

TRACE DNA FROM CARTRIDGES AND CASES: A STUDY OF THE COMPARATIVE SUCCESS RATES OF SWABBING, TAPING AND VACUUM FILTRATION

Prasad E¹, Hitchcock C², Raymond J³, van Oorschot RAH^{4,5}, Cole A⁶, Barash M¹, Gunn P¹, McNevin D¹

¹ Centre for Forensic Science, University of Technology Sydney

²NSW Health Pathology, Forensic & Analytical Science Service

³Forensic Evidence & Technical Services Command, NSW Police Force

⁴Office of the Chief Forensic Scientist, Victoria Police Forensic Services Centre

⁵School of Molecular Sciences, La Trobe University

⁶Forensic Ballistics Investigation Section, NSW Police Force

The recovery of trace DNA from fired cartridge cases has become an area of broad interest due to its potential value in identifying handlers of ammunition prior to or during a criminal event or providing links to persons of interest. Traditional DNA collection methods such as swabbing have previously resulted in limited success. However, recent studies published in journals and online sources have demonstrated varying success rates in obtaining human DNA from fired cartridge cases utilising novel DNA collection techniques.

This study aimed to compare the success rates of three DNA collection methods including swabbing, taping and vacuum filtration on the recovery of DNA from fired and unfired cartridges. For each method, five calibres of ammunition were tested. For each calibre, cartridges were spiked with a 5µl aliquot of diluted saliva, equating to 20ng, dotted randomly across the outer walls. Fired and unfired as well as brass and nickel cartridges were also tested to examine any effects of firing and metal composition on DNA recovery, respectively. Quantitative analysis of DNA recovery showed that swabbing and taping returned higher average rates of DNA recovery compared to vacuum filtration. Unfired nickel cartridges showed higher DNA recovery than fired nickel cartridges, while no differences were found between the fired and unfired brass cartridges. The work presented here is part of a more extensive study aiming to determine an optimal DNA sampling method for implementation into routine casework. Ongoing research also seeks to test the optimal sampling method on handled cartridges, which are more representative of casework samples.