H52 Distinguishing Features of Thermal Destruction on Fleshed Wet and Dry Remains

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After attending this presentation, attendees will have knowledge of differences in burn characteristics found on fleshed, wet, and dry burned bone. These features may be used to speculate the condition of human remains (fleshed, wet or dry) prior to a burn event.

This presentation will impact the forensic science community by contributing to knowledge regarding the condition of remains prior to the burn event.

The discovery of burnt bone often evokes questions about the condition of the body prior to burning. Although several observational and experimental studies (Krogman, Baby, Binford, Symes *et al*) have defined features on bones that were burnt in fleshed, wet, or dry states, contradictions in interpretations exist.[1-4] Color change, heat-induced fracture patterns, joint shielding, as well as shrinkage and warping have been found most useful in distinguishing burned, fleshed and wet bone from dry burned bone.

The purpose of this study was to score traits attributed to thermal damage on burned skeletal elements as a means to evaluate the reliability of these traits and to assess the relationship of these features to the body's condition (fleshed, wet or dry).

For the current study, 94 skeletal elements from 23 forensic cases (2 fleshed, 9 wet, 12 dry) were used. The South African Police Service had brought these remains to the Department of Anatomy, University of Pretoria for skeletal analysis between 1998 and 2009. Traits that are associated with burned bone were scored as either 0 (absent) or 1 (present). These included: greasy surface; joint shielding; defined tissue border; white tissue border; brown tissue border; predictable cracking in tissue border; minimal cracking around burned area; a heat line; cortical delamination; calcined bone; charred bone; and decomposition staining. Three observers independently scored these traits on each bone. A chi-squared test was performed to evaluate inter-observer error and differences in bone condition (fleshed, wet or dry).

No statistically significant difference was observed among observers. This demonstrates reliability in scoring these traits in a binary form. When all ten traits were compared, a statistically significant difference was noted among fleshed, wet and dry bone (p-*value* < 0.001) and between fleshed and wet bone (p-*value* < 0.001). The presence of joint shielding, defined tissue borders, white border, predictable cracking in tissue border and charred bone were found more often in fleshed than wet bone. As expected, wet bone was more likely to have a greasy surface, defined tissue border, white tissue border, predictable cracking in tissue border, and cortical delamination than dry bone (p-*value* < 0.001).

Differences between fleshed, wet, and dry bone are observable and can be easily quantified among researchers. Fleshed skeletal remains show a normal burn pattern as previously defined by Symes *et al*.[5] Whereas, wet bone, which has retained enough organic content and moisture, presents with similar changes in warping and shrinking as fleshed bone but results in a burn pattern that is different from fleshed and dry burned bone. Dry bone has lost all its organic components and moisture; thus, responding differently to thermal alteration. Warping of dry bone does not occur and therefore thermal related fracture patterns differ in comparison to fleshed or wet bone. Ultimately, the condition and organic composition of the remains at the time of burning affect the manner in which a bone will burn.

Further research is needed to assess sequential changes in the burn patterns with the progression of decomposition. This can aid in the taphonomic profile of unidentified skeletal remains and possibly in the estimation of time-since-death.

References:

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Burned Skeletal Remains, Taphonomy, Observational Study

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