CURRENT RESEARCH NEEDS FOR BLOODSTAIN PATTERN ANALYSIS

Research Subcommittee SWGSTAIN
April 7, 2011

Preamble

The following list represents the current research needs developed and agreed to by participants of the SWGSTAIN. The document is intended to focus research efforts on the most pertinent open questions within the discipline. It is neither exclusive nor prescriptive but rather indicative of current needs. No specific priority is intended by the order of this list.

1. Research that would minimize ambiguity in the characterization of small stain blood spatter patterns

Blood spatter patterns consisting of small stains created by different mechanisms can appear similar. Research is needed to develop methods that provide more discrimination between these patterns.

2. Research to evaluate the behavior of blood on fabric surfaces

BPA investigations frequently involve the examination of bloodstained clothing. Research is needed to develop an understanding of the complex problems of how blood transfers to, interacts with and persists on fabric surfaces.

3. Research to develop new methods to assist with the visualization of bloodstains on difficult surfaces

Without the use of enhancement techniques bloodstains can be difficult to visualize, especially on dark surfaces. Research is needed to develop and validate specialized techniques to locate, enhance and record bloodstains.

4. Research to develop new automated methods to record bloodstain patterns at crime scenes

The current manual methods of recording bloodstain data at crime scenes are time consuming, resource intensive and potentially subjective. Research is needed to implement new technologies and methods that would minimize subjectivity and maximize the amount of data that can be collected.

5. Research to determine the extent of bias in bloodstain pattern analysis

It is acknowledged that bias exists within forensic science, including bloodstain pattern analysis. Research is needed to determine what biases exist. Methods to identify, quantify and minimize such biases are required.

6. Research to develop methods to determine the age of bloodstains

Currently there are no validated methods to determine the age of a bloodstain. Research is needed to determine the factors that are relevant to the aging of a bloodstain and to develop reliable methods to determine a bloodstain's age.

7. Research to correlate bloodstain patterns at a crime scene with those on involved parties

Arguments in court often centre on the quantity of blood on relevant individuals, in particular defendants. It is known that the extent of bloodshed at a scene may not obviously correlate with the blood deposited on involved parties, their clothing and other items. Research is needed to develop an understanding of the distribution of blood during bloodletting incidents to assist the court with determining the extent of involvement of relevant individuals.

8. Research to develop new methods to simulate human blood, tissue and body parts to assist with reconstruction experiments

Experiments to investigate bloodstain pattern formation are limited by difficulties in simulating bloodletting events using human subjects. Research is needed to develop standard simulant materials to assist with physical and numerical modeling experiments.

9. Research to develop quantitative computer models for bloodstain pattern reconstruction

Experiments to test specific crime scene hypotheses and fundamental research into the complexity of bloodstain pattern formation are frequently expensive, time consuming, have health and safety implications and require ethical approval. Research is required to assess current numerical models and develop new quantitative computer models for bloodstain pattern reconstruction. These will require robust data sets derived from evidence examination and laboratory experimentation.

10. Research to develop reliable means of sequencing overlapping patterns.

Determining the sequence in which bloodstains were deposited can be difficult. Currently there are no established, validated methods by which this can be done. Research is required to develop methods to address this problem.

11. Research to determine the effect of the variation in blood composition on bloodstain pattern formation

Currently little is known about the effect of the variation in blood composition on the formation and appearance of bloodstain patterns. Research is required to determine the influence of drugs, medical conditions, age, body fluid mixtures and other factors on the properties of blood and bloodstain patterns produced from this blood.

12. Research to improve methods for presenting bloodstain pattern evidence within the legal environment

Bloodstain pattern evidence presented in the legal environment is not always clearly communicated or understood. Research is required to develop new methods to clearly present this type of evidence. This could include the use of visual aids to illustrate evidence, statistical techniques for the expression of likelihood and novel communication techniques.