

Exploring zebrafish swim bladder as a model for chronic lung diseases

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Principal Investigator: Dr Aleksandra Divac Rankov, IMGGE

This project aims to identify transgenic zebrafish lines within the Kawakami Laboratory collection, exhibiting Gal4 expression patterns in the swim bladder, to establish a robust model for investigating the impacts of e-cigarettes. The swim bladder, sharing an embryonic background with the mammalian lung, serves as a pertinent model due to the expression of genes crucial for lung function in adult zebrafish. Key signaling pathways involved in human lung development, including the Sonic Hedgehog and Wnt/ β -catenin pathways, play pivotal roles in zebrafish swim bladder development. The zebrafish swim bladder features a monolayer of cells, supported by a basement membrane. Surface surfactant is present, while beneath the membrane, connective tissues house collagen, elastin, immune cells, and a layer of smooth muscle cells. The research seeks zebrafish lines expressing Gal4 throughout the entire swim bladder and, ideally, within specific cell types or layers of the swim bladder. The overarching objective of this project is to unravel the mechanistic pathways activated by e-cigarettes, potentially contributing to the onset of lung diseases later in life. By utilizing transgenic zebrafish lines with targeted Gal4 expression in the swim bladder, this study aims to provide insights into the specific cellular and molecular responses induced by e-cigarette exposure, contributing valuable knowledge to the understanding of lung disease development.