Contribution ID: **203** Type: **Oral**

Advancement in Crime Scene Investigation with reference to Luminol test of Blood stains: A review

Blood is a bodily fluid containing Plasma and Blood cells. The plasma is the fluid part of blood, and the Blood cells comprise of Red Blood cells, White Blood cells and platelets which are suspended in the plasma. The human body is constituted around 8-10% by blood. Based on presence or absence of nucleus, blood cells are divided into White Blood Cells (WBC) and Red Blood Cells (RBC) and Platelets. Blood is one of the most significant pieces of evidence in the field of forensics. It can be useful for establishing connection between the suspect, victim and the scene of crime; the blood pattern and blood splatter analysis can be indicative of the mode of crime, movement of suspect or victim and is of vital importance in reconstruction of crime scenes. Bloodstains are not always visible an in obvious areas as the suspect might have cleaned off the scene of crime. But it is difficult to remove traces of spilled blood even if the surface is cleaned. Even if the scene of crime is spotlessly clean, blood stains can be determined and the possible areas containing blood stains can be highlighted by Luminol, a substance having chemiluminescent properties. Luminol reacts with the Iron (Fe) molecule present in hemoglobin molecule of RBCs emitting a faint bluish light. But luminol reacts with other iron containing compounds as well giving false positive results. To enhance the result of luminol, it might be possible to modulate luminol into other derivatives of luminol by using electrochemical and physical methods as well as using nanoparticles for the same. The incorporation of techniques like forming gold nanoparticle hybrids of luminol, alkylation, substitutions of groups in the luminol structure have seen widespread use in detection of health disorders as well as immunoassays. This study reviews various works done on formation of derivatives of luminol which can be used in the field of forensics for better and precise discovery of blood stains at the scene of crimes.

Keywords: Evidence; Forensics; Blood stain patterns; Blood splatter; Luminol; Nanoparticle hybrids; Alkylation; Substitution; Immunoassay.

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Track Classification: Forensic Sciences