

SPENT LITHIUM ION BATTERIES AS A SOURCE OF INCOMING OF LITHIUM AND HEAVY METALS IN HUMANS AND ANIMALS BODIES

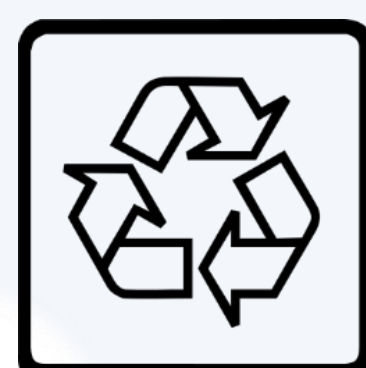
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Introduction

Lithium is the lightest alkali metal of the periodic table of chemical elements. In recent decades, lithium has been widely used for the production of lithium ion batteries, along with heavy metals such as copper, cobalt, nickel, manganese, cadmium, lead and others. Lithium - is an essential microelement with a wide range of biological and medical effects. It has a physiological effects if the concentration in the blood plasma from 0,14 to 1,4 mmol/l and pharmacological effects if the concentration more than 1 mmol/l. If the concentration of lithium more than 2 mmol/l the toxic effects are present. Blood lithium levels above 3,5 mmol/l are fatal. The most serious pathology of the effect of lithium is the progression of renal failure to the terminal stage. Lithium causes calciuria, phosphaturia and a decrease of phosphorus in blood serum.



Li-ion



Methods

The studies were conducting on male rats' intact and experimental groups of adult age, of six individuals in each. In the standard drinking water of the experimental group, a solution of lithium citrate was added to the lithium ions content of 10 mg/L. The samples of the organs and tissues were withdrawn to determine the sodium, potassium, calcium, magnesium and lithium content further. The contents of the macroelements were determined in an oxidative flame of acetylene-air on the atomic absorption spectrophotometer S-115 M1 (JSC "Selmi", Ukraine) in emission and absorption modes. The concentrations of the microelements were determined on a CAS 120.1 atomic absorption complex (JSC "Selmi", Ukraine) with deuterium background correction. The analytical wavelengths: Li – 670.8 nm, Na – 589.0 nm, K – 769.9 nm, Ca – 422.7 nm, Mg – 285.2 nm were used. Spectral measurement conditions and temperature-time modes for all elements were standard.

Results

Results of the studies showed a significant increase in the level of lithium in serum, kidneys, brain, wool, femur bone, liver. Significant changes in the content and ratio of potassium, sodium, calcium and magnesium in the organs and tissues of experimental animals were shown compared with the intact group. Samples of organs were selected for histological examination of the influence of lithium salts on the macro and microscopic structure of tissues and organs. The high content of lithium ions in the organs and tissues of animals can be explained by the high permeability of lithium ions through the biological membranes. Such changes in macronutrients contents can cause disruption of biochemical processes and the functioning of vital organs and systems. First of all, it are kidney, brain, thyroid gland, liver.



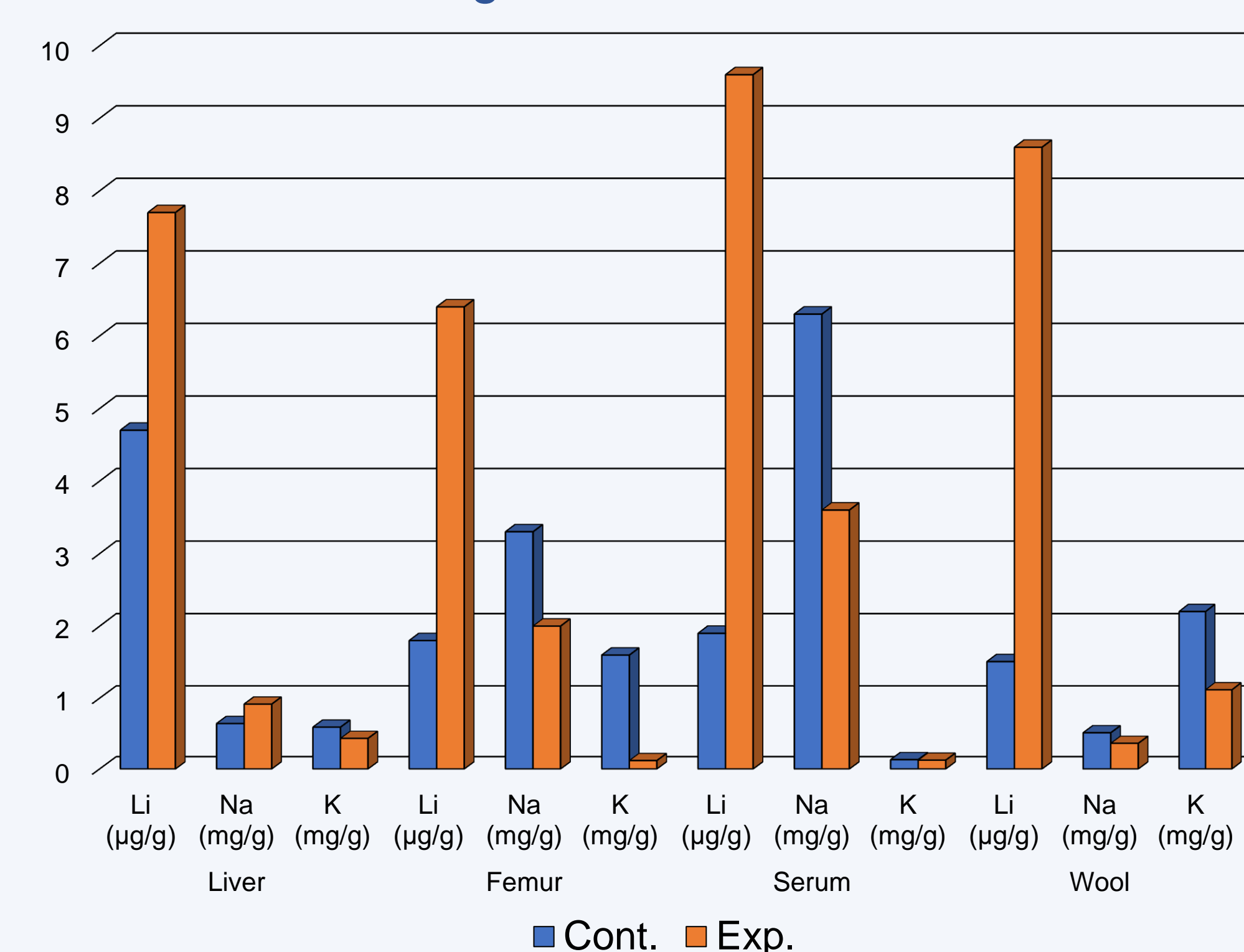
Discussion

This work is devoted to the study of lithium-ion batteries as one of the ways in which excess lithium is supplied into human. The applied purpose of work was to study the content of macro and microelements of organs and tissues of adult rats under the influence of lithium salt solution. Lithium salts were added to the drinking water of rats. After withdrawal from the experiment, the content of macro and microelements in the tissues and organs of rats was determined by atomic absorption and atomic emission spectrometry. Studies have shown that lithium quickly penetrates tissues and organs. It change the content and ratio of the body's major electrolytes: potassium, sodium, calcium and magnesium, which can lead to disruption of biochemical processes and diseases.

Conclusion

Thus, the strong influence of lithium ions on the content and ratio of major electrolytes was revealed. Increased concentrations of lithium were found in all tissues and organs that were examined. Further studies will focus on histological examination of the specimens obtained. Studies will be conducted regarding the monitoring of lithium content in environmental objects: soil, reservoir water, drinking water, plants and their residues, humus.

Lithium, sodium and potassium content in organs and tissues



References

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