In the article Protein degradation and protein synthesis in long-term memory formation,

ubiquitin-proteasome system (UPS) is mentioned as system that is comprised of different ubiquitin ligases that help regulate protein degradation in neurons. It has been found that UPS protein is involved in various stages of the memory storage process. Studies have been found to show that protein degradation may be required for formations and storage of long-term memory. Still researches are unsure of protein degradation is also a part of some transcriptional and translational process that are important for memory storage.

 Rodents have been used for studies in long term memory (LTM) formation. For these studies the Pavlovian conditioning is mostly used. mainly using some type of training involving fear. For optimum memory formation the amygdala and hippocampus have to be intact. The researchers mainly used auditory cues for stimuli. memories formed using auditory delay fear conditioning requires the amygdala to be intact but does not require the hippocampus. how they measured fear conditioning was by “freezing” a behavioral observation. the way they did this was to shock the rodent by putting them in a box that had to side one was lit and the other was dark. when the rodents went in to the dark side of the box they would get lit. the researches also used taste aversion for conditioning. They found that different types of conditioning required certain parts of amygdala and hippocampus to be active at either the same time or separately.

 During many years’ researchers had come to consensus that de novo protein synthesis was required for the formation of long-term memory. one study supporting this was in which certain inhibitors were added protein synthesis and they found that there was impairment in memory formation. again, depending 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. evidence points that protein degradation causes changes in protein synthesis while the formation of long-term memory. To show these correlations studies using manipulation of different proteasome inhibitors. It was also seen in the studies that protein degradation was important for reconsolidating of fear memories. One important link found between protein synthesis and protein degradation was NMDA-CAMK11 signaling. NMDA receptor regulates any changes in protein synthesis related to LTM formation.

 The article was very informative and did well in explaining its research. When reading the article, it did not leave the reader with many questions at the end. the authors of the article did well in supporting their studies. They were clear and concise with what how they obtain the link between protein synthesis and protein degradation pertains to the formation and storage of long-term memory.

Jarome TJ and Helmstetter FJ (2014) Protein degradation and protein synthesis in long-term memory formation. Front. Mol. Neurosci. **7**:61. doi: 10.3389/fnmol.2014.00061