

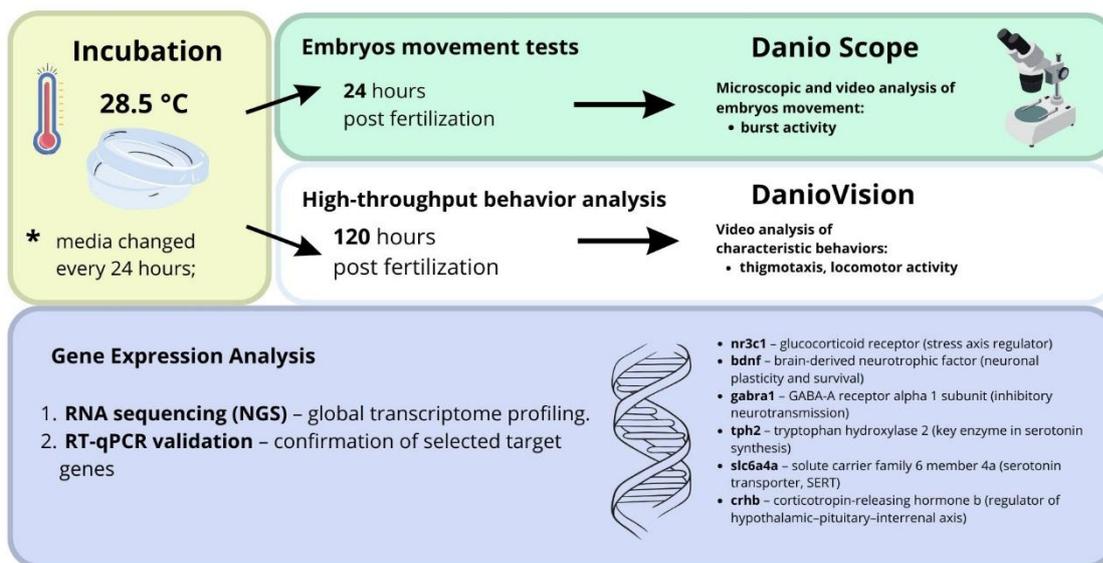
Inositol, also known as vitamin B8, is commonly used as a dietary supplement among women trying to conceive, typically in combination with folic acid (vitamin B9), to support proper fetal neural development. Despite numerous studies indicating the beneficial effects of inositols on depression, anxiety, and insomnia, their exact mechanism of action remains unclear and warrants further investigation.

Anxiety and depressive disorders are among the most common psychiatric conditions, affecting approximately 10% of the global population annually. Pharmacological treatments are often associated with considerable side effects and are effective in fewer than half of patients, with responses varying significantly between individuals. Several studies have shown decreased levels of inositol in individuals suffering from psychiatric disorders such as anxiety, depression, and obsessive-compulsive disorder.

The aim of this project is to determine the effects of three selected stereoisomers of inositol - myo-inositol, scyllo-inositol, and D-chiro-inositol - on anxiety-related behavior and central nervous system development using the zebrafish (*Danio rerio*) model. Zebrafish is an exceptional animal model characterized by a high degree of genetic similarity to humans (up to 80% of human genes have zebrafish orthologs), transparent embryos allowing high-throughput light microscopy-based screening, and a short developmental period from embryo to larva, during which individual anxiety-related behaviors can be assessed. Additionally, zebrafish are significantly less costly to maintain compared to rodent models.

The research will be conducted in three stages: (1) Toxicity assessment using the Fish Embryo Toxicity (FET) test in accordance with OECD guidelines; (2) Behavioral analysis of anxiety-related traits in zebrafish larvae using the DanioVision system; and (3) Transcriptomic analysis *via* next-generation sequencing (NGS), followed by RT-qPCR validation of selected differentially expressed genes.

A simplified illustration of the three research stages is presented below.



This project builds on prior pilot studies, in which myo-inositol was shown to influence larval development and locomotor activity. The planned study aims to deepen our understanding of the biological effects of cyclitols, which are increasingly used in supplementation despite the lack of conclusive data on their anxiolytic efficacy. The findings may have both clinical and translational relevance; not only in the context of human mental health but also for improving the welfare of animals used in production or research environments.