



E8 Bioaffinity-Based Concepts in Forensic Serology

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After attending this presentation, attendees will understand that bioaffinity-based methods for the analysis of body fluids offer simplicity compared to traditional forensic analyses of such samples. In addition, attendees will also understand the concept of using such body fluids to identify originator attributes in a quick and straightforward manner.

This presentation will impact the forensic science community by providing new methods for the analysis of body fluids in order to generate essential information directly at a crime scene. Ultimately, these systems can be incorporated into field-deployable devices (similar to glucometers) or connected to hand-held smart devices, which will allow for rapid analysis of body fluids that can be used and interpreted by operators with no scientific training, thus revolutionizing the “front end” of forensic science.

The analysis of biomarkers has been used in the field of forensics for many years in the form of DNA (usually from blood) for identification purposes; however, the process of matching DNA samples is very time consuming and causes backlogs in many states. While this is a useful tool, it may not be the best method of analysis during an active criminal investigation. There are many other biomarkers present in blood that can be analyzed in a much shorter amount of time by utilizing bioaffinity-based cascades. Cascades were developed, and are in the process of being developed, for the purpose of identifying personal attributes from individuals, such as age, biological sex, and general health conditions. These cascades were developed for both blood and fingerprint analysis. The cascades created for blood analysis focused on the determination of the age of the originator and the time since deposition of the sample.

Fingerprint analysis has focused on pictorial comparisons since the process was adapted for forensics. Advances in this area only progressed insofar that automated fingerprint identification systems can be used in certain cases (with an expert checking the results). Because of this, a fingerprint may be determined to be too smudged or smeared to be of use; however, what is often overlooked is that the patterns used to match fingerprint samples are created by sweat/sebum emulsions excreted from the fingertips. Like all bodily excretions, the emulsions have their own unique chemical composition, meaning there are biomarkers present for analysis. One of the cascades developed in this lab focused on the analysis of amino acids in the samples. The cascades developed for fingerprint analysis focused on the determination of biological sex. There is also ongoing research targeted at the development of a larger variety of cascades able to determine other attributes from blood and fingerprint samples.

Bioaffinity, Fingerprint, Blood