Y7 The Limits of Blood Pattern Analysis (BPA) in the Analysis of a Forensic Case

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Learning Overview: After attending this presentation, attendees will be able to understand the founding principles of BPA and its practical application in a crime simulation case. Attendees will understand the ways BPA is applied and which responses it is able to give thanks to a careful, meticulous, and scrupulous inspection of the crime scene.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by demonstrating the usefulness of the BPA principles known at the time of drafting this presentation, which aspects of it can be effectively adopted and which ones require implementation or integration with other techniques or methods in order to guarantee an effective, rapid, truthful, reliable, and expendable response in the investigative activity, not only of the forensic pathologist, but also of the detective, the criminologist, and any figure interested in the crime scene investigation.

The biophysical characteristics of blood make it unique among biological liquids. In particular, its composition and its cellularity ensure that it has a specific behavior in every dynamic capable of determining the more or less rapid encounter with a surface.

Since blood traces can be found with high frequency in the crime scene, the knowledge on how these traces can be distributed according to the ways in which the crime took place can be useful if not decisive in the reconstruction of the facts. Such knowledge and skills fall under the term BPA. The trajectory delineated by a high-speed blood jet on a smooth wall or the fall of drops to the ground are just two examples of how the blood can show itself to the forensic pathologist called for an inspection: although BPA can't determine whether it is actually a blood trace or not, nor establish precisely the origin, whether it was a spontaneous or simulated phenomenon, a key feature of BPA is that it can already determine in a scientifically validated manner many characteristics of the crime scene without using the aid of chemical-physical, genetic, or toxicological analyses of the blood fluid based on purely physical principles.

This study was able to appreciate the usefulness of the principles of BPA in an inspection that took place in the city of Lamezia Terme, Catanzaro, Italy. A man requested help from emergency services, reporting a suicide attempt due to a stab wound. Upon arrival of first aid at the house, the man, who was still alive, was seen as having a puncture wound on the back of his hand of little significance and entity, difficult to connect to the impairment of vital functions. It was also evident that the second floor of the house itself and the stairs to reach it were stained with a liquid that, at first sight, was of a blood nature to an extent obviously incompatible with the timing of bleeding and maintenance of the subject's vital functions as well as with the wound itself. In particular, the room in which he was waiting for help had the walls and the floor copiously smeared with reddish liquid. Faced with the obvious discrepancy between the amount of blood found in the rooms and the subject's wound, considering that the subject's former partner, who was pregnant, was unreachable, and being unable to establish the hematic nature (or not) of the congealed material on the walls and floor and its origin through chemical-physical and genetic study, the rescuers' suspicions were oriented on the murder of the ex-partner by the subject in question with simultaneous wounding of the back of his hand in a hypothetical struggle, and the consequent concealment of the corpse.

The inspection of the crime scene, aimed at inspecting and collecting multiple biological traces, allowed the team, with careful observation based on the principles of BPA, to suspect the artificial nature of true blood traces, the staging of the entire scene, and the suicidal nature of the facts. The genetic and toxicological studies performed by the Carabinieri Unit of Special Investigations based in Messina, Italy, fundamental and necessary for confirmation, confirmed the team's suspicions.

Forensic Sciences, BPA, Simulation