B30 Development of a Rubber Stamp for Fingerprint Research

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After attending this presentation, attendees should consider the use of a rubber stamp and an amino acid solution as a method for producing standard latent fingermarks for the evaluation of amino acid specific fingerprint reagents.

This presentation will impact the forensic community and/or humanity by demonstrating the use of the rubber stamp for fingerprint detection research will allow fingerprint reagents to be directly and accurately compared not only within one fingerprint research project but across different research projects. Significant applications for quality assurance purposes are also envisaged.

Latent fingermarks produced for research purposes are generally deposited by the same donor(s) at various times throughout the course of the project. The problem with this approach is that each fingermark deposited will differ in chemical composition and pressure applied due to environmental and physiological factors. Thus the results cannot be compared directly, as the composition of each latent mark on the support surfaces will vary to some extent.

The purpose of this research was to develop a rubber stamping process for the production of 'standard' latent fingermarks for the evaluation of fingerprint reagents, ensuring that the same quality print would be deposited with each application, thus allowing direct comparison not only within one research project but across various research projects.

The development of the rubber stamp involved three processes:

1) The development and manufacture of a rubber stamp. Inked thumbprints were obtained, scanned onto a computer, and sent to a rubber stamp making company. The stamps were ready within 48 hours.
2) The formulation of a 'standard' amino acid solution and the determination of a method of application. The formulation of the solution was determined by investigating the concentration of amino acids in eccrine secretions (human sweat). Inkless stamp pads were obtained to which the amino acid solution was added.
3) Method validation as well as transfer and persistence studies.
   This involved an investigation of the variations in amino acid concentration between stamp applications. A high performance liquid chromatography (HPLC) method was developed and validated for the detection of amino acids in a water-based solution and in deposited marks.

Using high performance liquid chromatography, it was found that the amino acids did not persist on the rubber stamp, nor did the concentration of the amino acids vary over time to any significant extent. This means that each impression laid by the stamp was qualitatively and quantitatively constant — this was the desired outcome for the use of the procedure as a comparative research tool.

The whole process enabled a rubber stamp to be developed and used for the application of 'standard' latent fingerprint samples to be used for research purposes. Through this process, fingerprint reagents can be directly compared against a uniform 'standard'. Application of this method in the study of amino acid based fingerprint reagents removes a large number of variables associated with the use of latent fingermarks deposited by a range of randomly-selected donors. A similar strategy could also be used for the development of proficiency tests and quality control checks for the evaluation of latent fingermark detection protocols. To date, no such tests are available.

The use of a rubber stamp and an amino acid solution of known concentration cannot replace natural fingermarks, but should be considered as an option for the objective evaluation of an amino acid based fingerprint detection technique. While this option may appear simplistic, it goes some way towards reducing the variables that typically impact on fingerprint detection studies.

Latent Fingermarks, Rubber Stamp, Quality Control

 ** Presenting Author*