Evaluating the Impact of Temperature Increases and Ultraviolet Radiation on Naegleria fowleri Using the Model Organism Chaos carolinensis

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With a mortality rate of 98%, primary amebic meningoencephalitis (PAM) is a rare and deadly infection caused by Naegleria fowleri. Many scientists believe with climate change and rising temperatures, the habitat of Naegleria f. will expand, and infection rates will increase. However, another climate change factor is the deteriorating ozone layer, which increases ground-level UV radiation. With both variables present in the environment, this experiment tested how both factors can influence the population of amoebas. Instead of experimenting with Naegleria f., the project will examine the results of Chaos carolinensis. There are seven treatments in the experiment. Two groups will be tested with two increasing temperatures, and two other groups will be tested with two different exposure times to UV light. There will also be two additional groups that will be experimented with, both increasing temperatures and exposure times. The final group will be the control group to compare data. The results show that the higher temperatures increased population growth, and the higher exposure time of UV radiation displayed the smallest increase in population. The groups influenced by both variables showed a rise in growth similar to the control group, which was around 40-60%. Since UV radiation damages DNA, and reproduction still occurs, it is noted that there is a possibility the amoeba reproduced with DNA discrepancies. Although the results do not directly reflect the responses to Naegleria fowleri, there is an assumption that there may be a trend when applying these variables to N. fowleri. Knowing this will allow scientists to determine what we must focus on when combating pathogenic organisms impacted by climate change.

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