Title : Determining the firing distance from the pattern of gunshot residue on fabric using color test

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ABSTRACT

This study focuses on developing a method to estimate shooting distances based on the distribution of gunshot residue found on fabric surfaces. Test firings were conducted at distances of 2, 5, 10, 15, 20, 40, 60, 80, 100, 150, and 200 centimeters from the muzzle to the target. The study utilized physical examination to observe burned and unburned particles, chemical examination using the Modified Griess Test to detect nitrite residues, and the Sodium Rhodizonate Test to detect lead from the bullet. These methods were used to analyze the radius and pattern of gunshot residue distribution. The results showed that physical examination could estimate the shooting distance from the distribution of gunshot residue within the range of 2 to 40 centimeters from the muzzle to the target, with the residue distribution radius ranging from approximately 3.83 to 2.67 centimeters. The lowest coefficient of variation in the data set was 3.8%. The chemical examination using the Modified Griess Test could estimate the shooting distance from the residue distribution within the range of 5 to 80 centimeters, with a distribution radius ranging from 1.57 to 10.7 centimeters. The lowest coefficient of variation in the data set was 2.4%. The Sodium Rhodizonate Test could estimate the shooting distance within the range of 2 to 40 centimeters, with a distribution radius ranging from 3.67 to 2.3 centimeters. The lowest coefficient of variation in the data set was 0%. Combining these methods to examine the gunshot residue distribution can yield accurate estimates of the shooting distance, providing reliable scientific evidence that is crucial for legal considerations.