OSAC RESEARCH NEEDS ASSESSMENT FORM

Title of research need: | Differentiating spatter from transfer for blood deposited on textiles

Describe the need:

SEE ALSO ATTACHED ADDENDUM for additional details.

Current limited research indicates variability in the way blood interacts with textiles, in particular fabrics, affecting resultant bloodstain appearance. This has implications for interpreting bloodstains on clothing. Past research indicates the appearance of bloodstains can be affected by fabric features such as type (manufactured or natural), absorbency, laundering, chemical treatments and construction (knitted or woven). Further research is needed to better understand how blood interacts with these fabric properties in order to relate the visual appearance of a bloodstain to its mechanism of deposition. Specifically of interest is how bloodstain observations and relevant textile properties can be utilized in attempt to distinguish spatter from transfer on textiles.

Keyword(s):

Blood, bloodstain pattern analysis, textiles, fabrics, clothing, spatter, transfer

Submitting subcommittee(s): | Bloodstain Pattern Analysis | **Date Approved:** | March 1, 2021

(If SAC review identifies additional subcommittees, add them to the box above.)

Background Information:

1. Does this research need address a gap(s) in a current or planned standard? (ex.: Field identification system for on scene opioid detection and confirmation)

Planned standard: Method for bloodstain pattern analysis on textiles or similarly titled.

2. Are you aware of any ongoing research that may address this research need that has not yet been published (e.g., research presented in conference proceedings, studies that you or a colleague have participated in but have yet to be published)?

Please refer to the Bloodstain Pattern Analysis Bibliography.

3. Key bibliographic references relating to this research need: (ex.: Toll, L., Standifer, K. M., Massotte, D., eds. (2019). Current Topics in Opioid Research. Lausanne: Frontiers Media SA. doi: 10.3389/978-2-88963-180-3)

Chang, J. and S. Michielsen (2016). "Effect of fabric mounting method and backing material on bloodstain patterns of drip stains on textiles." International Journal of Legal Medicine **130**(3): 649-659.

Cho, Y., F. Springer, F. A. Tulleners and W. D. Ristenpart (2015). "Quantitative bloodstain analysis: Differentiation of contact transfer patterns versus spatter patterns on fabric via microscopic inspection." Forensic Science International **249**: 233-240.

Li, X., J. Li and S. Michielsen (2017). "Effect of yarn structure on wicking and its impact on bloodstain pattern analysis (BPA) on woven cotton fabrics." Forensic Science International **276**: 41-50.

Williams, E. M. P., M. Dodds, M. C. Taylor, J. Li and S. Michielsen (2016). "Impact dynamics of porcine drip bloodstains on fabrics." Forensic Science International **262**: 66-72.

AAFS Standards Board, "ASB Technical Report 033 Terms and Definitions in Bloodstain Pattern Analysis" First Edition 2017.

4. Review the annual operational/research needs published by the National Institute of Justice (NIJ) at https://nij.ojp.gov/topics/articles/forensic-science-research-and-development-technology-working-group-operational#latest? Is your research need identified by NIJ?

Yes. "Understanding the interaction of blood with fabrics and textiles"

5. In what ways would the research results improve current laboratory capabilities?

Research would allow the analyst to understand and consider the limitations associated with bloodstains on textiles examined at the scene or in the laboratory. The ability to successfully distinguish transfer from spatter bloodstains can have serious implications in case work.

6. In what ways would the research results improve understanding of the scientific basis for the subcommittee(s)?

The research would provide underpinning scientific data that will further the understanding of bloodstain and bloodstain pattern formation on textiles such as clothing, upholstery and other fabrics. The majority of accepted analysis practices are based on blood interacting with non-porous surfaces. These practices do not necessarily apply to certain substrates such as textiles. Great variability exists in the properties of textiles, such as weave, knit, wettability, wicking properties, texture, and pigment. These properties influence the appearance of the resulting bloodstains. Other fabric conditions such as extent of wear (age of clothing), influence of washing, and surface treatments also influence resulting bloodstains.

7. In what ways would the research results improve services to the criminal justice system?

A better understanding of the limitations and implications of interactions between textiles and blood would provide the criminal justice system a more accurate and less subjective interpretation of a commonly encountered class of evidence.

8. Status assessment (I, II, III, or IV):

	Major gap in current knowledge	Minor gap in current knowledge
No or limited current research is being conducted	I	III
Existing current research is being conducted	II	IV

This research need has been identified by one or more subcommittees of OSAC and is being provided as an informational resource to the community.