The Effects of Acetaldehyde and Folic Acid on the Development of Lytechinus variegatus Zygotes

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This project will attempt to identify what effects different concentrations of acetaldehyde and folic acid have on the developmental rate of Lytechinus variegatus zygotes. Lytechinus variegatus are a type of green sea urchins that are commonly used as a model organism to observe zygotic development. Carcinogens are cancer-causing substances that will cause cells to proliferate abnormally. Carcinogenesis is the result of the activation of oncogenes and the deactivation of tumor suppressor genes. Cells become cancer cells when there is a severe mutation in the chromosome replication during the S phase of mitosis. Folic acid and acetaldehyde are known carcinogens. Low levels of folic acid can cause abnormal cell growth and high levels of acetaldehyde can lead to urinary tract cancer and immobilization of sperm in men. This information led to developing the following hypotheses: lower levels of folic acid will stimulate cell growth and higher levels of acetaldehyde will prevent development past fertilization stage. Gametes collected from sea urchins were fertilized with 100 zygotes in each group. In Phase I, there were 0.1%, 1.0%, 5.0%, and 10.0% folic acid and acetaldehyde solutions. In Phase II, to narrow down to which percentage caused sperm immobility, 2.0% and 4.0% solutions of acetaldehyde were made. The hypotheses were both supported. At the end of the 65-hour period, more zygotes in the 0.1% and 1.0% folic acid solutions made it to the late gastrula stage, rather than the control group. Past the 2.0% acetaldehyde solution, the 4.0%, 5.0%, and 10.0% immobilized the sperm. In conclusion the information obtained from this experiment supports the hypotheses that low levels of folic acid stimulate cell growth and high levels of acetaldehyde can cause sperm immobility.

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