1 pm on Thursday 3\textsuperscript{rd} December 2015 in room 201 Physical Sciences Building

"TRANSFORMING GSR EVIDENCE – ASSESSING THE PERSISTENCE AND TRANSFERENCE OF GUNSHOT RESIDUES"

Presenter: Nick Lucas  
PhD Student  
School of Chemical & Physical Sciences  
Flinders University

Abstract:  
Gunshot residue (GSR) is a valuable form of forensic trace evidence in the investigation of firearms crime. While a quantitative model for transfer of GSR and evaluation of the evidence has been elusive thus far\cite{1}, it is generally considered that the greater the amount of GSR detected on a suspect, the more likely the GSR originated from a firing incident, rather than from secondary transfer \cite{2}. However, the casework experience is often equivocal, and the potential for secondary transfer may seriously affect the significance of results. To ensure a GSR test result is given appropriate weighting in court, the dynamics of the deposition, retention and distribution of GSR in the aftermath of a firing event must be clearly understood. The focus of this research is to further develop a logical framework for the assessment of GSR evidence in Australia.

To begin with, cases of suicide were used as a means to approximate the maximum distribution of GSR as applicable to shooters in firearms crime. As the retention of GSR on a subject is significantly influenced the activity of the subject after firing \cite{3}. Cases of suicide involving a firearm provide an opportunity to assess GSR distribution and retention, assuming no movement of the shooter after firing, therefore representing a particle maximum. Seventy-one cases of suicide by gunshot in South Australia between 1998 and 2014 were examined to collect data on firearm type, calibre, and gunshot residue test results. Overall, 47\% of cases were found to produce GSR results of little probative value, even though it was known that the shooter had fired a firearm. Of particular interest were cases involving 0.22 rim fire ammunition, for which characteristic particles are not expected due to lack of antimony present in the primer\cite{4}. Despite this, 64\% of these cases resulted in the detection of antimony-containing, three component particles, indicating that significant numbers of three component particles may be present in cases where they were previously unexpected. Despite the lack of activity by the subject, GSR particle recovery was still seen to fall significantly with time.
Ongoing studies will be directed at assessing the conditions under which cross-contamination through secondary transfer between law enforcement and suspects during the process of arrest. Further investigation will involve conducting sampling from areas other than the hands (e.g., hairline, nose, ears) to assess the potential for these sites to better retain GSR, or be less prone to secondary transfer.

References