



B134 Chemical Analysis of Gunshot Residues on Typical Mortal Wounds

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The goal of this research was to detect the typical and fatal wounds caused by firearms projectiles.

This presentation will impact the forensic community and/or humanity by confirming whether or not wounds were caused by firearm projectiles. If so, the firing distance can also be calculated by analysis of many chemical compounds found on entrance wounds as well as exit wounds as well as holes in the clothes.

Firing a firearm produces combustion of primer and gunpowder in the cartridges. The residue of the combustion product, unburned primer, or powder components can be used to detect the firing status. The residue may be found on the skin of a body or clothing of the victim or target of firing, on an entrance wound, or other target materials at the scene. The discharge of a firearm can deposit residues on a person in close proximity.

The major primer elements are lead (Pb), Barium (Ba), or Antimony (Sb). Usually all three are present less common elements include aluminium (Al), Sulphur (S), Tin (Sn), Calcium (Ca), Potassium (K), Chlorine (Cl) and Silicon (Si). In addition, primer residue may adhere to fired bullets or projectiles and gradually ablate through the path of the projectiles. Thus primer residue may be found in target or entrance wounds and/or exit wounds.

The cartridge case, bullet, bullet coating, and metal-jacketed bullet also contain specific elements that can be detected by the process of chemical analysis. Virtually all cartridge cases are made of brass (70% copper and 30% zinc) although a few have a nickel coating. Primer cases are also made of similar composition. Bullet cores are most often made of alloys of lead and antimony. Bullet jackets are usually made of brass (90% copper and 10% zinc) and alloys of copper and nickel.

Modern gunpowder, known as smokeless powder, can contain up to 23 organic compounds. Nitrocellulose is virtually always present along with other compounds containing nitrate or nitrogen. Modern gunpowder is also described as 'single-base' when the basic ingredient is Nitrocellulose and 'double-base' when 1 to 40% nitroglycerine is added.

In the physical examination of the target for gunshot residues it may be remembered that lead residues may be found up to 30 ft from the muzzle and always present on the opposite side of penetrated target. Though the amount of residue deposited tends to decrease with increasing range of fire, the actual deposits can be highly variable for a range up to 20 cm.

On using the above process of chemical analysis gunshot residues were detected on typical mortal wounds, those responsible for firing on the target, the direction of firing, and position of firing, etc. Cases containing wounds and holes in clothing were confirmed whether or not the wounds or holes were caused by firearm projectiles.

Wounds, Analysis, Holes