H146 Talin as a Potential Protein Biomarker in Forensic Investigations

Sait Özsoy, MD, Gulhane Military Medical Academy, School of Medicine, Dept of Forensic Medicine, Etlik-Kecioren, Ankara 06018, TURKEY; Gulnaz T. Javan, PhD, Alabama State University, Forensic Science Program, 915 S Jackson Street, Montgomery, AL 36104; Zahra Campbell, 1205 S Main Street, Tuskegee, AL 36083; and Sheree J. Finley, MS, Alabama State University, 915 S Jackson Street, Montgomery, AL 36104*

After attending this presentation, attendees will: (1) understand how to use immunoblotting techniques to demonstrate the correlation between protein integrity and Postmortem Interval (PMI); and, (2) learn methods to assess proteomic degradation in cadaver tissues of from actual criminal cases with times of death between 3-72 hours.

This presentation will impact the forensic science community by providing empirical data from the investigation of PMI-mediated protein degradation in order to provide new insight for formulating an innovative forensic method to determine the time of death.

Changes in brain biochemistry attributable to death can result in altered concentrations of individual proteins in postmortem brain tissues. A recent study investigated the degradation of thanatophagy proteins and revealed that the levels of key proteins involved in postmortem autophagy increased in the brain specimens of actual cadavers from criminal cases. According to the natural order of decomposition, the internal organs in dead bodies decay in a particular order depending on the cause of death, beginning with the intestines and culminating with the brain due to the fact that medial sections of the brain cool more slowly than other tissues. The estimation of PMI is of utmost importance in medicolegal death investigations. There are a number of ways to estimate the PMI; however, the current established methods are susceptible to numerous abiotic and biotic factors. Previously published studies state that protein concentrations in postmortem brain tissues can detect protein changes via immunoblotting and densitometry techniques. There is a paucity of studies that correlate the time since death and cytoskeletal and neuronal protein levels. The objective of the current study was to determine if there is a correlation between protein expression in cadaver tissues and PMI. For this purpose, 18 brain tissues from cadavers from criminal cases were examined to determine how many hours after death the presence of four proteins (talin-1, α-enolase, cofilin-1, and vinculin) are detectable. The cases were divided into three PMI time groups: Group 1, Group 2, and Group 3 (0-24 hours, 24-48 hours, and 48-72 hours, respectively). Talin-1 protein levels steadily decreased with increasing postmortem interval. Interestingly, the study demonstrated that talin-1 protein levels were statistically significant as determined by a one-way Analysis of Variance (ANOVA) test between Group 1 versus Group 2 and between Group 1 versus Group 3. These results provide strong evidence that talin-1 has the potential to be used as a unique biomarker for the establishment of an additional method to estimate the time of death. Future studies would involve mechanistic animal models (i.e., mice and swine) to investigate PMI-mediated protein degradation to provide new insight into formulating an innovative forensic method to determine the time of death.

Talin, Postmortem Interval, Cadaver