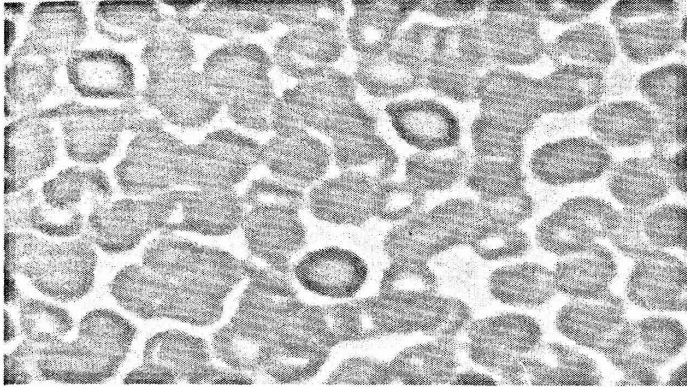


Figure 1 – Lymphocytes before poisoning

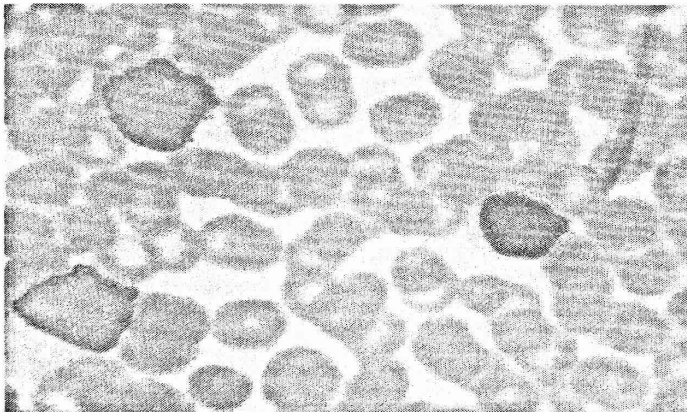


Figure 2 – Medullo-cells after poisoning with zinc, lead, and cadmium salts

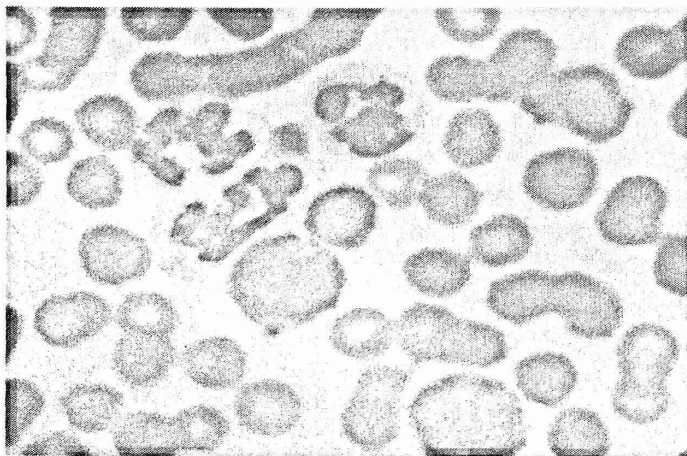


Figure 3 – Core segment neutrophils and monocytes after poisoning with zinc, lead, and cadmium salts

Therefore, cadmium salt decreases the number of lymphocytes, increases the number of immature lymphocytes and reduces activity of the immune system.

To conclude, zinc, lead and cadmium ions concentrations of 25, 50, 75, 100 times ACL hugely impact on immune system of rats which have an immunosuppressive effect on animals.

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