Hong, K. U., Doll, M. A., Lykoudi, A., Salazar-González, R. A., Habil, M. R., Walls, K. M., Bakr, A. F., Ghare, S. S., Barve, S. S., Arteel, G. E., & Hein, D. W. (2020). Acetylator genotype-dependent dyslipidemia in rats congenic for N-acetyltransferase 2. *Toxicology Reports*, *7*, 1319-1330. https://doi.org/10.1016/j.toxrep.2020.09.011

Definitions

- **N-acetyltransferase 2 (NAT2)**: An enzyme that helps process and detoxify certain chemicals.
- **Dyslipidemia**: An abnormal amount of lipids (fats) in the blood.
- **Genotype**: The genetic makeup of an individual.
- **High-fat diet (HFD)**: A diet high in fats, often used in research to study obesity and related conditions.
- **Oral glucose tolerance test (OGTT)**: A test to measure the body's ability to use glucose.
- **Insulin tolerance test (ITT)**: A test to measure how the body responds to insulin.

Key Findings

- Rapid acetylator rats are more prone to develop dyslipidemia compared to slow acetylator rats.
- High-fat diet leads to weight gain and changes in lipid profiles in both male and female rats.
- Rapid acetylator rats exhibit higher triglycerides, higher LDL, and lower HDL levels than slow acetylator rats.
- Differences in glucose tolerance and insulin sensitivity were observed between rapid and slow acetylator rats.

Introduction

This study investigates the relationship between acetylator genotype and metabolic health in rats. Specifically, it examines how a high-fat diet and genetic variations in the NAT2 enzyme affect body weight, glucose tolerance, insulin sensitivity, and lipid profiles.

Main Content

Background

N-acetyltransferase 2 (NAT2) is an enzyme involved in the detoxification of chemicals. Variations in the NAT2 gene can lead to differences in enzyme activity, categorizing individuals as rapid or slow acetylators. This study uses rats with different NAT2 genotypes to explore how these genetic differences impact metabolic health when subjected to a high-fat diet.

Methods

- **Animals**: Male and female rats with rapid and slow NAT2 genotypes.
- **Diets**: Rats were fed either a control diet (CD) or a high-fat diet (HFD) for 26 weeks.
- **Glucose Tolerance Tests**: OGTT and ITT were performed to assess glucose handling and insulin sensitivity.
- **Body and Liver Weights**: Measured before and after the diet period.
- **Plasma Lipid Profiles**: Measured triglycerides, total cholesterol, HDL, and LDL levels.

Results

- **Food and Calorie Intake**: Rats on the HFD consumed more calories than those on the CD.
- **Body and Liver Weights**: HFD led to increased body and liver weights, particularly in rapid acetylator rats.
- **Glucose Tolerance**: Rapid acetylator rats showed higher glucose levels and larger OGTT area-under-the-curve (AUC) values, indicating poorer glucose tolerance.
- **Insulin Sensitivity**: Rapid acetylator rats had lower insulin sensitivity, especially males on the HFD.
- **Lipid Profiles**: Rapid acetylator rats exhibited higher levels of triglycerides and LDL, and lower levels of HDL, leading to higher total cholesterol-to-HDL ratios.

Conclusion

The study found that NAT2 genotype significantly influences metabolic health in rats, with rapid acetylator rats being more prone to dyslipidemia and related metabolic issues. This suggests that individuals with certain NAT2 genotypes may be at higher risk for conditions like metabolic syndrome and cardiovascular disease. Further research is needed to explore these genetic impacts and develop targeted interventions.

Word Count: 452