

Need

Problem Statement and Users

- Novel biomaterial systems require proof of biocompatibility



Current Solutions:

Low complexity vs High cost, low throughput

Objective

Develop **cost-effective, high-throughput** toxicity assays using *Drosophila melanogaster* to test the **biocompatibility** of biomaterials.

Design Inputs

Constraints:

- Clinical relevance, low cost
- Known toxic and non-toxic verification biomaterials

Requirements

- Systemic Toxicity
- Reproductive Toxicity
- Oxidative Toxicity
- Cellular Toxicity

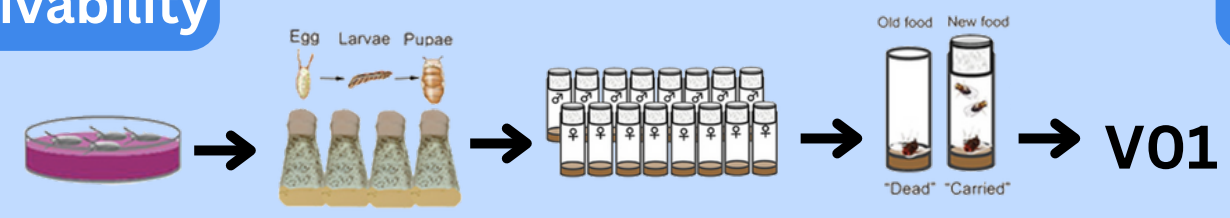
Quantification

- Drosophila* lifespan
- Hatchability ratio
- ROS concentration
- Dying cell quantity

Solution & Verification

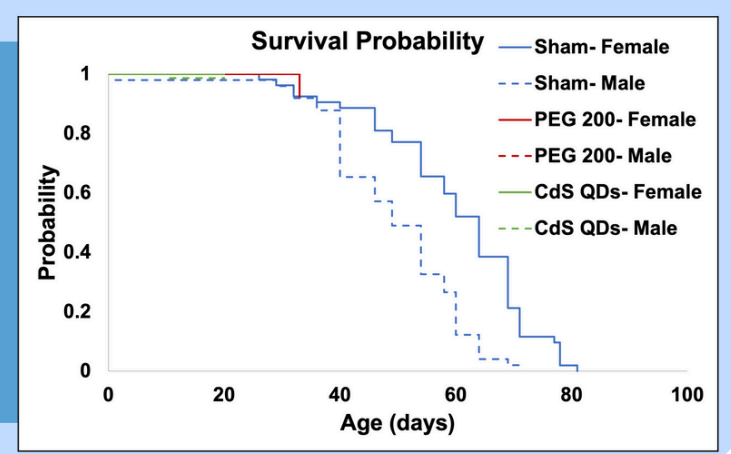


Survivability

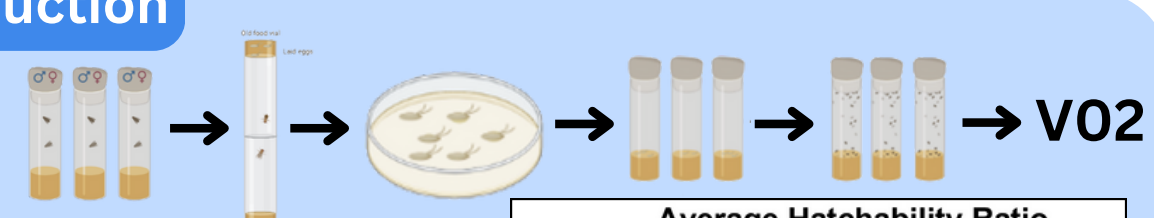


Methods: Dead flies counted over time
Results: No significant differences

Inconclusive

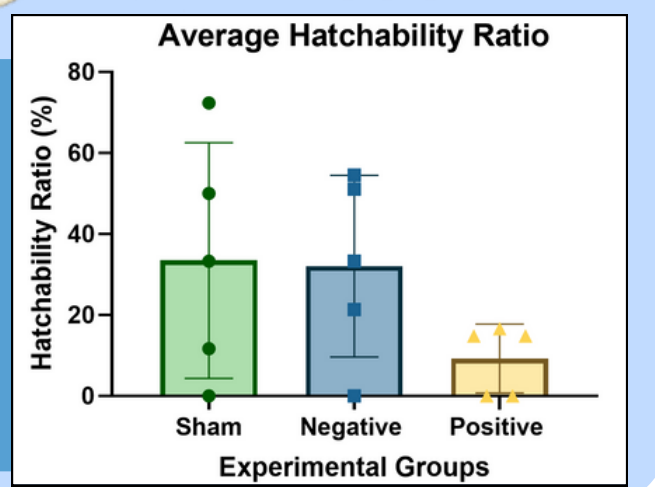


Reproduction

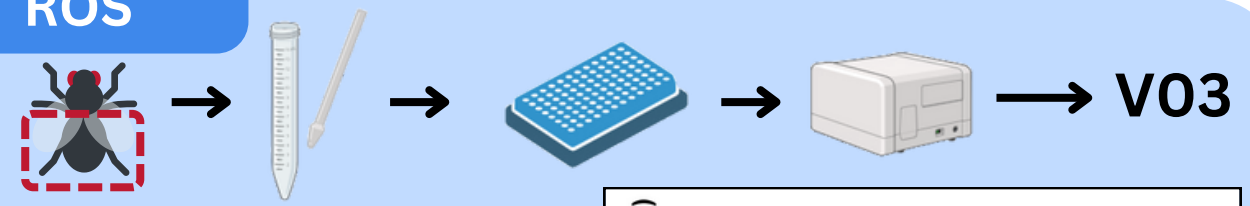


Methods: # Eggs laid and flies hatched counted over time.
Results: No significant differences, but positive trend

Partial Pass

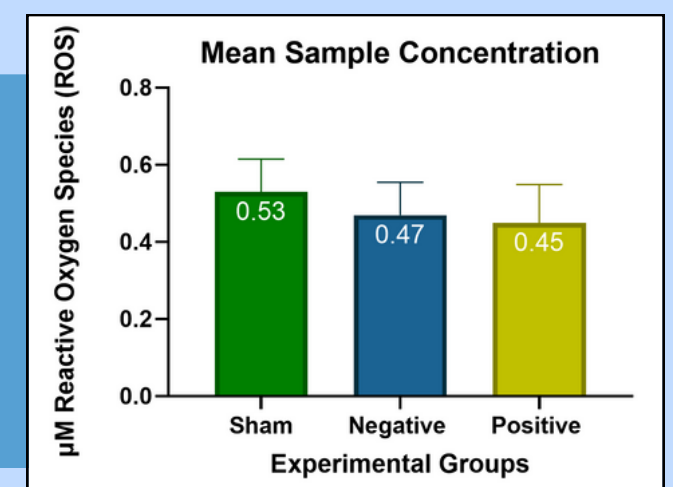


ROS

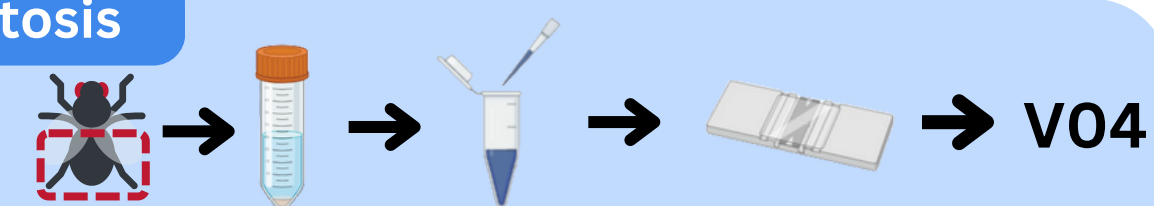


Methods: Cell samples incubated with ROS-reactive dye
Results: No significant differences

Inconclusive

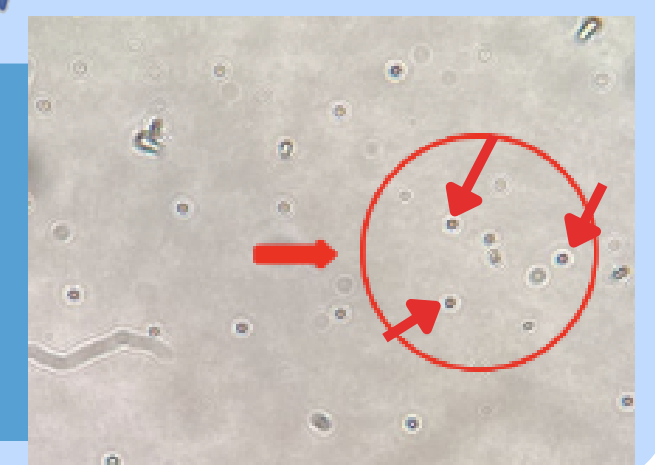


Apoptosis



Methods: Cells isolated and stained with Trypan Blue for apoptosis
Results: Unable to count cells

Fail



Future Revisions

- Include tracking technique to confirm uniform consumption
- Expand on exposure methods of materials

Impact

- Accessible assays for early toxicity detection
- Advance safety testing in the development of safer clinical interventions