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Definitions

- **Epitranscriptome**: Chemical modifications on RNA that affect its function without changing the RNA sequence.

- **Aroclor 1260 (Ar1260)**: A mixture of polychlorinated biphenyls (PCBs) that are environmental pollutants.

- **Non-Alcoholic Fatty Liver Disease (NAFLD)**: A liver condition where fat builds up in the liver without alcohol use.

- **High-Fat Diet (HFD)**: A diet with high levels of fat, often used in research to study obesity and related conditions.

- **N6-methyladenosine (m6A)**: A common RNA modification that affects RNA stability and function.

- **Steatosis**: Accumulation of fat in the liver.

- **Fibrosis**: Formation of excess fibrous connective tissue in an organ.

Key Findings

- Long-term exposure to Aroclor 1260 (Ar1260) disrupts the liver's epitranscriptome in mice, leading to changes in RNA modifications.

- These changes are associated with liver conditions like NAFLD and steatohepatitis.

- The study identified specific RNA modifications that are altered by Ar1260 exposure.

- Both diet and chemical exposure influence the liver's epitranscriptome and related pathways.

Introduction

This study explores how long-term exposure to Aroclor 1260 (Ar1260), a type of polychlorinated biphenyl (PCB), affects the liver's RNA modifications in mice. The focus is on understanding the connection between environmental toxins, diet, and liver diseases such as non-alcoholic fatty liver disease (NAFLD).

Main Content

Background

Polychlorinated biphenyls (PCBs) like Aroclor 1260 are environmental pollutants that can disrupt endocrine and metabolic functions. They have been linked to obesity, type 2 diabetes, and NAFLD. Despite being banned, PCBs are still found in the environment and can affect human health.

Methods

- **Animal Model**: Male mice were fed a low-fat diet (LFD) and given a single dose of Ar1260. Their liver tissues were analyzed after 34 weeks.

- **RNA Analysis**: Researchers measured various RNA modifications using mass spectrometry and other biochemical techniques.

- **Histological Analysis**: Liver tissues were examined for signs of steatosis (fat buildup) and fibrosis (scarring).

Results

- **Body Composition**: Long-term exposure to Ar1260 did not significantly change body weight or liver weight in mice on a low-fat diet.

- **Liver Function**: Increased levels of AST (a liver enzyme) suggested liver injury. However, there was no significant change in cholesterol or triglycerides.

- **RNA Modifications**: Ar1260 exposure altered 12 specific RNA modifications, with most being reductions in methylation. These changes affected RNA stability and function.

- **Pathway Analysis**: The study identified pathways involving NRF2, a protein that helps protect against oxidative stress, which were disrupted by Ar1260 exposure.

Conclusion

Long-term exposure to the environmental pollutant Aroclor 1260 disrupts the liver's RNA modifications, leading to changes in gene expression and liver function. These changes are linked to liver diseases such as NAFLD. The study highlights the importance of understanding how environmental toxins and diet can interact to affect health. Further research is needed to explore these interactions and develop strategies to mitigate their impact on human health.

Word Count: 451