CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)

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Project Number

35800

Project Title

Lights Out: The Effect of Chronic Sleep Deprivation Using a Nocturnal House Mouse (Year 6)

Abstract

Objectives/Goals

This experiment was performed to see if changes in sleep cadence affected a mouse's learning ability. This builds on my previous five years study of the effects of artificial lighting (as a form of habitat destruction) on the learning patterns and eating habits of animals.

Methods/Materials

Materials: 5 mice, small pool, platform, stopwatch.

Methods: In a water maze, I put a platform I made out of a cup and a sheet of metal and marked the location of the platform on the side of the pool. The mice were on a normal light schedule (12 hours light and 12 hours dark. Timed tests were run for each mouse. I recorded how long it took for the mouse to find the platform. This was repeated several times. I then subjected the mice to a 24 hour setting of light. Every half hour I would go in and gently wake them up. I repeated this every day for three days. On the fourth day I put them back on the normal light settings and ran them to see if they were affected by the light.

This entire procedure was repeated for a bigger pool/maze.

Results

I recorded 180 maze runs (thirty-six for each mouse) at normal light conditions. When the timed test was similar to their natural light exposure of 12 hours per day, mice on average learned the course and ran it faster. For maze 1, the shortest time ran was 0:03 seconds. The length of time reduction ranged from 1:26 to 0:03. For maze 2, the shortest time was 0:07 The time reduction ranged from 1:08 to 0:07.

When the lighting conditions were changed, the length of time that it took each mouse to navigate the maze increased. While the mice navigated each day quicker, there was an increase from the last run in normal conditions to the first run in excessive lighting conditions. The average length of time for maze 1 increased from 0:05 seconds to 0:33 seconds. The average length of time for maze 1 increased from 0:09 to 1:17.

Conclusions/Discussion

Mice are nocturnal. However, they are very adaptable and can learn. When the light changed, the learning patterns of the mice changed as well. At 12 hours of light, the mice learned the water maze; while they learned the maze under excessive light conditions as well, it took them longer. The sleep deprivation was a factor in their ability to learn.

If the learning and eating habits of the mice change, then their behavior may change. This could affect their predators and move up the food chain.

Summary Statement

What is the effect of chronic sleep deprivation on the common house mouse.

Help Received

My mother created the format for the graph which I then input the data.

Preliminary