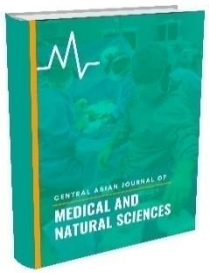
CENTRAL ASIAN JOURNAL OF MEDICAL AND NATURAL SCIENCES



Volume: 03 Issue: 02 | Mar-Apr 2022 ISSN: 2660-4159

http://cajmns.centralasianstudies.org

Amounts of Lead Salts Dispersion from Heavy Metal Salts

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Received 19th Jan 2022,
Accepted 10th Feb 2022,
Online 5th Mar 2022

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Abstract: Heavy metals, due to their migratory ability, tendency to bioaccumulation, specific toxic effects, getting into feed and food, worsen their sanitary qualities, and when contained above permissible levels, they pose a danger to animal and human health.

In this articles highlights of amounts of lead salts dispersion from heavy metal salts.

Keywords: heavy metal, salt, lead, chemistry, food, environmental pollution, animal and human health.

The problem of environmental pollution is one of the most acute global environmental problems of our time. It is no exaggeration to say that the fate of humanity depends on the solution of this problem. Among the wide variety of environmental factors affecting the human body, the leading place is occupied by heavy metals, which mainly enter the environment as a result of human activity. Heavy metals include mercury, lead, cadmium, cobalt, copper, zinc, and iron. Among chemical pollutants, heavy metals are considered as a factor bearing severe environmental and biological consequences.

Compounds of heavy metals with high toxicity to living organisms are not destroyed in soil, water, plants and animals. They can persist for a long time in environmental objects, migrate, accumulate in the human body and animals, causing changes in organs and tissues and causing irreparable harm to health. Many heavy metals and their compounds, in addition to toxic effects, have carcinogenic and mutagenic effects and cause serious long-term consequences. Among these compounds, lead occupies one of the first places.

Lead, as a potentially dangerous toxicant, belongs to substances of the first hazard class and its content in food, drinking water, atmospheric air, etc. is strictly regulated. It is listed as a priority pollutant by a number of international organizations, including WHO and UNEP (2004). In many countries of the world (Russia, USA, Germany, Denmark, Australia, Mexico, Thailand, etc.), national programs have been developed to reduce environmental pollution with lead and limit its negative impact on the health of the child population. Lead can cause a number of health disorders even in low concentrations: immune, neuropsychiatric, hematological, etc.

Due to the widespread occurrence of lead pollution, almost the entire population is at risk of exposure to it, regardless of socio-economic status, race and ethnicity, or place of residence (rural area, city or suburb). Chronic lead poisoning poses a threat, first of all, to the health and mental development of the younger generation and thereby to the future of all mankind. The increased attention to this problem is due to the fact that it has moved from the professional plane to the ecopathological one, due to the global spread of lead.

Waste and by-products of production, pesticides, waste water, slags, ash and gases, waste from transport, heavy industry, mechanical engineering, instrumentation, heat and power plants, contain a large amount of heavy metals, among which lead and cadmium are the most toxic.

The physiological effect of metals on the human body and animals is different and depends on the nature of the metal, the type of compound in which it exists in the natural environment, as well as its concentration. Many heavy metals exhibit pronounced complexing properties. Thus, in aqueous media, the ions of these metals are hydrated and are capable of forming various hydroxo-complexes, the composition of which depends on the acidity of the solution. If any anions or molecules of organic compounds are present in the solution, then the ions of these metals form various complexes of different structures and stability.

Among heavy metals, some are extremely necessary for the life support of humans and other living organisms and belong to the so-called biogenic elements. Others cause the opposite effect and, getting into a living organism, lead to its poisoning or death. These metals belong to the class of xenobiotics, that is, alien to the living. Environmental protection specialists have identified a priority group among toxic metals. It includes cadmium, copper, arsenic, nickel, mercury, lead, zinc and chromium as the most dangerous to human and animal health. Of these, mercury, lead and cadmium are the most toxic.

The main danger of toxic elements for the body is not in the manifestation of acute poisoning, but in their constant accumulation in organs and tissues throughout life. At the same time, pathological processes of varying severity occur in the organs and systems of the body, depending on the amount of heavy metal compounds that have entered it.

An increase in the concentration of heavy metals in the environment increases the number of inherited mutations. Mutants are subject to defects of physical and mental development. Of particular danger is the ability of lead and zinc to overcome the placental barrier, cause immunosuppression in the mother and fetus and have a teratogenic effect.

The works of domestic and foreign authors show the negative impact of these metals on the nervous, cardiovascular, endocrine and other body systems of experimental animals and exposed people.

It has been established that heavy metals can reduce the body's resistance to infections, increase the risk of developing oncological and autoimmune pathologies.

The enzymopathic effect plays an important role in the mechanism of action of lead. All lead compounds affect living organisms in a similar way, the difference in the strength of the toxic effect is due to the unequal solubility of various lead-containing compounds in biological fluids. Lead combines with sulfhydryl, carboxyl and amine groups of active centers. Lead intoxication has a noticeable effect on the synthesis of porphyrin, key enzymes of the liver, kidneys, and erythrocytes.

The ways in which lead enters the human body are as follows: inhaled, oral and trans-cut. Scientists believe that most of the lead enters the human body with food (from 40 to 70% in different countries and by different age groups), as well as with drinking water, atmospheric air, smoking, accidental ingestion of pieces of lead-containing paint or lead-contaminated soil into the esophagus.

An insignificant amount of lead comes from atmospheric air - only 1-2%, but most of the lead is absorbed in the human body. Lead, which comes from breathing, is 10-100 times more toxic than that which comes through the stomach. It enters the blood and connects with red blood cells, which leads to poisoning of the blood and the whole body. Thus, when one liter of fuel is burned, 200-400 milligrams of lead enter the air. But no matter how it enters the body, it is still deposited in the bone system.

In the drinking water of various countries of the world, the lead content varies between 1- 60 micrograms/l and in most European countries does not exceed 20 micrograms/l. A small amount of lead (0-0.3%) enters through the skin. The proportion of this route of entry increases when the skin is contaminated with lead nitrate, Lead is a competitive biometallic in relation to calcium and can displace it from selective binding sites with phosphate, carboxyl and sulfate ligands in tissues and on cell membranes, realizing its damaging effect through a violation of passive calcium transport. Affects all internal organs, including the kidneys. Against the background of prolonged contact with lead, disorders of the functional state of the kidneys develop, ending in irreversible chronic nephropathy.

Elevated levels of lead in the blood are particularly dangerous for pregnant women, since lead freely penetrates through the placenta, having a toxic effect on the fetus. Lead accumulated in bone tissues in childhood is released back into the blood during pregnancy, threatening the health of the mother and child.

According to the results of official statistics, lead takes the first place among professional intoxications. Among the workers affected by lead exposure, about 40% are women. According to the scientific literature in the surveyed cities with metallurgical production, women have increased the number of cases of infertility, spontaneous abortions, toxicosis, stillbirth and the birth of children with deformities: defects in the development of the bone and joint system, congenital heart defects, etc. The frequency of congenital malformations is higher among children whose parents work at metallurgical plants.

The data on the effect of xenobiotics on the reproductive system of mammals attract the most attention. The analysis of sources on a certain topic revealed a rather insignificant number of works devoted to the study of the influence of lead acetate, heavy metal salts on reproductive function. In experiments on guinea pigs when injecting females with water a solution of lead acetate at a dose of 50 mg / kg daily for 25 days revealed structural changes in the ovaries (degenerative atresia of primordial and growing follicles, the formation of large, functionally active yellow bodies or rare in the regression stage, the formation of cysts).

The introduction of lead solders to female rats intragastrically at a dosage of 25 and 250 mg / kg during 1 month before pregnancy and the first 12 days of pregnancy caused a violation of the estrous cycle. The introduction of solder in the amount of 250 mg / kg reduced the ability to fertilize. Intratracheal administration of solder aerosol in various dosages led to degenerative-dystrophic changes in the tubular and glomerular apparatus of the kidneys (lead-cadmium solders), osteoporosis (lead-cadmium solders) and bone sclerosis (lead-tin solders), disruption of the estrous cycle and increased processes of atresia in the ovaries in females, a decrease in the mass of the appendages of the testis and prostate gland in males.

The analysis of scientific literature showed that in the experiment, lead at a concentration of 0.1 mg/m3 caused a change in the structure of the ovaries in females and a decrease in the viability of their offspring, and at a concentration of 1.0 mg/m3 - a decrease in the number of spermatogonies and an increase in the number of pathological spermatozoa in males.

When lead and cadmium were added to the semi-synthetic diet in the ovaries of rats, fullness, interstitial edema detected, cyst-like structures were found in the organ, and an active process of follicle atresia was underway. In the process of atresia occurring in the follicles, luteinization of follicular epithelial cells is observed - the formation of lutein-like cells. The described changes with follicles occur against the background of the predominant number of yellow bodies in the organ.

A group of Belarusian researchers conducted a number of experiments on the effect of lead acetate on the organs of the reproductive and sympatho-adrenal system of guinea pigs. When studying the ovaries of experimental animals, it was noticed that the reaction of the gonads to lead seed at a dose of 50

mg/kg was not the same. In the 1st group of animals, more numerous (70%), during histological examination of the ovaries against the background of the usual, unchanged picture of the microscopic structure of the cortical layer, a tendency to cyst formation and proliferation of connective tissue structures was observed. The wall of cysts, due to the rejection of the follicular epithelium and the death of cells, is formed by a single layer of inactive cells. Yellow bodies in the ovaries of this group were rare, mainly at the stage of regression.

In the second group, the predominance of degenerative atresia of primordial and growing follicles was determined, which indicated suppression

potential reserve of the generative function of the organ. In the ovaries of some animals of this group, large, functionally active yellow bodies, luteinization of interstitial tissue cells were determined. At a dose of 10 mg/kg in the ovary, scientists identified a large number of atretic bodies with compensatory hypertrophy of the tissue, yellow bodies with delayed regression, i.e. there were all morphological signs of a prolonged luteal phase.

It was concluded that with prolonged priming of the animal, there was a violation of the ovarian cycle, manifested in a prolonged luteal phase. Colpocytological studies also testified to this. However, the gland retained the potential for normalization of the cycle. At high doses, data indicating destructive pre-pathological changes (tendency to cyst formation) were obtained.

The effect of lead chloride on the gonads of male rats showed that with prolonged administration of lead to male rats at a dose of 0.006 mg / kg by the end of the 6th month of administration, a reduction in sperm motility time, a decrease in their resistance to 1% sodium chloride solution was determined.

There are experimental data in the scientific literature indicating the ability of lead to pass through the placental barrier. The permeability of the placental barrier is not a constant value during pregnancy. With a single seed of female white rats with lead nitrate in a dosage of 50 mg/ kg of lead at different stages of pregnancy, the largest amount of lead passes the placental barrier during the beginning of placentation (day 4 of pregnancy). The accumulation of this metal in the embryos of the experimental group exceeded the accumulation in the control group by 4 times. For a person, the possibility of lead penetration through the fetoplacental barrier may be indicated by an increase in its content in the blood and hair of newborns in areas of environmental distress. conclusions. Analysis of the scientific literature data on the subject showed that the influence of heavy metals and lead compounds leads to disruption of various organ systems and the reproductive system. The most frequently manifested consequences of exposure to heavy metals on the reproductive organs are degenerative atresia of primordial and growing follicles, the formation of large, functionally active yellow bodies or rare ones in the regression stage, the formation of cyst-like structures.

These studies were conducted using high and medium doses of heavy metals in experiments. Studies on the influence of low and ultra-low doses of metals, as close as possible to the natural background of their content in ecosystems, would look interesting.

Scientific literature data indicate a lack of information on the effect of heavy metals on reproductive function and ontogenesis, as well as the lack of data on the effect of low and ultra-low doses. Despite the developments of domestic and foreign scientists, not all aspects of the problem have been sufficiently investigated.

Despite the fact that the spectrum of research on this issue is widely represented in morphological and hygienic works, it is relevant to search for antagonists to heavy metals by their effect on reproductive function and embryogenesis.

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