CHRONIC EXPOSURE TO GLYPHOSATE-BASED HERBICIDE CAUSES GENOTOXICITY IN RATS

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Introduction

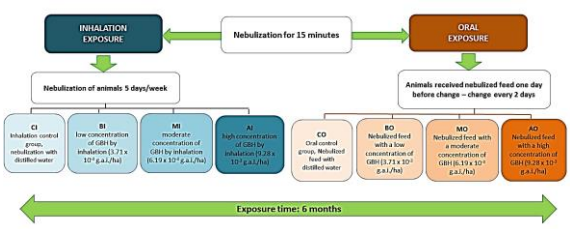
Glyphosate-based herbicides (GBH) are the most used in crops in Brazil and worldwide. The population is generally exposed to GBH by residing near sprayed areas, for domestic use and for food.

Although there are several studies that have evaluated the genotoxic potential of GBH over the years, there is a consensus that these herbicides currently marketed have a highly variable composition, which makes the systematic evaluation of these GBH important for greater protection against potential chronic adverse effects caused to humans.

The aim of this study was to evaluate the genotoxicity of chronic oral and inhalation exposure to the herbicide glyphosate in rats.

Methods

Eighty-eight adult male albino Wistar rats were divided into nine groups:



Positive control (PC), whose animals received cyclophosphamide in a single dose on the first day of the experiment and were euthanized 24 hours later. Bone marrow cells were collected for the micronucleus test and for the Comet assay.

Results

The median of micronuclei in the inhaled and oral control groups was 0, in the BI group 4.5, in the BO of 1.5, in the MI of 5, in the MO of 1, in the AI of 5, in the AO of 3, and in the positive control group of 9. There was a difference between the studied groups ($p < 0.0001$).

Regarding the route of exposure, the animals exposed by inhalation had a higher number of micronuclei than those exposed orally ($p < 0.0001$).

In the comet assay, while the control groups had a higher number of cells with damage class 0, the animals exposed to GBH had a greater number of cells with damage class 4, especially those exposed to high concentrations ($p<0.05$).

Results

Micronucleus test

Figure 1 - Polychromatic erythrocyte (circle) with micronucleus (arrow). Animal in the low inhalation concentration group. Giemsa, 400x magnification.

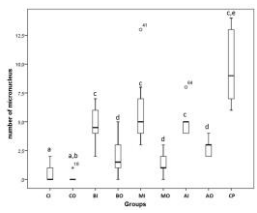


Figure 2 - Median and interquartile range of micronuclei per study group (n=88). a x c; b x d; d x e: $p < 0.0001$ (Dunn's test). °,*: outlier and animal number.

Comet assay

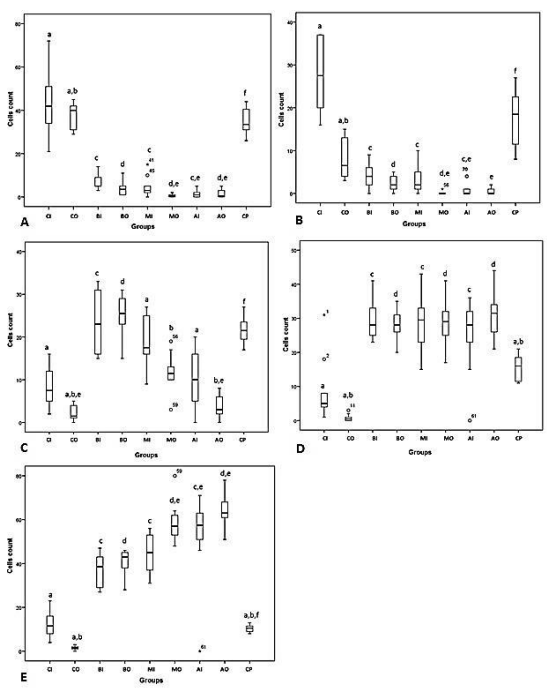


Figure 3 - Cell counts at the Comet assay (median and interquartile range): A - Cells with a score of 0 in each study group (a x c; b x d; e x f: p-value <0.0001 - Dunn's test). B - Cells with score 1 in each study group (a x c; b x d; b, e x f: p value <0.0001 - Dunn's test). C - Cells with score 2 in each study group (a x c; b x d; e x f: p value <0.0001 - Dunn's test). D - Cells with score 3 in each study group (a x c; b x d: p-value <0.0001 - Dunn's test). E - Cells with score 4 in each study group (a x c; b x d; e x f: p value <0.0001 - Dunn's test). °,*: outlier and animal number.

Conclusions

Under the conditions of exposure performed, we concluded that chronic inhalation exposure to GBH leads to greater formation of micronuclei, and exposures to higher concentrations present greater damage to a single cell, as evidenced by the comet assay.

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Contato

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