proceedings

Abstract

Thiram Effects on HeLa TI Cells †

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† Presented at the 1st International Electronic Conference on Toxics, 20–22 March 2024; Available online: https://sciforum.net/event/IECTO2024.

Keywords: thiram; pesticide; HeLa TI cells; DNA damage; colony formation; proliferation; epigenetic activity

Citation: Maksimova, V.; Bukina, A.; Khayrieva, G.; Popova, V.; Yakubovskaya, M.; Kirsanov, K. Thiram Effects on HeLa TI Cells. *Proceedings* **2024**, *102*, 35. https://doi.org/10.3390/proceedings2024102035

Academic Editor: Yankai Xia

Published: 3 April 2024

1. Introduction

Dithiocarbamate pesticides possess a diverse array of molecular mechanisms, making them multifunctional substances. Among the commonly used dithiocarbamates, there is the fungicide thiram, employed for safeguarding plants and seeds against fungal diseases. The limited solubility of thiram in water facilitates its accumulation in the soil, thereby raising concerns about its potential impact on human health. Despite the widespread use of thiram, there is still a paucity of knowledge regarding its toxic effects on humans. This study aimed to assess the genotoxic effects of thiram, its influence on cell colony formation, and its effect on the expression profile of genes associated with proliferation and repair. Additionally, we conducted an analysis of thiram's integral epigenetic activity under different time exposures.

2. Materials and Methods

HeLa TI cells were used in this study. DNA damage was assessed using the DNA comet assay, while the clonogenic assay was utilized to evaluate the colony-forming ability of cells after thiram treatment. Gene expression levels were measured using real-time PCR. The epigenetic activity of thiram was assessed by quantifying the reactivation level of the epigenetically silenced GFP gene utilizing flow cytometry.

3. Results

Using HeLa TI cells, we observed that thiram significantly increased tail moment in the DNA comet assay and caused a significant decrease in cell survival as determined by the clonogenic assay. Additionally, thiram downregulated the gene expression levels of *DDB2*, *ERCC5*, *LIG4*, and *WEE1*, while upregulating the expression levels of *MCM2*, *DDIT3*, *ERCC3*, *JUN1*, and *ESR1*. The analysis of epigenetic activity revealed that thiram induced a statistically significant increase in the GFP+ cells amount after exposures of 24, 72, and 96 h.

4. Conclusions

Thus, thiram exhibits genotoxic and cytotoxic effects, influences the expression of proliferation and repair genes, and induces dose- and time-dependent epigenetic modifications in HeLa TI cells.

Supplementary Materials: The following are available online at https://www.mdpi.com/article/10.3390/proceedings2024102035/s1.

Author Contributions: Conceptualization, V.M., M.Y. and K.K.; methodology, V.M.; formal analysis, V.M., A.B., V.P. and G.K.; investigation, V.M., A.B., V.P. and G.K.; resources, K.K.; data curation, V.M.; writing—original draft preparation, V.M.; writing—review and editing, M.Y. and K.K.; visualization, V.M.; supervision, K.K.; project administration, V.M.; funding acquisition, V.M. All authors have read and agreed to the published version of the manuscript.

Funding: This research was funded by Russian Scientific Foundation, grant number 23-25-00541.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: Data available on request.

Conflicts of Interest: The authors declare no conflict of interest.