Hardesty, J. E., Wahlang, B., Falkner, K. C., Shi, H., Jin, J., Zhou, Y., Wilkey, D. W., Merchant, M. L., Watson, C. T., Feng, W., Morris, A. J., Hennig, B., Prough, R. A., & Cave, M. C. (2019). Proteomic analysis reveals novel mechanisms by which polychlorinated biphenyls compromise the liver promoting diet-induced steatohepatitis. *Journal of Proteome Research*, *18*(4), 1582–1594. https://doi.org/10.1021/acs.jproteome.8b00886

Definitions

- **Polychlorinated biphenyls (PCBs)**: Man-made chemicals found in electrical equipment, paints, and building materials.
- **Proteomics**: The large-scale study of proteins, their structures, and functions.
- **Steatohepatitis**: A type of fatty liver disease that includes inflammation and liver cell damage.
- **Hepatic**: Relating to the liver.
- **Transcription factors**: Proteins that help turn specific genes on or off by binding to nearby DNA.

Key Findings

- PCBs negatively affect liver health, particularly when combined with a high-fat diet.
- PCBs reduce important liver protective responses and activate liver cells that can lead to fibrosis (scarring).
- PCBs disrupt normal liver protein functions and signaling pathways.

Introduction

This study investigates how polychlorinated biphenyls (PCBs), a type of chemical pollutant, affect liver health, especially when combined with a high-fat diet. PCBs are known to be harmful and have been linked to liver disease. The research focuses on understanding the specific mechanisms by which PCBs contribute to liver damage and disease.

Main Content

Background

PCBs are chemicals that do not break down easily and can accumulate in the environment and in the bodies of animals and humans. They have been found to cause various health problems, including liver disease. This study aims to understand how PCBs, especially when combined with a high-fat diet, cause liver damage.

Methods

- **Participants**: The study used archived liver samples from male mice.

- **Exposure**: Mice were exposed to a commercial PCB mixture (Aroclor 1260) and fed a high-fat diet for 12 weeks.
- **Analysis**:
    - Proteomic analysis was used to identify changes in liver proteins.
    - Pathway and transcription factor analysis were performed to understand the changes.
    - Validation studies confirmed key findings.

Results

- **Protein Changes**: PCBs caused changes in the levels of 1103 proteins in the liver, with significant upregulation and downregulation of various proteins.
- **Pathway Disruptions**: PCBs disrupted pathways related to liver metabolism, inflammation, and cytoskeletal remodeling.
- **Transcription Factors**: PCBs reduced the activity of transcription factors that protect the liver, such as NRF2 and HNF4α.
- **Liver Damage**: PCBs, especially when combined with a high-fat diet, led to increased liver cell death and fibrosis.

Conclusion

The study concludes that PCBs, particularly when combined with a high-fat diet, significantly harm liver health. They do this by disrupting important liver functions and protective responses, leading to inflammation, cell death, and fibrosis. These findings highlight the need for further research to fully understand the health impacts of PCBs and to develop strategies to mitigate these effects.

Word Count: 397