Proteins in Memory Usage

Without memories how do we do anything. Memories are how we know where we work, how to go home, and anything essential in life. Proteins are what not only help create memories but also store memories. Sometimes mutations can occur causing those proteins to not be made. This disrupts the way memories are formed and stored. Ubiquitin-proteasome system (UPS) is a complicated web that is made of various ligases and proteins. The Ubiquitin-proteasome system assists with the regulation of protein degradation. These proteins are involved with long term memory formation. There have been studies that have shown that protein degradation may be required for formation and storage of long-term memory. Research is currently being done to understand how protein degradation is a part of transcriptional and translational processes that are important for memory storage.

Many researches use rodents to study long term memory formation. Pavlovian conditioning is used to understand long-term memory formation in rodents. One of the most common type of training used involves fear. For memory formation to be at its best researches must make sure that the amygdala and hippocampus must be intact. Auditory cues for stimuli have been the options for researchers to use on the rodents. Memories formed using auditory delay fear conditioning require the amygdala to be intact but does not require the hippocampus. The amygdala and the hippocampus both form different types of memories

Another study has shown that de novo protein in protein synthesis can cause impairment in memory formation. Though it does depend on the type of conditioning and the parts of the brain needed for memory formation. They added different inhibitors for that because there are different types of memory formation in different parts of the amygdala and hippocampus. the studies showed that the increase protein synthesis was extremely important to store fear bases memories in the amygdala.

The second part of the study was on the role of protein degradation in the storage of memory. It was found that the regulator of synaptic plasticity was protein degradation. Protein degradation causes changes in protein synthesis while the formation of long-term memory. Using different proteasome inhibitors this theory has been tested. It was also seen in the studies that protein degradation was important for reconsolidating of fear memories. NMDA-CAMK11 is a signaling link found between protein synthesis and protein degradation. NMDA receptor regulates changes in protein synthesis related to long term memory formation.

Proteins are essential for memory formation and by one small mutation memory formations will alter the way of living for many humans. It will take more research to fully understand not only how it works but how to help keep our memories. The our vital to our health and we need to find a way to cure these diseases that alter memory formation and storage.