

Presenting Author Name

Jaida Albrechtsen

Phonetic spelling of your (full) name

JAY-duh AL-brekt-sen

Presenting Author Category

PhD Student

Supervisor Name

Richard Keijzer

Research Category

Basic Science

Abstract Title

Modelling Nitrofen-Induced CDH in *Drosophila melanogaster*: Development, Behaviour, and Airway Branching Phenotypes

Authors

Name	Role	Profession
Jaida Albrechtsen	Presenting Author	PhD Student
Jan Ziv Prieto	Co Author	Undergraduate Student
Anika Enns	Co Author	Undergraduate Student
Dr Paul Marcogliese	Co-Supervisor	Assistant Professor
Dr Richard Keijzer	Co-Supervisor	Full Professor

Background

Congenital Diaphragmatic Hernia (CDH) is a severe birth defect affecting 1 in 2,500 babies, with a 30% mortality rate. CDH is defined by a diaphragmatic defect, but mortality is due to accompanying pulmonary hypoplasia (PH). Since the causes of the PH remain unclear, we aim to uncover key contributing factors. A common CDH model administers nitrofen to pregnant rats, resulting in offspring with CDH and PH. Nitrofen-exposed fetal rat lungs show abnormal airway branching even without the diaphragm defect. Although *Drosophila melanogaster* lack lungs, their branching tracheal system is analogous to mammalian lungs in development and function, offering a simplified model to study abnormal airway branching in CDH.

Objective

We aim to examine nitrofen-induced airway branching in an organism without a diaphragm: *Drosophila melanogaster*.

Methods

Wild-type Canton-S flies were fed food containing 5, 50, 500, or 1000 μ M of nitrofen or DMSO throughout development and adulthood. The appropriate dose was determined via lifespan assay. Btl-GAL4;UAS-mCD8::GFP flies were exposed to nitrofen or DMSO, imaged using confocal microscopy, and tracheal phenotypes were quantified using Arivis neurite tracer software. Larvae underwent developmental timing and pupation height assays; and adult flies were assessed for negative geotaxis (climbing) and heat-induced seizure phenotypes.

Results

Flies exposed to 500 μ M nitrofen display delayed development and reduced lifespan compared to DMSO controls. Larvae raised on nitrofen exhibit decreased tracheal length and volume early in development due to nitrofen exposure. These larvae also display decreased pupation height, and adults take an increased time to climb compared to controls. Flies on nitrofen also exhibit an increase in heat-induced seizure-like behaviour.

Conclusion

Nitrofen impairs *Drosophila* development, behaviour, and tracheal morphology. These findings support *Drosophila* as a simplified, powerful tool to explore nitrofen's effect on airway development, potentially aiding in the discovery of key mechanisms of abnormal airway branching associated with human CDH.