The Effects of Nicotine on Zebrafish Development

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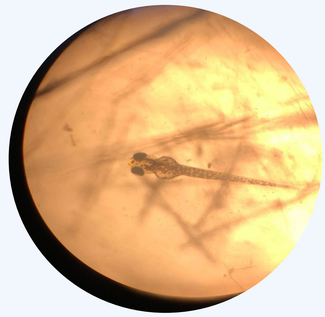
Abstract: Nicotine is a harmful substance that is used by many people today. Not only is this drug harmful, but it is also extremely addictive, with life-changing consequences. Women who are pregnant are not only putting themselves at risk but their babies as well. Using nicotine while pregnant can cause low birth weight and preterm birth. It can also affect the brain and the lungs of the baby. For testing our embryos we put eight or nine embryos in each well filled with different levels of ppm. The first well consisted of 10 ppm, the second well was 100 ppm, and lastly, the third well was filled with 200 ppm. We then watch the zebrafish embryos grow in this solution while also watching our embryos in our control group filled with just insta ocean. We found that they had a slower development and had curved spines. Researching nicotine and the effects it has on zebrafish embryos it can show us the effects it can have on human embryos when pregnant women vape.

Hypothesis: If the Zebrafish are infected with nicotine, then their development will be slowed.

Day	10 PPM	100 PPM	200 PPM	Control
Day 1	8 Present: 0 Dead Still in Embryo.	8 Present: 0 Dead Still in Embryo.	8 Present: 0 Dead Still in Embryo.	10 Present: 0 Dead Still in Embryo.
Day 2	7 Present: 1 Dead Still in Embryo.	7 Present: 1 Dead Still in Embryo.	7 Present: 1 Dead Still in Embryo.	8 Present: 2 Dead Still in Embryo.
Day 3	7 Present: 1 Dead Correct Stage of Development.	7 Present: 1 Dead Correct Stage of Development.	7 Present: 1 Dead Correct Stage of Development.	8 Present: 2 Dead Correct Stage of Development.
Day 4	6 Present: 2 Dead Correct stage of development.	6 Present: 2 Dead Underdeveloped.	6 Present: 2 Dead Underdeveloped.	7 Present: 3 Dead Correct Stage of Development.
Day 5	1 Present: 7 Dead Correct Stage of Development with curved spines.	1 Present: 7 Dead Underdeveloped with curved spines.	2 Present: 06 Dead Underdeveloped with curved backs.	0 Present: 10 Dead All Dead.

Day 3 of experiment: First time we saw the embryos out and moving. Was a day later than normal.



Results: At the beginning of the 5-day experiment of our 3 nicotine solutions and our one insta ocean control, our hypothesis ended up being somewhat right. We started to see our Zebrafish grow within a couple of days. Our independent variable was the nicotine but how it affected the fish was the dependent variable. The growth of the Zebrafish was affected by the nicotine. Our group soon began to realize that within the first few days our embryos were growing slower than usual. We saw the curved spine and the slow development which was concluded from our nicotine solution.

Introduction: Previous to our experiment our group knew about the horrible effects of nicotine from vape and smoking products on the human body. This intrigued our team into testing the effects of nicotine on Zebrafish. We wondered what effects nicotine would have on the development of Zebrafish and how this translates to human consequences of nicotine consumption.

Materials and Methods: Each day we started by looking at each dish and counting how many embryos were alive and how many were dead. Then, we identified the embryos' stage of development from each of the dishes by comparing the physical features of each embryo to the examples in the chart provided. The materials we used were:

- Microscope
- Pipetes
- Well plate
- Nicotine concentrated water
- Insta-Ocean for the control

Discussion: When using nicotine to grow our embryos, most of the embryos had a slowed development compared to the embryos in the control group. By the end of the experiment, the embryos in the nicotine had curved backs in the shape of a "v". Relating to the hypothesis, the embryos had slowed development especially those under the conditions with the highest concentration of nicotine. We expected this to happen as nicotine has immense effects on humans. As the amount of nicotine concentration got higher, the development of the embryos got slower and got farther away from where they were expected to be. We were limited by the slow development as it was more difficult to see any significant changes until later on in the experiment. On the last day of the experiment, we were also limited as all of the embryos had died so seeing any significant changes in the development was hard to notice.