FORENSIC ASPECTS OF HUMAN BLOOD EVIDENCE: FROM IMMUNOCHROMATOGRAPHIC TEST TO STR PROFILE

Horjan I¹, Barbaric L¹, Mrsic G¹,²

¹Forensic Science Center "Ivan Vučetić", Zagreb, Croatia; ²University Department for Forensic Sciences, University of Split, Split, Croatia

We investigated blood detection and STR profiles of simulated forensic evidentiary samples deposited on various substrates or treated with cleaning agents. Substrates with the trace deposited may itself introduce contaminants, while cleaning agents may alter the visible appearance of the trace. Furthermore, limited size of DNA samples can challenge the limits of PCR-based STR typing and question whether the trace yields sufficient good quality DNA for STR profiling. Immunochromatographic hemoglobin (ABAcad® Hematrace, HemDirect Hemoglobin) and glycophorin A (RSIDTM-Blood) tests were evaluated for sensitivity and specificity for the effects of substrates and the stain remover. Furthermore, potential negative effects on subsequent DNA analysis were tested. Data from this study support the notion that a full AmpFISTR®NGMTM DNA profile can be obtained from approximately 0.2 ng of starting DNA that equates to approximately 2 nL of fresh blood. The highest blood detection limit was observed for Hematrace® (approximately 2 pL of blood), HemDirect showed ten times lower sensitivity, while the lowest sensitivity was exhibited by RSIDTM-Blood (approximately 20 nL of blood). In addition, this test encountered the lowest efficacy in detection of blood treated with the stain remover containing active oxygen. None of the tested substrates (wood, metal, brick, and soil) neither stain remover influenced on test specificity, although soil substrate affected STR amplification.

Keywords: forensic science, blood tests, sensitivity, specificity, DNA analysis