



Physical Anthropology Section - 2014

H128 The Stone Cold Truth: Preliminary Results of the Effect of Concrete Encasement on the Rate and Pattern of Soft Tissue Decomposition

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After attending this presentation, attendees will gain knowledge of the rate and pattern of decomposition of remains interred in concrete over one year in southern Illinois. Furthermore, attendees will learn the best practice for removing remains from concrete while maintaining the highest level of evidence preservation.

This presentation will impact the forensic science community by reporting a successful method for removal of remains encased in concrete and highlighting differences in the rate and pattern of individuals encased in concrete when compared to individuals decomposing in other taphonomic circumstances. The results of this study will show that estimates of Postmortem Interval (PMI) using traditional methods differ dramatically when used on "natural" and concrete interment victims, possibly hindering several aspects of criminal investigation.

Eight pigs (*Sus scrofa*) (27-36kg) were assessed to investigate differences in decomposition between individuals buried in concrete versus surface placement. All research in this study took place at the Complex for Forensic Anthropology Research (CFAR). Subjects were attained from the Southern Illinois University (SIU) Swine Research Center and were euthanized for other reasons of individual health. Each subject was placed on a 15cm bed of Quikrete Concrete® in a one-meter-square hole dug 30cm deeper than individual laying height. Enough concrete was then poured over the subject to cover it with an even depth of 15cm of concrete. Depending on the size of the pig, this required 437-582kg of concrete (11-15 80lb. bags). A control subject was placed on the surface at CFAR at the same time as initial encasement.

Subjects were removed from their encasements at monthly intervals for five months and bimonthly intervals from the next six to twelve months. Methods of removal ranged from using manual concrete chisels and hammers of various weights, to air, and electric, powered chisels. The best method identified in this study involved digging ~0.5m-wide trenches around the interment for ease of access to the sides of the concrete block and then removing 2.5cm strips of concrete with pointed concrete hand chisels. Care must be taken to ensure soft tissue and material evidence attached to the concrete is retained.

Results demonstrate encasement in concrete severely slows decomposition, with subjects excavated after one year being in early stages of decomposition. The Total Body Score (TBS) method was utilized at the time of excavation for each subject to assess decomposition stage.¹ The concrete subjects yielded substantially lower TBS. By three months (25,949.45 Kelvin Accumulated Degree Days (KADD)), the control subject was nearly completely skeletonized yielding a TBS of 30, while the concrete subject yielded a score of 7, barely entering the "early" decomposition stage. Skin slippage of concrete subjects was first witnessed at four months. At one year (105,339.16 KADD) purging of fluids and intact organs were present yielding a TBS of 12 for the final subject excavated. These results are contrary to recent findings of Gibelli and colleagues, who report mummification, significant adipocere formation, and partial skeletonization of subjects after six months in concrete.²

Additionally, decomposition pattern differed greatly between control and research subjects. Individuals encased in concrete may be more difficult to locate in clandestine disposal situations, as no odor permeated the concrete until it was breached, insect activity was not noticeably higher in the local area, and motion-activated cameras revealed no scavenger interest in these subjects. The outer layer of skin was also chemically burned and adhered to the concrete. This was most likely due to both the exothermic reaction of the concrete curing process (reaching temperatures over 60°C) and exposure to harmful chemicals in the concrete such as lime and calcium sulfate. Any superficial markings or staining on the skin of the victim may be compromised due to these processes, so examination of these concrete pieces should be performed to minimize evidence loss.

The recorded data show differences in both the rate and pattern of decomposition when subjects interred in concrete are compared to controls placed on the ground surface. Concrete encasement protects subjects from scavengers and insects alike, severely hindering decomposition. The pattern is also unique, as the outer layer of skin burns and adheres to the concrete. One should expect traditional methods of estimating PMI to yield skewed results when dealing with concrete interments. Continued research is necessary and ongoing.

References:

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Concrete Burial, Taphonomy, Forensic Anthropology