E84 A Comprehensive Comparison of Various Postmortem (PM) Fingerprint Recovery Techniques

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After attending this presentation, attendees will understand the time, effort, personnel, supplies, cost, and issues involved in manual PM fingerprint recovery from Unidentified Human Remains (UHR) as compared to digital PM fingerprint recovery. The unpredictable condition of UHR resulting from various stages of decomposition is widely known throughout the forensic identification community. This unpredictability leads to various issues involved with recovering examination-quality fingerprints for forensic identification purposes.

This presentation will impact the forensic science community by comparing the time, effort, personnel, supplies, cost, and issues involved for various PM fingerprint recovery techniques. This presentation will provide results from a controlled experiment in an area with very little previous research and broaden the understanding of the different aspects of PM fingerprint recovery. A thorough understanding of the strengths and limitations of these techniques can enable Medical Examiner/Coroner's (ME/C) offices to better plan time management, resources, supplies, and personnel involved in PM fingerprint recovery for daily caseloads, as well as for Mass Fatality Incidents (MFIs).

Various methods for fingerprinting the deceased have significantly advanced and are continually progressing due to ongoing research, publications, and information sharing; however, even with the advancement of techniques, the manual recovery of PM fingerprints requires a significant amount of time, effort, personnel, supplies, and cost, especially when dealing with remains exhibiting significant PM changes. [1-8] Each case of PM fingerprint processing may require a unique combination of techniques due to the circumstances and environment surrounding an individual's death. Recovered remains may exhibit significantly compromised friction ridge skin depending on the severity of PM changes, such as rigor mortis, dehydration, decomposition, and animal/insect activity. As such, the condition of the friction ridge skin on each individual finger dictates which method must be used to successfully enhance and record any valuable friction ridge information. Multiple techniques may be used on each finger and the time and cost to employ them can vary considerably. Additionally, the forensic examiner may have only one chance to capture an examination-quality fingerprint record before a significant portion of the information is unsalvageable. Thus, the examiner should be properly educated and trained in the various PM fingerprint recovery techniques.[3,7]

Some ME/C offices and Law Enforcement Agencies (LEAs) have started to use digital livescan devices to capture fingerprints from the deceased. The benefits of PM digital fingerprint capture include immediate feedback on the quality of the fingerprint being obtained, as well as rapid response with results through various fingerprint databases. The development of mobile biometric devices could be used with single or multiple fatalities for the accelerated acquisition of fingerprint identification data with the potential for rapid identification. Previous studies of contact scanners reported that a full set of examination-quality fingerprints could be acquired in 45 to 90 seconds; however, fingerprints were only obtained from decedents where friction ridge detail was visible to the naked eye using contact scanners, but they could not be acquired from bodies affected by fire or showing advanced changes of decomposition. Furthermore, the devices had to be routinely decontaminated.[9,10]

The research discussed in this presentation explores the use of non-contact, 3D fingerprint scanners to evaluate their potential PM fingerprint capture. This research includes a series of fingerprint collections from taphonomically altered human remains, designed to mimic the types of cases that would be encountered in ME/C offices. Additionally, the research will benchmark non-contact 3D PM fingerprint recovery against existing manual and digital collection techniques in terms of quality of fingerprints and efficiency, as well as the time, personnel, and supplies necessary to process and record the fingerprints.[11]

The purpose of this presentation is to quantify, compare, and contrast all manual and digital PM fingerprint recovery techniques. Specific resources and supporting data will be provided for the time, resources, personnel, and costs involved for the various fingerprint recovery techniques currently available to the forensic community. In conclusion, streamlined PM fingerprint recovery techniques would be especially helpful for large agencies exhibiting a high caseload and during MFIs, when time and resources are significantly limited.[3]

Reference(s):

1. Kahana T., Grande A., Tancredi D., Penalver J., Hiss J. Fingerprinting the deceased: traditional and new techniques. *J For Sci* 2001, 46 (4): 908-912.
2. Miller R. Recovery of usable fingerprint patterns from damaged postmortem friction ridge skin. *Journal of Forensic Identification* 1995, 45, 602-605.
3. Mulawka M., Miller L. Postmortem Fingerprinting and Unidentified Human Remains. *Routledge*, 2014.
4. Mulawka M., Mosco M., Uhle A., Mokleby L. The Efficacy of Combining Various Fingerprint Acquisition Techniques to Obtain Examination-Quality Postmortem Fingerprints from Unidentified Human Remains. Proceedings of the American Academy of Forensic Sciences, 65th Annual Scientific Meeting, Washington, DC. 2013.
5. Mulawka M. *A Uniform Protocol to Address the Rapidly Accumulating Unidentified Remains and Missing Persons in the United States - Our Nation's Silent Mass Disaster* (Master's Thesis). National University, La Jolla, California, 2008.
6. Tomboc R. Obtaining Fingerprint and Palmprint Impressions from Decomposed Bodies or Burn Victims using the Mikrosil Casting Method. *Journal of Forensic Identification*, 2005, 55 (4), 471-475.
7. Uhle A.J. The Boiling Technique: A Method for Obtaining Quality Postmortem Impressions from Deteriorating Friction Ridge Skin. *Journal of Forensic Identification*, 2007, 57 (3), 358-369.
8. Uhle A. Fingerprints and human identification. *Forensic Dentistry*. CRC Press, 2010.
9. Garrett R. Printing Decomps: Livescan and Digital Fingerprint Systems Streamline Identifying the Deceased. *Law Enforcement Technology*. 2006, 33(6), 22-24.
10. Rutty G., Stringer K., Turk E. Electronic fingerprinting of the dead. *Int J Legal Med*, 2008, 122(1), 77-80.
11. Mulawka M., Troy M., Reinecke G., Agaian S. *Evaluation of the Use of A Non-Contact, 3D Scanner for Collecting Postmortem Fingerprints* (Current Research). NIJ FY 14 Research and Development in Forensic Science for Criminal Justice Purposes Grant Award # 2014-IJ-CX-K003.

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