

EVALUATION OF THE TOXICOLOGICAL EFFECTS OF THE HERBICIDE TERBACIL ON ENERGETIC METABOLISM OF *DROSOPHILA MELANOGASTER*

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Introduction – Metabolism-associated fatty liver diseases (MAFLDs) are a global concern for public health because they affect ~30% of global population and no effective therapy is available. In addition, they have several etiologies, including the exposition to environmental contaminants such as pesticides. Among those chemicals, terbacil, an uracil-based pesticides, are largely used. Then, to address the physiological effects of the pesticides on liver health, *Drosophila melanogaster* has emerged as an important biotechnological tool for the study of human diseases, considering the homology of genes and metabolic pathways between the animal and humans. **Objective** – This study aims to use *D. melanogaster* as an alternative model for the study the effects of pesticide terbacil on the establishment of MAFLD. **Material and Methods** – For this study, eggs from *D. melanogaster* Canton-S strain were maintained on different diets: standard; high-fat diet (5% coconut oil); diets containing different concentrations of terbacil (5 nM, 500 nM, 5 µM) until the prepupae stage, which were collected and used in different analyses. The samples collected were used in biochemical analyses related to energy metabolism [triglycerides (TG) and glucose (GL)], mitochondria activity [lactate dehydrogenase enzyme (LDH) and reactive oxygen species production (ROS)], and gene expression analysis using RT-qPCR. **Results and Conclusion** – The analyses showed reduced LDH activity and increased ROS levels under all tested conditions versus control. These effects were stronger at 500 nM and 5 µM, with LDH activity decreasing by 74% and 64%, and ROS levels rising 47% and 48%, respectively, in the presence of bromacil. In addition, gene expression analysis revealed significant effects on key metabolic pathways, including oxidative stress, pyrimidine biosynthesis and clearance, epigenetic regulation, and detoxification. Among the detoxification genes, *ss* and *hr96*, orthologous to the human *AHR* and *PXR*, showed markedly reduced expression at 5 nM, with decreases of 61% and 68%, respectively, compared to the control. Thus, the results of this study demonstrated that the pesticide induced significant metabolic alterations in *D. melanogaster* prepupae, reinforcing the toxic potential of terbacil and the usefulness of *D. melanogaster* as a model for studies in environmental and metabolic toxicology.

Key words: *Drosophila melanogaster*; MAFLDs; environmental contaminants; terbacil; alternative animal model

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