H47 Evaluating the Use of Accumulated Degree Days and Total Body Score to Estimate Time-Since-Death of Human Remains in Central Texas

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After attending this presentation, attendees will better understand how the extreme heat, radiation, and arid environment of Central Texas affects the use of current total body score methods to estimate time-since-death.

This presentation will impact the forensic science community by elucidating the need for a more regional approach to time-since-death estimation based on an evaluation of current anthropology methods using human remains in Central Texas.

The ability of a forensic anthropologist to offer law enforcement an accurate time since death or Postmortem Interval (PMI) estimate is integral to a successful relationship between law enforcement and the field of anthropology. Often, a PMI estimate is the only aspect of a forensic case in which anthropologists are asked to participate. The ability of anthropologists to estimate PMI, therefore, must be improved and current methods must be evaluated in order to meet the new standards of practice as outlined by Scientific Working Group for Forensic Anthropology (SWGANTH).

This study evaluated the Megyesi *et al.* method for estimating PMI from human remains found in the summer in Central Texas.[1] To date, the Megyesi method is the only widely accepted method for quantitatively estimating PMI of human remains. The method was developed based on photographic observations of forensic cases from across the United States, but mostly concentrated in both Indiana and Illinois. The climate in Central Texas, however, varies greatly from the climates of both Indiana and Illinois. Central Texas is extremely dry and humid with high levels of solar radiation. Average temperatures for the year are in the low 80s Fahrenheit, with summer temperatures plateauing around 100° Fahrenheit for weeks at a time. The objective of this study, therefore, was twofold. First, the aim was to test the method's accuracy when estimating PMI from human remains in Central Texas. Second, if the method proved inaccurate, the aim was to evaluate whether the variables outlined in the method accurately described the decomposition process in Central Texas.

The study evaluated the decomposition of ($N=43$) donations made to the Forensic Anthropology Center at Texas State (FACTS) in San Marcos, TX. All of the donations were human subjects placed at the facility between 2012 and 2013 with a known PMI of less than one year. All of the donations were evaluated in the month of July 2013, and all PMI estimates were calculated from the date of placement at the facility. In some cases, the date of death preceded the date of placement by as much as two weeks. Photographs were taken to document the scoring and the amount of shade versus sun was recorded. Following the original method, Total Body Score (TBS) was calculated for each donation. From the TBS, the Accumulated Degree Days (ADD) and 95% confidence interval range were calculated for each donation following the Megyesi method. Accuracy was calculated by comparing whether the date of placement fell within the 95% confidence interval range for each donation's ADD. Qualitative assessments of the Megyesi variables were described by comparing the TBS of each donation to the photographs taken during scoring and the expected description corresponding to the TBS scores listed in the original method.

Overall, the method performed poorly for estimating PMI from human remains in Central Texas. Only five donations fell within the 95% confidence interval of the Megyesi method. The qualitative assessment of Megyesi's variables revealed that, overall, her descriptions of the TBS stages matched the TBS calculated for this study. The qualitative assessment of the TBS scores for this study, however, revealed that in Central Texas there could be a separate stage for mummification compared to Megyesi's incorporation of mummification into the advanced stage. Future research using modifications to Megyesi's method will be discussed as well as the need to test current PMI estimation methods across the United States in varying environments.

Reference:

1. Megyesi MS, Nawrocki SP, Haskell NH. Using accumulated degree-days to estimate the postmortem interval from decomposed human remains. J Forensic Sci 2005;50:1-9.

PMI, Time-Since-Death, Human Decomposition

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