H20 The Effects of Fire Suppression Techniques on Burned Bone

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After attending this presentation, attendees will understand the causes and types of secondary fractures produced on burned pig (Sus scrofa) bones by two distinct fire suppression techniques: (1) water from a portable fire engine with a pressurized hose; and (2) hand-held compressed air/chemical portable fire extinguishers.

This presentation will impact the forensic community by presenting the differences of fracture patterns produced by natural burn, natural cooling, handling, pressurized water, and hand-held compressed dry chemical portable fire extinguishers. Results from this study will allow forensic anthropology practitioners to better discriminate between fractures caused by heat exposure and those caused by fire suppression techniques. In particular, this research will clarify the description and identification of fracture patterns resulting from the two most common suppression techniques employed at fire scenes.

Pope and Smith (2004) discuss five typical fire scene events that damage bone: (1) falling debris; (2) heat embrittlement; (3) types of fire extinguishments; (4) manual handling of the burned remains; and, 5) transport of the burned remains. This research will focus upon fire extinguishment methods. It will be shown that burned remains extinguished by pressurized water or portable fire extinguishers produce differences in secondary trauma fragmentation and fractures compared to burned remains allowed to cool naturally (i.e., no fire suppression technique employed).

This study examines the results from experimentally burning four intact fleshed pig carcasses for four hours on mattresses. Test one involves burning the fleshed remains of one whole pig with no method of fire suppression employed, with the remains allowed to cool naturally.

Test two involves physical removal of the burned remains from the fire and allowed to cool, which simulates conditions where firefighters hastily remove remains from the fire scene. Test three examines the effects of using pressurized water extinguishment from a fire engine. Test four examines the postmortem condition of burned remains that were extinguished using a hand-held compressed air/chemical portable fire extinguisher.

Several variables are held constant for each of the four tests: size of the fire and amount and type of fuel, size of the pig, temporal exposure of the body, and condition of the bone (DeHaan 2002). In addition to these variables, the duration of the fire will be held constant for tests two through four, which will be allowed to burn for four hours, the approximate time it will take for the majority of appendicular bones to be defleshed and fractured from heat (de Gruchy and Rogers 2002).

Comparisons between the burned bones from each of the four tests (natural cooling, cooling and manual removal from the fire, pressurized water, and hand-held compressed dry chemical portable fire extinguisher) will be outlined. Examination of secondary post-fire fractures caused by the different types of suppression techniques will be performed through both macroscopic and microscopic comparative analyses, with variables including bone fracture type and size, fragmentation degree, length, width, and external/internal color scored for each bone. Type of trauma, distinguished between heat-related fractures caused by fire, post-fire fractures caused by handling/external pressure due to fire suppression and post-fire fractures caused by handling and transport alone will be demonstrated. This ability to distinguish between heat-related, post-fire extinguishment, and post-fire handling fractures is important to forensic anthropologists who are confronted with burned bones, and this research will allow practitioners a better understanding of the mechanisms of bone fracture caused by fire suppression techniques.

Burned Bone, Fire Suppression, Secondary Fractures

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