H140 A "Realistic" Study of Sharp Force Trauma Recognition in Burned Remains: The Forensic Implications

Dagmar P. Heinrich, MSc, UCL Dept of Security & Crime Sci, 35 Tavistock Square, London, Greater London WC1H 9EZ, UNITED KINGDOM; and Ruth Morgan, PhD, University College London, UCL JDI Ctr for Forensic Sciences, 35 Tavistock Square, London WC1H 9EZ, UNITED KINGDOM*

After attending this presentation, attendees will gain an understanding of the effects of fire on trauma in bone and of the methodologies utilized in corresponding experimental forensic anthropological research.

This presentation will impact the forensic science community by demonstrating what the effects of fire modification are on Sharp Force Trauma (SFT) in bone, specifically the thoracic region of fully fleshed and clothed remains burned in a realistic fire scenario. This presentation will also highlight that caution should be used when designing forensic experimental studies and assurances should be made that experimental conditions reflect forensic reality.

Research into fire modification of bone is necessary in forensic investigations, as clandestine fires can be used to cover up a homicide by attempting to destroy evidence of trauma and contact to the perpetrator or identity of the victim.[1,2] Previous research studies have utilized (partly) defleshed bones and fire substitutes such as furnaces and gas cookers in their research into burned bone and/or SFT.[3-5] These conditions don't reflect actual crime scenarios; therefore, this study proposed to mimic forensic reality by using whole, clothed remains, stabbed in the thorax, and burned in a real fire. Research was conducted with help of the West Midlands Fire Service Research and Investigation Unit. This study presents the findings of a study that intended to determine the effect of fire modification on SFT, expecting warping, color change, and fracturing of the bone and trauma location.

To create a realistic experimental design, freshly slaughtered fleshed and clothed *sus scrofa* were stabbed using two knives (a serrated and a non-serrated kitchen knife) in the thoracic region, reflecting the most common homicide type in England and Wales.[6-8] Two fire scenarios were used: an accelerated pyre and a body doused in white spirits and left on the ground, to represent a body dump. The fires were left to burn for 2 hours. The West Midlands fire service extinguished the fires as they would any other fire of this kind. The remains were removed from the fire, bagged, and taken to the lab where the ribs were excised and cleaned. Following cleaning, analysis of the ribs was possible.

Unexpectedly, there was little to no fire modification of the bones, let alone of the trauma. Sample A, burned on the pyre, exhibited severe burning to level 3 of the Crow-Glassman scale; the forelimbs, cranium and vertebrae were severely burned.[9] Despite this extensive burned exterior, the ribs were safely encased in the surrounding flesh, with only some charring at the stab sites. Sample B showed only minor charring of the skin, although fat had escaped from the stab wounds and rendered down; the remains had failed to "burn." There was no fire modification of the ribs of sample B.

The results of this experiment were surprising given the findings of previous research in this field and the similar, albeit more realistic and larger scale experimental approach taken in this study. There was no notable fire modification of the SFT present in the ribs. These findings raise questions regarding the validity of conducting forensic research that does not sufficiently incorporate forensic reality of an actual crime scenario into the experimental design, and the implications of these findings for forensic science research will be discussed in the presentation.

References:

1. Fanton L, Jdeed K, Tilhet-Coartet S, Malicier D. Criminal burning. Forensic Sci Int 2006;158(2-3):87-93.
2. DeHaan JD. Fire and bodies. In: Schmidt CW, Symes SA, editors. The analysis of burned human remains. UK: CRC Press, 2008:1-13.
3. de Gruchy S, Rogers TL. Identifying chop marks on cremated cone: A preliminary study. J of Forensic Sci 2002;47(5):1-4.
4. Thompson TJU. Heat-induced dimensional changes in bone and their consequences for forensic anthropology. J Forensic Sci 2005;50(5):1008-15.
5. Poppa P, Porta D, Gibelli D, Mazzucchi A, Brandone A, Grandi M, Cattaneo C. Detection of blunt, sharp force and gunshot lesions on burnt remains: A cautionary note. Am J of Forensic Med and Path 2011;32(3):275-79.
6. Hunt AC, Cowling RJ. Murder by stabbing. Forensic Sci Int 1991;52(1):107-12.
7. Home Office. Homicides, firearm offences and intimate violence 2010/11. UK: 2012.
8. Bohnert M, Hüttemann H, Schmidt U. Homicides by sharp force. Forensic Path Rev 2006;4:65-

 ** Presenting Author*

89.
9. Glassmann DM, Crow RM. Standardization model for describing the extent of burn injury to human remains. J Forensic Sci 1996;41(1):152-4.

Forensic Research, Sharp Force Trauma, Fire

 ** Presenting Author*