

1. Project title, Principal Investigator name, title and location where the research will take place

Principal Investigator: Louis Kwantwi

Title: “Evaluating Whether M64HCl Can Reverse Liver Injury Caused by the Toxic Metabolite of Tylenol in an In-Vitro Hepatic Cell Model.”

Institution: Northeast Ohio Medical University

Department: Biomedical Sciences

Location: NEOMED Biomedical Sciences Research Laboratories

2. Abstract of project

Acetaminophen (Tylenol) overdose causes liver injury when the drug is converted into a harmful metabolite that damages hepatocytes. This project uses a liver cell line to determine whether M64HCl can promote recovery after exposure to this toxic metabolite. By comparing cellular responses in injured cells treated with M64HCl versus untreated controls, the student will evaluate the compound’s potential protective or restorative effects. The project provides hands-on experience with cell-based injury models and introduces the student to how candidate compounds are assessed for therapeutic promise.

3. The significance of the overall research

Acetaminophen toxicity is one of the most common causes of acute liver failure. Identifying compounds that counteract injury from its toxic metabolite could improve patient outcomes and inform new therapeutic strategies. If M64HCl demonstrates beneficial effects in this model, the findings would support further mechanistic studies and contribute to efforts to understand and mitigate metabolite-driven hepatotoxicity.

4. The goals and objectives for the research project; what aspect of the overall research will be the focus of the student’s research experience? What is the specific research question being addressed by the research project?

- Assess whether metabolite-injured hepatocytes show reduced indicators of stress or damage when treated with M64HCl.
- Compare outcomes between injured cells with and without M64HCl exposure.
- Interpret whether any observed improvements suggest that M64HCl enhances recovery.

5. Research Methods

The project uses a liver-derived cell line to model toxic injury from the acetaminophen metabolite. The student will learn how cell lines are used as simplified systems for studying hepatocyte responses, how to interpret conceptual indicators of cellular injury or recovery, and how to compare results across conditions (injury alone vs. injury + M64HCl). All work follows established, supervised laboratory practices, with emphasis on data interpretation rather than technical optimization. Students will learn and use mammalian cell culture, Western blot, ELISA.

6. The proposed methods of data analysis

The student will evaluate differences in injury-related indicators across treatment groups, identify whether M64HCl-treated cells show signs of improved health, and apply basic statistical reasoning to interpret trends. The focus is on understanding biological meaning rather than complex analyses. T test, outlier tests, tests of normality, non-parametric tests if the data are not normally distributed will be used.

7. A statement of how the anticipated findings from the fellow contribute to the success of the overall research being investigated

This work will eventually contribute to an overall plan to apply to the FDA for human testing and lives saved.

Student Fellow Training/Mentoring Plan

Students will meet the PI at least 3x weekly and will participate as well in weekly 2-hour lab meetings of the Kwantwi/Liu/Basson lab group at which they will present their work and receive feedback from all three faculty. It is expected that the student will present their work at next year's Student Research Day and be mentored by Drs. Kwantwi and Basson in the preparation and rehearsal of this presentation. It is expected that the data that the student will generate will also be part of a publication on which the student will be a coauthor

Resources

Supervised access to cell-culture facilities, standard laboratory equipment, data-analysis tools, and mentoring from experienced research personnel.

Research Site:

All activities will be conducted in the **Biomedical Sciences Research Laboratories at NEOMED**, which provides a supportive environment for undergraduate research training.