A118 A Comparison of Seasonal Decomposition Patterns Between Human and Non-Human Animal Models

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After attending this presentation, attendees will understand the difference in seasonal patterns of decomposition between humans and two frequently used animal proxies: pigs and rabbits. Attendees will further understand the challenges of applying a commonly used decomposition scoring system to animal remains.

This presentation will impact the forensic science community by discussing whether two species of animal proxies are adequate substitutes for human cadavers for decomposition studies in forensic contexts.

Animal remains are utilized in postmortem interval studies if human subjects are unavailable. It is undetermined if these animal models will yield data that are directly comparable to human patterns, as systematic research comparing decomposition variables between subject species is scarce in the forensic literature. This presentation continues the discussion from the 2015 American Academy of Forensic Sciences (AAFS) Annual Scientific Meeting of a two-year multidisciplinary validation study that compared three cadaver species during three trials that differed by season and microenvironment at the University of Tennessee's Anthropology Research Facility (ARF). The specific purpose of this presentation is to present the results of the analysis of the morphological decomposition rates of all three species across all three trials and seasons; the previous paper detailed only the results of the spring trial.

During each of three trials, five subjects of each species were placed in the same microenvironment at the ARF. Each trial took place during three different seasons (spring, summer, and winter) and in three different microenvironments within the ARF. Decomposition stage was recorded twice daily by applying the Total Body Score (TBS) system of Megyesi et al.[1] Daily photographs were also collected and temperature data was captured hourly.

The TBS scores of all three trials were analyzed using fuzzy clustering. This method was selected because it allows for incorporation and direct comparison of the data from all three seasonal trials. Unlike other clustering methods, the algorithm in fuzzy clustering allows for overlap between group memberships. This is important in this scenario when the question is how much commonality can be found between the patterns of decomposition of the three subject species. The species were compared on the basis of their TBS for specific Accumulated Degree Days (ADD) and also marked by season. If the animal models are a sufficient proxy for human remains, then the animal subjects should show a TBS similar to the humans at the same number of ADD. This would then lead them to be assigned to the same group or cluster.

When all three species were analyzed together, the pigs and humans consistently grouped together in one cluster, while the majority of the rabbits formed their own group. This reflects that the decomposition pattern between pigs and humans is much more comparable than either species is to rabbits. When the rabbits were removed from the analysis to compare only the pigs and the humans, the pigs formed the main cluster, with some of the humans included with the pigs and some humans in a separate group. This reflects the high amount of variability seen in the human specimens as opposed to the consistency across species observed in the pigs.

One of the challenges in this study was applying the TBS system to the animal models. Multiple stages listed in the TBS system rely upon visual cues of decomposition. While indicators such as color changes, skin slippage, and bloat were easily visible on the pigs, the thick fur and small body size of the rabbits often obscured these indicators, making it more difficult to determine stage of decomposition of the rabbits. Use of consistent methods of evaluation is needed in order for research data to be comparable to other studies and must be accurately applied to all specimens.

This project was supported by the National Institute of Justice, Office of Investigative and Forensic Sciences, United States Department of Justice. The opinions, findings, and conclusions or recommendations expressed in this presentation are those of the researchers and do not necessarily reflect the views of the Department of Justice.

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Reference(s):

1. Megyesi M.S., Haskell N.H., Nawrocki S.P. Using accumulated degree days to estimate the postmortem interval from decomposed human remains. *J Forensic Sci* 2005;50(3):1-9.

Forensic Anthropology, Decomposition, Taphonomy