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SLS44QL2

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SA Organ Clock R&W Assignment

1.

Carl Johnson and his colleagues at Vanderbilt University experimented with cyanobacteria to figure out how the internal clocks of cyanobacteria affect their survival. They noticed that a normal cyanobacteria with a 24-hour clock length fared better than mutant cyanobacteria with a 22-hour clock. However, when the team artificially changed the light-and-dark cycle to a 22-hour cycle, the mutants survived better than the normal cyanobacteria. From this, the team determined that a well-coordinated internal clock enhances fitness.

2.

The liver clock maintains the body's blood glucose levels by ensuring a constant and adequate source of energy to support bodily functions and the brain. Without the liver clock, mice experienced hypoglycemia, or low blood sugar levels, during rest periods. The pancreas clock maintains normal blood sugar levels as well, but if compromised results in diabetes. In mice, without the pancreas clock they experience diabetes early in life as well as a reduction in insulin secretion. Despite both regulating blood glucose levels, the liver and pancreas clocks regulate opposing physiological processes. The liver clock makes sure the blood doesn't lose too much glucose while the pancreas clock makes sure the blood doesn't overflow with glucose.

3.

One way an irregular internal clock of fat cells affects health is through the enzyme histone deacetylase 3 (HDAC3) which turns off genes that control the production of fatty molecules during the night. If the internal clock of fat cells in mice are tampered with, they experience an increase in fat deposits when they shouldn't and show signs of obesity and diabetes.

4.

At times, I think I have experienced "social jet lag." Being a Stuyvesant student usually means an overload of work to be done and I often get home late. This means that I have to stay up late doing work, sacrificing sleep time. This results in me being very tired and often sleeping during the day. However, I haven't experienced any weight gain as a result of disrupting my circadian cycles.

5.

Chemical communication in living systems is a process that happens all the time in order to maintain homeostasis within the living systems. There are four main ways that living systems use to communicate within itself: autocrine, juxtracrine, paracrine, and endocrine. Each method involves a process of signaling, reception, transcription, and finally response. All of these are necessary in making sure all bodily functions are working properly, even if those living systems are cellular organisms. An example of chemical communication involves circadian clocks which are internal clocks that regulate bodily functions. Organs and tissues within complex organisms use these clocks to help regulate when and how some bodily functions are done.