

The Effect of Elapsed Time on the Cardiac Troponin-T Degradation and Its Utility as a Time Since Death Marker in Cases of Death Due to Burn

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Abstract : It's extremely important to study postmortem interval in different causes of death since it assists in a great way in making an opinion on the exact cause of death following such incident often times. With diligent knowledge of the interval one could really say as an expert that the cause of death is not feigned hence there is a great need in evaluating such death to have been at the CRIME SCENE before performing an autopsy on such body. The approach described here is based on analyzing the degradation or proteolysis of a cardiac protein in cases of deaths due to burn as a marker of time since death. Cardiac tissue samples were collected from (n=6) medico-legal autopsies, (Department of Forensic Medicine and Toxicology), King George's Medical University, Lucknow India, after informed consent from the relatives and studied post-mortem degradation by incubation of the cardiac tissue at room temperature (20 ± 2 OC) for different time periods (~7.30, 18.20, 30.30, 41.20, 41.40, 54.30, 65.20, and 88.40 Hours). The cases included were the subjects of burn without any prior history of disease who died in the hospital and their exact time of death was known. The analysis involved extraction of the protein, separation by denaturing gel electrophoresis (SDS-PAGE) and visualization by Western blot using cTnT specific monoclonal antibodies. The area of the bands within a lane was quantified by scanning and digitizing the image using Gel Doc. As time postmortem progresses the intact cTnT band degrades to fragments that are easily detected by the monoclonal antibodies. A decreasing trend in the level of cTnT (% of intact) was found as the PM hours increased. A significant difference was observed between <15 h and other PM hours ($p<0.01$). Significant difference in cTnT level (% of intact) was also observed between 16-25 h and 56-65 h & >75 h ($p<0.01$). Western blot data clearly showed the intact protein at 42 kDa, three major (28 kDa, 30kDa, 10kDa) fragments, three additional minor fragments (12 kDa, 14kDa, and 15 kDa) and formation of low molecular weight fragments. Overall, both PMI and cardiac tissue of burned corpse had a statistically significant effect where the greatest amount of protein breakdown was observed within the first 41.40 Hrs and after it intact protein slowly disappears. If the percent intact cTnT is calculated from the total area integrated within a Western blot lane, then the percent intact cTnT shows a pseudo-first order relationship when plotted against the time postmortem. A strong significant positive correlation was found between cTnT and PM hours ($r=0.87$, $p=0.0001$). The regression analysis showed a good variability explained ($R^2=0.768$) The post-mortem Troponin-T fragmentation observed in this study reveals a sequential, time-dependent process with the potential for use as a predictor of PMI in cases of burning.

Keywords : burn, degradation, postmortem interval, troponin-T

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