H135 Experimental Shots in Tissue-Simulant Materials and Analysis Through Computed Tomography (CT) Scanning

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Learning Overview: After attending this presentation, attendees will understand the contribution of modern wound ballistic experimentation in providing crucial information regarding bullet paths within the human body.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by providing a better understanding of experimental shootings in tissue-simulant materials, which is useful when handling complex cases.

Projectile paths through the human body and subsequent injuries may not always be predictable as they depend on a variety of factors, such as impact velocity, geometrical shape of the bullet, shooting distance, incidence angle, and affected tissue.

Ballistic gelatin materials were used as tissue simulants. Experimental shots were performed with various pistol and revolver types (9mm Parabellum®, .45 Automatic Colt® Pistol [ACP], .357 Magnum®, etc.) and with various bullet types (full metal jacket, hollow point). Furthermore, shots with rifles were conducted in 7.62 Kalashnikov and 5.56mm NATO calibers. Fired blocks were scanned by a Computed Tomography (CT) scanner thus allowing calculation of the density of entry/exit wound morphology as well as the bullet path deviation, according to the shooting line.

The analysis provided an opportunity to observe and calculate the characteristics of wound channels in a highly accurate numerical analysis and to evaluate the effectiveness of the used projectiles. The created wound paths represent the amount of energy that is transferred into the human body, which in turn can often be associated with the traumatic results. Density of the gelatin blocks was measured on average at 1.03g/ml.

Kinetic energy was measured and permanent cavities were determined by CT. A proportionality between the kinetic energy deposited in the used blocks and the resultant cavities could be visible. These experiments may prove quite useful in aiding routine forensic pathology practice as they document a bullet's path through the human body, thus providing invaluable confirmation of the autopsy findings.

Any subsequent effort to reconstruct the shooting using ballistic gelatin is useful in wound ballistic studies and enables us to document and record the wound track that a projectile follows in a simulation of the human body. The application of CT technology renders the objective easier, as any deflection, the total path length, and the final resting point of the projectile can be observed with great accuracy. Among the benefits is the calculation of the density of the gelatin used and the fact that the data can be recalled in the future for comparisons between them or for further analysis.

Forensic Science, Ballistic Gelatin, Experimental Shootings

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