Phenotypic effects in DJ-1 deficient zebrafish larvae

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(I) Background

Parkinson's disease is a neurodegenerative disease affecting millions of people around the world and is causing tremor, rigidity, and mobility issues. Park7 is a gene encoding the protein DJ-1, and has been shown to be associated to the development of Parkinson's.

Zebrafish has been used as a model organism to study the effects of lacking DJ-1 by using knockout lines. Previous research have shown a progression of Parkinson's Disease related phenotype in adult DJ-1 knockout fish [1].

In these experiments, we have focused on the zebrafish larval stage up to five days post fertilization. Both the proteomics, motility and touch-evoked response have been examined to find differences between the wild type and DJ-1 knockout larvae.

cells





61 of the 120 proteins with a 1.5 fold change in abundances between wildtype and park7 knockout 5 dpf larvae. In total 4196 proteins were identified with at least two unique peptides. Only neural cells with red fluorescent protein (RFP) were analysed. The cells were sorted by FACS and analysed using mass spectrometry (LC-MSMS). Figure 2 shows two main clusters: one with several signalling molecules, and one with mostly proteins that can bind to actin, like myosin, and that are typically important in mechanical motion. All proteins in the former cluster are downregulated, while most in the second cluster are upregulated in the park7 knockouts.

to determine the motility. Figure 3 shows preliminary results that indicate a slight, but not statistically significant increase in motility. Parkinson's disease patients and adult DJ-1 knockout fish show decrease motility. Our results show that reduced motility in the DJ-1 knockout is not prominent before after the larval stage.

References

1. Chavali, L.N.M., et al., Progressive Motor and Non-Motor Symptoms in Park7 Knockout Zebrafish. Int J Mol Sci, 2023. 24(7).



