

MODULATION OF microRNA EXPRESSION IN INDIVIDUALS OCCUPATIONALLY EXPOSED TO PESTICIDES: EVIDENCE OF THE POTENTIAL BIOMARKER MIR-1255B-5P

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INTRODUCTION: Brazil is one of the largest consumers of pesticides in the world, a direct result of the expansion of agribusiness. Chronic exposure to these compounds is associated with various adverse health effects, such as cancer and neurological diseases. However, the epigenetic mechanisms mediating these effects—particularly the modulation of microRNAs (miRNAs)—remain poorly understood. **OBJECTIVE:** To investigate the differential expression of miRNAs in individuals occupationally exposed to pesticides. **METHODS:** A total of 48 individuals were analyzed, including 32 occupationally exposed to pesticides and 16 non-exposed, matched by sex, age, smoking status, and alcohol consumption. Plasma miRNA expression was assessed using the NanoString nCounter® platform. **RESULTS:** Nineteen miRNAs were differentially expressed ($p < 0.01$) between exposed and non-exposed groups. Among them, ten showed a significant Odds Ratio (OR) in a Forest Plot analysis. After multiple linear regression, four miRNAs were selected based on adjusted R^2 and significant association with exposure, all with $AUC > 0.7$. The combined ROC analysis of these miRNAs yielded an AUC of 0.924. miR-1255b-5p stood out with an OR of 5, indicating that individuals with high expression of this miRNA are five times more likely to be exposed to pesticides. PCA analysis showed a trend of separation between exposed and non-exposed groups, reinforcing the role of miR-1255b-5p as a risk marker. Functional analyses (KEGG and Gene Ontology) revealed the involvement of this miRNA in cancer-related pathways. Moreover, data from the Comparative Toxicogenomics Database (CTD) showed a strong association between pesticides and the TERT gene, which is implicated in telomere maintenance and the development of prostate neoplasms. **CONCLUSION:** Chronic pesticide exposure modulates miRNA expression, contributing to cancer development. miR-1255b-5p emerges as a potential effect biomarker with applicability in exposure monitoring and risk assessment for pesticide-related diseases.