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DEVELOPMENT OF CHEMICAL TOXICOLOGICAL ANALYSIS METHODS OF NITENPYRAM PESTICIDE

Mamatisakova G.A.

Andijan State Medical Institute

Abstract: The article covers the section of toxicological chemistry concerning the determination of pesticides in biological objects. The article reflects information on the pharmacotoxicokinetic characteristics, toxicology, physicochemical properties of the most common pesticides and their metabolites.

Keywords: chemistry, toxic, method, treatment, metabolic.

INTRODUCTION

The potential danger to wildlife and humans, the inevitability of pesticide circulation in the biosphere and, therefore, the contact of large numbers of people with it distinguish pesticides from other chemicals used by humans. Thousands of pesticides are available and widely used. Large stocks of obsolete pesticides that are no longer produced on an industrial scale are stored in warehouses and continue to be used. Pesticides undoubtedly pose a danger to the environment, humans and animals.

MATERIALS AND METHODS

Classification of pesticides by toxicity. Possessing pronounced biological activity, pesticides can have a toxic effect on the human and animal organism, which leads to impairment of human performance, illness and even death. The degree of toxicity depends on the route of entry of pesticides into the organism (inhalation, oral, percutaneous, etc.), on the individual characteristics of the organism (age, gender, heredity, etc.) and other factors [1].

RESULTS AND DISCUSSION

Persistence is very important for assessing the toxicity of pesticides. Pesticides are divided by their stability in the soil into very persistent, the decomposition period of which is more than 1 year, persistent - from 6 months to 1 year, moderately persistent - 1 - 6 months, slightly persistent - up to 1 month. The cumulation of pesticides in the body of humans and animals is characterized by the cumulation coefficient, which is determined by the ratio of the total dose of the drug causing the death of 50% of experimental animals with repeated administration, to the dose causing the death of 50% of animals with a single administration. If the cumulation coefficient is less than 1, the substance has super-cumulation, with a cumulation coefficient of 1 - 3 the substance has pronounced cumulation, with a coefficient of 3 - 5 - moderate, with a coefficient of more than 5 - weakly expressed cumulation. Different classes of pesticides have embryotoxicity, immunotoxicity, hepatotoxicity and other types of toxicity to a greater or lesser extent [2].

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To classify a pesticide into a particular hazard class, the property that determines its danger is primarily taken into account. This means that even a low-toxic substance that has carcinogenic or mutagenic properties can be classified as hazard class 1.

To select methods for determining pesticides, it is important to know their properties. In this case, classification by chemical structure is convenient. Depending on the chemical structure, pesticides are divided into two groups: inorganic (arsenic, thallium, copper and sulfur compounds) and organic (synthetic or biological). Organometallic compounds, such as alkylmercury fungicides, can be singled out separately. Most pesticides are organic compounds that are divided into classes and subclasses (organochlorine compounds (OCC), organophosphorus compounds (OPC), synthetic pyrethroids (SP), carbamates). Representatives of the same class, having a similar chemical structure, can have a multidirectional effect (belong to different groups by purpose), and have different toxic properties.

With improper use of equipment for dusting or spraying crops with pesticides and violation of personal hygiene rules when working with these pesticides, cases of both acute and chronic poisoning can be observed. Chronic poisoning is due to the high cumulative capacity of these drugs [3].

Acute pesticide poisoning can occur in mild, moderate, severe degrees.

Mild poisoning is characterized by moderate headache, dizziness, general weakness, malaise. When the poison enters through the upper respiratory tract, irritation of the mucous membranes (cough, lacrimation, sneezing) is observed; through the food canal - pain in the epigastric region, diarrhea, metallic taste in the mouth (as with poisoning with arsenic and mercury-containing drugs).

In moderate and severe poisoning, all symptoms are more pronounced. There is repeated vomiting, loss of consciousness, convulsions, coma, cardiac and respiratory failure.

Acute poisoning is characterized by an increase in body temperature to 38-40 ° C, leukocytosis with a shift in the leukocyte formula to the left, and an increase in ESR. Parenchymatous organs are also affected: the liver enlarges and hardens, kidney damage leads to albuminuria, the appearance of erythrocytes in the urine, oliguria, and anuria. Lung damage manifests itself as pulmonary edema, especially in cases of poisoning with phosphorus-containing drugs.

Fatalities from acute pesticide poisoning can be caused by paralysis of the respiratory center or cardiovascular system, kidney or lung damage.

With a favorable course of the pathological process from the nervous system, tremor of the hands is detected (especially in case of poisoning with mercury-containing pesticides), movement coordination disorder, pain in the limbs and paresthesia with impaired sensitivity in the area of the hands and feet, segmental motor and sensory disorders, and dysfunction of the pelvic organs.

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All of the above changes indicate the possibility of developing a clinical picture of encephalomyelopolyradiculoneuropathy type in case of pesticide poisoning.

Chronic pesticide poisoning for a long time is clinically manifested by functional and dynamic disorders from the nervous system in the form of vegetative-asthenic syndrome: decreased performance, insomnia, increased irritability, lability of blood pressure, hyperhidrosis, hyperreflexia, and other disorders [4].

Currently, the most widely used organomercury pesticides (ROM) in agriculture in our country are granozan and mercur-benzene. Distinctive features of all pesticides based on ROM are high fungicidal and bactericidal activity at low rates of drug consumption, as well as high toxicity for humans and warm-blooded animals. Only those in which one mercury atom is directly bonded to carbon atoms are true ROMs. Organic mercury derivatives differ from inorganic ones in that the reactions of mercury ions are masked in them: they do not precipitate yellow mercury oxide when exposed to alkalis, do not bind protein and do not immediately react with ammonium sulfide.

The volatility of ROM-based preparations varies. Ethyl mercuric chloride is the most dangerous in this regard.

Mercury preparations are insoluble or slightly soluble in water. Among the ROS, the most active in their fungicidal and bactericidal properties are compounds of the RHgX type, where R is a benzene ring with or without substituted groups, X is a hydroxyl (OH) or cyanide group or a halogen atom. In the latter case, the activity of the compounds increases from chlorine to iodine.

The biological action of ROS of the RHgX type is disproportionate to the percentage content of mercury. It depends on the structure of the radical and the acid residue X, and is also determined by a number of other factors.

The nature and severity of the biological action of ROS are determined by the changes they undergo upon contact with body fluids or tissues, as well as by the organs through which they are excreted and to what extent they are retained. Compounds of the RHgX type are more active than compounds of the R2Hg type. Organomercuric derivatives of the fatty series are, as a rule, more toxic than aromatic ones. A relationship is observed between the strength of the toxic effect and the nature of the attachment of organic residues to the mercury valence. The so-called symmetrical compounds, in which both valences are linked to carbon, are less toxic than compounds that have one bond with carbon and the other with hydroxyl-cyanogen-chlorine. This circumstance can be explained by the fact that symmetrical ROS are very stable. The toxic effect when they are introduced into the body is associated with the splitting off of one radical and its subsequent replacement with chlorine.

CONCLUSION

In case of poisoning, it is necessary to quickly determine the routes of penetration of the poison into the body. If pesticides have entered through the respiratory system (in the form of vapors, dust, small droplets), work should be stopped immediately, the victim should be taken from the poisoned area to fresh air, and the chest should be freed from tight clothing.

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If breathing weakens, the victim should be given ammonia to smell, and if breathing stops, artificial respiration should be performed.

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