# Cytogenetic Effect of the Actellic Insecticide on Bone Marrow Cells by Muscle

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**ABSTRACT**

*Studies of pesticides to determine their mutagenicity should be carried out with different dose levels, which are used in toxicology to determine the main parameters of toxicity and serve as starting data for the establishment of standards and the development of regulations for use. When testing pesticides for mutagenicity, as well as a necessary step is to determine the comparative sensitivity of somatic and generative cells[1,4].*

**KEYWORDS:** *chromosome rearrangements, structural mutations, mutations.*

It is known that the nature of mutations is largely determined by the conditions in which mutagenesis processes take place [3]. In some conditions, potential changes occurring in the DNA molecule may not turn into mutations, but the restoration of the original hereditary structures occurs. In this regard, experiments with changing conditions at the time and after the action of pesticides are important. High temperature is one of the mutagenesis modifiers capable of influencing the frequency of mutations caused by pesticides. In our work, the cytogenetic effect of aktellik in different doses and different temperature regimes was studied in bone marrow cells.

Cytogenetic activity of actellycus was studied at doses of 48, 96, 192, 384 and 786 mg/kg, respectively 1/25, 1/12, 1/6, 1/3 and close to LD50. As the data show, low doses of aktellik do not affect the genetic apparatus of bone marrow cells in mice. Table 1. In this regard, the frequency of chromosome rearrangements after administration of doses of the drug: 48, 96, 192, 384 mg / kg remained approximately at the control level of 0.7, 0.6, and 0.5, respectively.

*Table 1.* The frequency of chromosome aberration in the bone marrow cells of mice with a single action of different doses of aktellik at a temperature of 18-200 degrees

| Dose mg/kg | Number of studied | | Metaphases with perestroika | | Perestroika | |
|---|---|---|---|---|---|---|
| | animals | metaphase | number | % | in total | 100 metaphases |
| Control | 11 | 1040 | 5 | 0,5 | 5 | 0,5 |
| 48 1/25 | 9 | 1036 | 7 | 0,7 | 7 | 0,7 |
| 96 1/12 | 13 | 942 | 6 | 0,6 | 6 | 0,6 |
| 192 1/6 | 10 | 1020 | 5 | 0,5 | 5 | 0,5 |
| 384 1/3 | 12 | 952 | 5 | 0,5 | 5 | 0,5 |
| 768 is close to 1050 | 11 | 956 | 28 | 2,9 | 32 | 3,3 |
| 1000 | 9 | 979 | 29 | 3 | 33 | 0,4 |

The number of chromosome rearrangements significantly increased after administration of high doses of the drug. So at a dose of 768 mg / kg, it increased 6 times. However, with further increases in the doses of acetylic, an increase in the number of chromosome rearrangements was not observed, and even a higher dose, such as 1000 mg/kg, caused approximately as many chromosome rearrangements (30%) as the dose of 768 mg/kg (2.9%).

In the bone marrow cells of animals that were placed in conditions with high air temperature (37-38 degrees) immediately after the introduction of acetylic at a dose of 48 and 96 mg/ kg, the frequency of chromosome rearrangements remained approximately at the control level of 0.5 and 0.6%, respectively. However, after the introduction of higher doses of acetylic, where the animals were placed in air temperature conditions (37-38 degrees), an increase in the number of chromosome aberrations was noted in bone marrow cells (Table 2).

*Table 2.* The frequency of chromosome aberrations in the bone marrow cells of mice after a single action of different doses of actellik at a temperature of 37-380 degrees

| Dose mg/kg | Number of studied | | Metaphases with perestroika | | Perestroika | |
|---|---|---|---|---|---|---|
| | animals | metaphase | number | % | | |
| Control | 7 | 964 | 5 | 0,5 | 5 | 0,5 |
| 48 | 9 | 929 | 5 | 0,5 | 5 | 0,5 |
| 96 | 8 | 971 | 6 | 0,6 | 6 | 0,6 |
| 192 | 10 | 1038 | 17 | 1,63 | 17 | 1,6 |
| 384 | 9 | 1036 | 33 | 3,2 | 37 | 3,6 |
| 768 | 10 | 1141 | 37 | 3,2 | 42 | 3,7 |

Thus, the doses of acetylic 192 and 384 mg / kg at a normal temperature of 18-20 degrees did not cause chromosome mutations in the bone marrow cells of mice, and in experiments where, after the introduction of these doses, animals were placed in high temperature conditions (37-38 degrees), an increase in the frequency of chromosome aberration was noted by 3 (1.6%) and 6 times (3.2%) compared to the control. And at a higher dose of acetylic, such as 768 mg/kg, the number of chromosome mutations (3.2%) did not increase, compared with a dose of 384 mg/ kg (3.2%).

Data on the frequency of chromosome aberrations in mouse bone marrow cells with a single exposure to acetylic, depending on the temperature regime, are shown in Table 3.

It was found that acetylic at a dose of 384 mg/ kg did not have a cytogenetic effect on animal cells under normal temperature conditions (18-200C), the frequency of chromosome rearrangements remained at the control level. (0.5%).

In the bone marrow cells of mice that were placed in conditions with high air temperature (37-38 ° C) immediately after the introduction of acetylic, the frequency of chromosome rearrangements (2.7%) increased 5 times compared to the experiment in which the mice were injected with acetylic at normal temperature. The number of chromosome aberrations (0.9%) in mice that underwent the effect of high temperature an hour after administration of the drug was almost 3 times less than in the experiment, where the animals were transferred in conditions with high air temperature (37 ° C) immediately after the introduction of acetylic. In an experiment in which the animals were injected with acetylic, and after 2 hours they were operated with a high temperature (37-38 ° C), the frequency of chromosome aberration (0.6%) almost did not differ from the control indicators (0.5%). The frequency of chromosome aberration (0.5-0.6%) also remained at the control level (0.5-0.4%) in animals transferred in conditions with high temperature 4 and 8 hours after the introduction of acetylic.

Thus, under normal temperature conditions, aktellik (384 mg / kg) with a single injection does not affect the genetic apparatus of somatic cells, as evidenced by the frequency of chromosome rearrangements in bone marrow cells, which are at the control level. However, in conditions of high temperature (37-38 ° C), this pesticide caused 6 times more rearrangements of chromosomes in bone marrow cells compared to normal conditions. (table 3).

The increase in the frequency of structural mutations of chromosomes at high temperature can be explained by the fact that, under normal conditions, potential changes that occur under the action of an acetylic do not turn into structural mutations and are restored, and at high temperature, part of them turns into a mutation.

The cytogenetic effect of acetylic decreases by 2 times (0.91%) if the animals were in a high-temperature environment only for an hour after its administration compared with immediate temperature exposure (2.5%), 2 hours after the introduction of acetylic, high temperature had almost no effect on the appearance of structural mutations. This indicates that the potential ruptures that occur during the action of the acetylic were obviously fully restored in 2 hours.

*Table 3.* The frequency of chromosome aberrations in the bone marrow cells of mice with a single administration of actellic (384 mg / kg), depending on the temperature regime.

| Option | Number | | Metaphases with perestroika | | Perestroika | |
|---|---|---|---|---|---|---|
| | Animals | Metaphase | Number | % | Total | 100 metaphases |
| Control 18-20 | 9 | 982 | 5 | 0,5 | 5 | 0,5 |
| Actellik 18-20 | 11 | 1126 | 6 | 0,5 | 6 | 0,5 |
| Actelliknemed. 37-38 | 9 | 1204 | 32 | 2,7 | 35 | 2,9 |
| Actellik via. 1 hour 37-38 | 10 | 976 | 9 | 0,9 | 9 | 0,9 |
| Actellik via. 2 hours 37-38 | 9 | 920 | 6 | 0,7 | 6 | 0,7 |
| Actellik via. 4 hours 37-38 | 10 | 996 | 5 | 0,5 | 5 | 0,5 |
| Actellik via 8 hours 37-38 | 8 | 871 | 5 | 0,6 | 5 | 0,6 |

Notes *- differences relative to the control group data are significant (+++ _p<0.001)

Data on the frequency of chromosome aberrations in mouse bone marrow cells with repeated exposure to actellik (12 mg / kg) at high temperature (37-38 ° C) is presented in Table 4. When actellik is active for 30 days in bone marrow cells in animals kept at high temperature (37-38 ° C), the frequency of the aberration was (1.5%) and was 3 times more than the control (0.5%). In experimental animals that received the cell for 60 days, 8 times more chromosome aberrations were noted in bone marrow cells (3.94%) compared to the control (0.5%), and in animals that received the cell for 90 days, the same number of chromosome aberrations (4.5%) was noted in bone marrow cells as in in an experiment where animals received actellic within 60 days (3.9%), i.e. there was no further increase in the number of chromosome mutations with an elongation of the time of receipt of the pesticide into the body.

The data obtained indicate that the cytogenetic effect of actellik on bone marrow cells manifests itself with its repeated exposure. It should also be noted that the cytogenetic effect of actellik

increases when it acts at a high temperature (37-38 ° C) compared to the usual (18-20 ° C). Apparently, at high temperature, conditions are created for the transformation of potential changes arising from the action of the mutagen into structural mutations. Probably, gradual adaptation took place in a high-temperature environment, that is, adaptation, which ensured the normal operation of the repair system, or the actellik effect is associated with the level of activity of the functional state of the organism at the time of the actellik action, so it did not affect the frequency of structural mutations of chromosomes in the bone marrow cells of mice that were in high-temperature mode for 30, 60 and 90 days.

*Table 4.* The frequency of chromosome aberrations in the bone marrow cells of muscle with repeated (30, 60, 90 days) actellic action at a temperature of (37-38 ° C)

| Option | Number of studied | | Metaphases with perestroika | | Perestroika | |
|---|---|---|---|---|---|---|
| | Animals | Metaphase | Number | % | Total | 100 metaphases |
| Control | 8 | 780 | 4 | | 4 | |
| Actellik (30 days) | 6 | 820 | 13 | | 13 | |
| Actellik (60 days) | 9 | 910 | 37 | | 43 | |
| Actellik (90 days) | 7 | 834 | 38 | | 46 | |

Notes *- differences relative to the control group data are significant (+++ _p<0.001)

**Literatures:**

1. The effect of high temperature on the cytogenetic effect of aktellik. Shermurodov A.R., Khalikov P.H., Kurbanov A.K. Modern Biology: Topical Issues November 14-15, 2014, St. Petersburg, Russia.
2. Taskhodjaev P.I., Khalikov P.H., Kurbanov A.K., Sharofitdinkhodjaev N.S. 2005. Study of the cytogenetic effect of pesticides under various temperature conditions. Avicenna. 1-2: 35.
3. Shermurodov A.R., Khalikov P.H., Kurbanov A.K., Mirtolipova M.A., Kushaliev. The state of testicular cells under the action of the actellic insecticide. Journal of Theoretical and Clinical Medicine. 2015. № 6.