

# The Effect of Nerve Growth Factor on the Cardiac Regeneration of Zebrafish

Labban, Nayla (School: Governor Mifflin High School)

The purpose of this experiment was to determine the effect of the augmentation and inhibition of Nerve Growth Factor (NGF) on the ability of zebrafish to regenerate cardiac muscle. It was hypothesized that an increase in NGF concentration would allow the zebrafish to regenerate heart tissue faster, and decrease the death rate due to heart failure; whereas the inhibition of NGF would prohibit the fish from being able to regenerate cardiomyocytes (heart cells) and lead to an increased death rate due to heart failure. Heart disease is the number one killer in humans, primarily because humans are unable to regenerate their hearts after substantial injury. If the mechanisms of cardiac regeneration in other species are understood, it could lead to the potential discovery of a cure for heart failure patients. Four groups of 100 fish were exposed to Aristolochic Acid (AA: meant to induce heart failure) and then consequently: NGF, K252-a (an inhibitor of NGF), Gambogic Amide 10nM (the minimum dosage of an NGF medicinal replacement), and Gambogic Amide 50nM (maximum dosage). There were two controls: just AA and no AA. The results revealed that fish treated with NGF were more likely to effectively undergo cardiac regeneration, as opposed to fish in which NGF was inhibited; in that group, almost all of the fish contracted heart disease and were unable to regenerate their hearts. It was found that between the two medicinal replacement dosages, Gamb 50 was more effective than Gamb 10, but neither of them was as beneficial as NGF. The research hypothesis was supported by the statistically significant results. This research may lead to further studies that investigate the effects of these substances on more complex organisms, in order to develop a cure for heart disease in humans.