

E86 Discrimination Between Aerial and Targeted Shooting by the Analysis of Trace Evidence: A Case Study

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Learning Overview: After attending this presentation, attendees will understand the use of trace evidence analysis to establish trajectory of the bullet and to discriminate between aerial and targeted shooting.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by illustrating the use of Scanning Electron Microscopy with Energy-Dispersive X-ray Spectroscopy (SEM/EDX) for the analysis of trace evidence trailing on the bullet and to reach a definite conclusion regarding aerial or targeted shooting.

A suspected shooting took place in the area around the residence of a famous personality from the Pakistani judiciary. The matter was highlighted in the media and led to chaos. It was suspected to be a targeted shooting. However, no loss of life or injury to the residents took place. The matter was taken up by the provincial government and the crime lab was requested to unveil the facts behind the incident. The task was to determine that either the incident was some terrorism activity (targeted firing) or the bullets could have been the result of some aerial shooting (i.e., stray bullets).

The crime scene investigation team found two bullets, one (30-bore pistol) bullet found in the garage and the second (9mm pistol) found in the backyard area shaded by a fiberglass shed. The team noticed a suspect hole in the fiberglass just above the area where the 9mm bullet had landed. Both bullets and a portion of the fiberglass that had the suspected piercing damage in it were submitted to the trace chemistry department to determine whether these were the result of targeted shooting or were stray bullets.

Keeping in mind the case scenario, an analysis strategy was devised to establish the trajectory/path that both the bullets could have followed to approach the target. The bullets were initially examined through low power magnification light microscopy followed by SEM/EDX to observe the surface of the bullets for the severity of impact and for the detection and identification of any traces of building material, vegetation, paint, or something else adhering to the bullets. No significant damage (deformation) was observed on either bullet tip, which could have come about as the result of targeted firing impacting the hard targets. However, the SEM/EDX examination revealed that the 9mm pistol bullet had some greenish material impinged into the damage site of the bullet, which was identified as the fiberglass through SEM/EDX. A relatively minor bullet defect is an indication of possible aerial shooting because the velocity of the bullet may have been slowed due to air drag, and the speed was further reduced by striking and passing through the fiberglass shed. Whereas, the second 30-bore pistol bullet was found to have only traces of silicate (i.e., soil material) adhering to the side of the tip along a soft depression due to the free-fall parabolic path impact on the ground.

The SEM/EDX analysis of aluminum stubs coated with pure carbon adhesive prepared by a single perpendicular dab just on and around the defect hole in the fiberglass revealed the presence of copper and consistent Gunshot Residue (GSR) particles. The presence of GSR particles around the hole in the fiberglass sheet of the shed indicates that the hole had been sourced from the bullet during its entry through the fiberglass sheet.

The bullet-intermediate target interaction, path of the travelled bullets, origins of trace evidentially valued deposits on bullet, traces of the bullet jackets and the gunshot residues due to the bullet wipe on the fiberglass shed, and, finally, the extent of bullet's surface deformation demonstrates that the incident was an aerial shooting as opposed to a targeted shooting.

Forensic Investigation, Trace Evidence, Aerial/Targeted Shooting