

COMBINED EFFECT OF PESTICIDES ON THE CYTOGENETIC EFFECT

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Abstract: The genetic effect of pesticides is of no small importance for their combined effect on the body. Mature male laboratory mice were used in the experiments. The cytogenetic effect of pesticides was studied in the cells of the bone marrow and testicles using tests for accounting for a b e p p a t i o n of chromosomes in metaphase in bone marrow cells; micronuclei in polychromatophilic erythrocytes (PCE); aberrations of chromosomes in diakinesis - metaphase in testis cells.

Key words: genetic effect, pesticides, bone marrow, spermatocytes, chromosome aberrations, metaphase.

INTRODUCTION

When assessing the genetic effect of pesticides, their combined effect on the body is of no small importance, since several pesticides can enter the human body at the same time during the use and storage of drugs . Moreover, pesticides can produce an additive (summed), synergistic (intensification) and antagonistic (weakening) effect. However, in the literature, data on the genetic effect of pesticides in their combined exposure are very rare. [1] Based on this, in this work, the cytogenetic effect of magnesium chlorate (defoliant), fosalone (insecticide), and cotorane was studied. (herbicide).

MATERIALS AND METHODS

Mature male laboratory mice were used in the experiments. Animals were divided into 10 groups. First r p y p p a - control. Animals of the second, third and fourth groups were injected once separately with kotozan (330 mg/kg), fosalone (27 mg/kg) and magnesium chlorate (1745 mg/kg); animals of the fifth group - magnesium chlorate (1745 mg/kg) and fosalone (27 mg/kg) together once; the sixth group - three drugs together once; in experiments with the combined administration of drugs,

the ratio of the volume of drugs was 1:1. Animals of the seventh, eighth and ninth groups were repeatedly (within 3 months) injected with magnesium chlorate (52 mg/kg), cotoran (10 mg/kg), phosalone (0.8 mg/kg); the tenth animal - magnesium chlorate (52 mg/kg) and phosalone (0.8 mg/kg) together; the eleventh animal - together with magnesium chlorate (52 mg/kg); fosalone (0.8 mg/kg) and kotoran (10 mg/kg).

RESULTS

Data on the frequency of chromosome aberrations and the number of PChE with micronuclei in bone marrow cells of mice with separate and combined effects of kotoran, fosalone and magnesium chlorate with their single injection are given in Table. 1

Kotoran, fosalone and magnesium chlorate at a dose of $1/3 LD_{50}$, each with a separate single use, does not affect the genetic apparatus of mouse bone marrow cells. The frequency of xpo m oco m mutations (0.37; 0.35; 0.44%), as well as the number of PECs with micronuclei (1.14; 1.08; 0.83%) after the action of these pesticides were at the control level. Table 2 presents data on the frequency of chromosome aberrations and the number of PChE with micronuclei in bone marrow cells of mice after separate and combined action of kotoran, fosalone, and magnesium chlorate administered multiple times (within 3 months). With separate repeated administration of each pesticide, the frequency of chromosome aberration and the number of PChE with micronuclei increased by 6-7 times compared with the control. Such a frequency of chromosome aberrations and the number of PCEs with micronuclei were also observed in experiments in which animals were injected with combinations of two (magnesium chlorate + phosalone) and three (kotoran + fosalone + magnesium chlorate) pesticides in a ratio of 1:1.

Table 1. Chromosome aberration frequency and number of PChE with micronuclei in mouse bone marrow cells after separate and combined exposure to kotoran (330 ig/kg), phasalona (27 mg/kg) and magnesium chlorate (1745 mg/kg) with their simultaneous administered

Table 1

Options	Number studied		metaphase with rearrangements		perestroika	
	Animals	metaphase	number	%	Total	per 100 metaphases
Control	8	731	3	0.41 +0.78-0.32	82	0.91±0.10
Apart						
Kotoran	8	540	2	0.37+0.96-0.32	103	1.14+0.11
Fazalon	9	857	3	0.35+0.67-0.27	97	1.08+0.10
Magic chlorate	9	681	3	0.44+0.84-0.34	75	0.83±0.3
Combined						
Phasalona+chl . magnesium	7	454	2	0.44+1.14-0.38	78	0.87+0.10
Kotoran + fazalon + chl . magnesium	8	769	4	0.52+0.81-0.37	85	0.94±0.10

CONCLUSION

However, under the action of chemical mutagens, including pesticides with mutagenic properties, there is a “saturation limit” in the appearance of chromosome aberrations, i.e. with an increase in the dose, duration of action of pesticides and combinations of pesticides, the frequency of chromosome aberrations does not increase in the future, therefore, it is very difficult to characterize the dose dependence of the appearance of chromosome aberrations in combination.

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