THE PROTEIN PHOSPHATASE INHIBITOR OKADAIC ACID STIMULATES OOCYTE MATURATION AND INHIBITS EGG ACTIVATION IN ZEBRAFISH.
Ravikanth Nathani and Charles A. Lessman
Department of Biology, The University of Memphis, Memphis, TN 38152

ABSTRACT
In vitro fertilization of fully mature nematode oocytes with purified okadaic acid (OA) plateaus faster than in the control group without OA treatment. OA induces a rapid increase in cytoplasmic [Ca2+]i, resulting in the induction of a Ca2+ transient. OA also stimulates the release of chromatin from the oolemma, leading to the formation of pronuclei and the activation of the egg. The results suggest that OA can be used as a tool to study the mechanisms of oocyte maturation and egg activation in zebrafish.

INTRODUCTION
Oocytes of zebrafish, Danio rerio, are formed by the first meiotic division of meiosis and are arrested in prophase I until they are fertilized by sperm. The second meiotic division is completed in the early embryo after fertilization. The process of oocyte maturation involves the activation of genes that are responsible for the synthesis of the cytoplasmic and nuclear components necessary for egg activation and embryonic development. OA is a potent inhibitor of protein phosphatases, which play a critical role in regulating various biological processes, including cell cycle progression, gene expression, and signal transduction.

RESULTS
Table 1: Micronuclei results for Phosphatase 1A in Danio rerio using aldehyde esterase assay. Values represent number of micronuclei per 1000 cells. [The table is not included in the text, but should be referenced in the figures and text.]

Figure 1: Graph comparing the average number of micronuclei in Danio rerio oocytes treated with okadaic acid (OA) and control groups. The x-axis represents the concentration of OA, and the y-axis represents the number of micronuclei per 1000 cells. The control group shows a lower number of micronuclei compared to the OA-treated group.

Figure 2: Graph showing the effect of okadaic acid on oocyte maturation in Danio rerio. The x-axis represents the time after fertilization, and the y-axis represents the percentage of oocytes that have completed the first meiotic division. The OA-treated group shows a significant increase in the percentage of oocytes that have completed the first meiotic division compared to the control group.

Figure 3: Graph comparing the average number of pronuclei in Danio rerio embryos treated with okadaic acid (OA) and control groups. The x-axis represents the concentration of OA, and the y-axis represents the number of pronuclei per 1000 cells. The OA-treated group shows a significant increase in the number of pronuclei compared to the control group.

Figure 4: Graph showing the effect of okadaic acid on egg activation in Danio rerio. The x-axis represents the time after fertilization, and the y-axis represents the percentage of eggs that have completed egg activation. The OA-treated group shows a significant decrease in the percentage of eggs that have completed egg activation compared to the control group.

CONCLUSIONS
OA is a potent inhibitor of protein phosphatases and can be used as a tool to study the mechanisms of oocyte maturation and egg activation in zebrafish. The results suggest that OA can be used to regulate the cell cycle and gene expression in the early embryo.

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