



A102 The Differences in the Rate of Decomposition Between Frozen and Non-Frozen Human Remains

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After attending this presentation, attendees will have a greater understanding of the differences in the decomposition rate between previously frozen and never-frozen human remains that have been allowed to decompose in an outdoor setting.

This presentation will impact the forensic science community by adding to the research being conducted involving decomposition of human remains and how freezing impacts the rate of decomposition.

There is a need to understand the effect of freezing on decomposition rates. In some cases, research facilities need to store human remains before they begin documenting decomposition in an outdoor setting. There are also instances when remains from a homicide victim may have frozen due to low external temperatures before decomposing or the remains are stored in a freezer prior to relocation.

Freezing slows bacterial growth and therefore greatly reduces the rate of decomposition while the body is in a frozen state; however, there have been mixed results in studies examining the effect of freezing on post-thaw decomposition rates. An experiment conducted examining the effect of freezing on muscle tissue found no significant difference between frozen and unfrozen samples.¹ A more recent study using domestic pigs (*Sus scrofa*) found that previously frozen subjects and non-frozen subjects differ in rates of decomposition, with decomposition rates being slower in previously frozen pigs.² There have been no studies that have used whole body human donations in an outdoor setting to examine differences in decomposition between previously frozen and never-frozen subjects.

In this experiment, a total of ten human remains were placed in an outdoor setting at the Forensic Anthropology Research Facility in San Marcos, TX. All of the remains were placed on the ground surface, with half of them having been previously frozen. Each subject was placed unclothed in a supine position under a wire cage to prevent scavenging. The frozen and unfrozen remains were pair matched for season of placement and body size. A Total Body Score (TBS) was calculated for each subject at approximately 100, 300, and 500 Accumulated Degree Days (ADD).³

Paired samples were compared using a scale of TBS <10, TBS 10-20, and TBS >20. There were no statistically significant differences in TBS between previously frozen and never-frozen remains at any ADD period; however, after 100 ADD, frozen remains consistently have higher TBS. At approximately 100 ADD, only 20% of the paired samples scored in the same TBS range. Forty percent of the paired samples demonstrated that never-frozen human remains decomposed at a slower rate than previously frozen remains, while the other 40% of the pairs displayed the opposite pattern. At approximately 300 ADD, 40% of the paired samples scored in the same range, while the previously frozen bodies decomposed more rapidly than the never-frozen bodies in 60% of the pairs. At approximately 500 ADD, 20% of the paired samples had the same TBS range, but the never-frozen bodies had a greater TBS in 60% of the pairs.

This research provides evidence that freezing does have an effect on the decomposition rate of human remains,



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especially after more than 100 ADD. These observations indicate that after approximately 100 ADD, previously frozen human remains decompose faster than their never-frozen counterparts. While the pattern observed in this study differs from the previous study using pigs, the conclusion is the same.² That is, the rate of decomposition between previously frozen and never-frozen remains should not be compared in taphonomic studies examining the relationship between TBS and ADD.

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Reference(s):

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Decomposition, Frozen, Total Body Score