E106 A Comparison of Gunshot Residue (GSR) Visualization With Alternate Light Sources (ALS) and Infrared (IR)

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Learning Overview: After attending this presentation, attendees will understand how ALS and IR light is used to locate GSR on dark-colored substrates and recognize the need for additional research concerning the detection of GSR on painted surfaces.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by promoting a better understanding of the capabilities of ALS and IR in visualizing GSR on dark-colored surfaces and will also help attendees understand the need for additional research on how paint may affect visualization of GSR.

Initial detection of GSR at a crime scene, even if presumptive in nature, may aid investigators in better understanding shooting scenes and can be very valuable during a variety of investigative tasks, particularly interviews and evidence collection. GSR can be observed on many surfaces; however, dark-colored surfaces often obscure it. This study examines two methods of presumptively detecting the presence of GSR on dark-colored surfaces, both ALS and IR.

Four types of ammunition (.22, .223, 9mm, and .45) were fired five times each from a distance of six inches into two substrates: (1) black, cotton tee-shirt samples, and (2) drywall samples painted with Valspar® Black Gloss Latex Enamel paint. The samples were later observed using Sirchie TMX (395nm and 450nm) and Sirchie Megamax (530nm) ALS light sources with appropriate orange and red barrier filters, and a Fuji XT1 IR camera with IR 695 and IR 830 filters was utilized, in conjunction with 100-watt incandescent light sources, to observe the samples with IR. All samples were viewed with the same ALS and IR equipment prior to shooting for control purposes. No particles were detected on any of the samples prior to shooting.

GSR was visualized on all 20 cotton tee-shirt fabric samples using both IR (both filters) and ALS 450nm. ALS 530nm allowed visualization of GSR on 14 of the 20 samples, while ALS 395nm allowed visualization of GSR on seven of the 20 samples. GSR was not identified on any of the painted drywall samples using any of the light sources.

The GSR observed with IR on cotton fabric was located in close proximity to the bullet defects, while the particles observed with ALS (all wavelengths) were scattered and found up to four inches away from the bullet defects. Though these methods should only be applied as search tools, the GSR identified with IR could be easily interpreted due to its contiguous presence around the circumference of the bullet holes. However, the scattered particles detected with ALS could cause interpretation difficulties when other trace particles are present, thus potentially minimizing some of the immediate interpretative value of the evidence.

The inability to visualize GSR on the painted drywall using either method is significant. Additional research could analyze how other paints may affect visualization and seek alternative visualization methods.

GSR, Infrared, ALS