The Effects of Creatine on Fish Development
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Abstract
The purpose of this lab is to study the effects of creatine concentration and developing zebra fish. Creatine is an amino acid that is found in meat and fish. It is used for short bursts of energy when doing short, high intensity workouts. It is converted to creatine phosphate or phosphocreatine and stored in the muscles where it is used for energy. Preliminary studies suggest that creatine supplements may help lower levels of triglycerides in men and women with high levels of triglyceride. In studies of people with heart failure, those who took creatine in addition to receiving standard medical care, increased the amount of exercise they could do before becoming fatigued, compared to those who took a placebo. One symptom of heart failure is becoming tired easily. One study of twenty people with heart failure found that short-term creatine supplementation in addition to standard medication helped to increase body weight and improved muscle strength. Creatine has also been reported to help lower levels of homocysteine. Homocysteine is associated with heart disease, including heart attack and stroke. Preliminary studies suggest that creatine may have anticancer properties. One study found that people with chronic obstructive pulmonary disease who took creatine increased muscle mass, muscle strength, and endurance, and improved their health status compared with those who took a placebo. People with Parkinson’s disease have decrease muscular fitness, including decreased muscle mass, muscle strength, and increased fatigue. One study found that giving creatine to people with Parkinson’s disease improved their exercise ability and endurance (Creatine). Zebra fish are used for testing because they have high fecundity, short generation time, rapid development, external fertilization, translucent embryos, and are easily maintained. Zebra fish are one of the most tractable developmental systems.

Introduction
The purpose of this lab was to study the effects of creatine monohydrate on zebra fish development. Creatine is a naturally-occurring amino acid that is found in meat and fish. It is also made by the human body in the liver, kidneys, and pancreas. It is converted to creatine phosphate or phosphocreatine and stored in the muscles where it is used for energy. Preliminary studies suggest that creatine supplements may help lower levels of triglycerides in men and women with high levels of triglyceride. In studies of people with heart failure, those who took creatine in addition to receiving standard medical care, increased the amount of exercise they could do before becoming fatigued, compared to those who took a placebo. One symptom of heart failure is becoming tired easily. One study of twenty people with heart failure found that short-term creatine supplementation in addition to standard medication helped to increase body weight and improved muscle strength. Creatine has also been reported to help lower levels of homocysteine. Homocysteine is associated with heart disease, including heart attack and stroke. Preliminary studies suggest that creatine may have anticancer properties. One study found that people with chronic obstructive pulmonary disease who took creatine increased muscle mass, muscle strength, and endurance, and improved their health status compared with those who took a placebo. People with Parkinson’s disease have decrease muscular fitness, including decreased muscle mass, muscle strength, and increased fatigue. One study found that giving creatine to people with Parkinson’s disease improved their exercise ability and endurance (Creatine). Zebra fish are used for testing because they have high fecundity, short generation time, rapid development, external fertilization, translucent embryos, and are easily maintained. Zebra fish are one of the most tractable developmental systems.

Materials And Methods
To complete this lab, the following procedures were followed: Instant ocean mix was obtained. The Instant ocean mix was then separated into nine twenty-five milliliter increments and placed in nine separate one hundred milliliter beakers. Then a .2 gram per liter solution was made by adding .05 grams of creatine to one of the twenty-five milliliter instant ocean solutions. Then a one gram per liter, two grams per liter solution, three grams per liter solution, four grams per liter solution, five grams per liter solution, six grams per liter solution, seven grams per liter solution, eight grams per liter solution, and a nine grams per liter solutions by following the previous procedure but making mathematical changes accordingly. The solutions were placed into nine wells and a control solution of only instant ocean mix was placed in a well. Then ten to eleven zebra fish embryos were placed into each of the wells. Data is represented in percentages because of the discrepancy in the amount of embryos in each well. The embryos were examined every day for the next five days and results were recorded in a table. The solutions were changed every day. Observations were made by counting how many living fish were left and calculating the percent rate of survival and the percent of hatched eggs. Any extra observations were made daily.

Results
The design of this experiment is testing different concentrations of creatine and how it affects the hatching rate and living percentage of zebra fish. The independent variable is the concentration of creatine and the dependent variable is the number of living fish and the size of fish. The control was the well with only instant ocean mix. Constants were the amount of solution placed in each well, the temperature of the water, and how often the wells were cleaned. The results from this lab show that there may be no correlation between creatine concentration and fish development. Fish that were exposed to creatine had a darker pigment, no other differences were noted. There may be a correlation between the percent of fish that survived and concentration of creatine. The percent of living fish did not decrease with increasing creatine concentration, but more fish that were exposed to creatine did die compared to those that were not.

Discussion
The data fails to support the hypothesis that fish that are exposed to creatine will experience faster hatching rate because there is no significant difference between each of the solutions. It was noted that there was increased movement in fish that were exposed to creatine such as extra tail flipping and tremors in the first week. Fish that were exposed to creatine had a higher death rate than those that were not. As creatine concentration increased, the percent of living fish decreased. Errors in this project may have been that the concentration of creatine was too high and when cleaning solutions fish may have died from excessive handling. A limitation of this project is time. If more time would have been allowed, then changes in fish size and behavior may have been noted. Many people use creatine as a workout supplement and if high concentrations of creatine causes death in young fish, then it may not be wise to give creatine to young people.

Sources

http://umm.edu/health/medical/altmed/supplement/creatine
www.blonyx.com/pages/what-is-creatine