

## Hidden Evidence : Latent Prints on Human Skin

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Reprinted from the FBI Law Enforcement Bulletin April 1996

Whether to stop them from fleeing, immobilize them, or dispose of them, murderers often grab their victims. What homicide detective has not wished for the ability to develop identifiable fingerprints of a suspect from the skin of a dead body? Crucial fingerprint evidence linking the perpetrator to the victim must be right there, but, until recently, attempts to retrieve those prints rarely meet with success.

Skin possesses a number of unique qualities that distinguish it from other specimens examined for latent prints. Skin tissue grows and constantly renews itself, shedding old cells that might contain the imprint of an assailant's grip. Its pliability allows movement and, hence, possible distortion of fingerprints. As the skin regulates the body's temperature and excretes waste matter through perspiration, latent prints can be washed away.

In addition to these natural changes, the skin of homicide victims often is subjected to many harsh conditions, such as mutilation, bodily fluids, the weather, and decomposition after death. Further, during crime scene processing, many people might handle a body while removing it from the scene, which also can destroy existing fingerprints or possibly add new ones to the corpse's skin.

In spite of these hurdles, research conducted by the FBI Laboratory's Latent Fingerprint Section - in conjunction with police and medical authorities in Knoxville, Tennessee - proves that latent fingerprints can be lifted from skin if only investigators are willing to try. This article outlines the history and research that led to development of a workable method for developing identifiable latent prints on human skin.

### HISTORY

The FBI has been involved in research on methods to develop identifiable latent prints on human skin for many years. In the early 1970's, FBI scientists reexamined existing methods using cadavers at a major university and the Virginia State Medical Examiner's Office in Richmond, Virginia. Most of these cadavers had been embalmed.

To create prints, these researchers applied a coating of baby oil and petroleum jelly to their hands and then touched areas of skin on the cadavers. At timed intervals, they then attempted to develop these latent prints, using primarily the iodine/silver transfer method. This method has five steps: heating iodine in an iodine fuming gun, directing the fumes onto the skin, laying a thin sheet of silver on the skin, removing the silver plate, and, finally, exposing the plate to strong

light, which causes the prints to become visible.

The researchers developed identifiable prints in this fashion within a time frame that ranged from several hours up to several days after the prints were applied. It should be noted, however, that the researchers achieved these results under ideal laboratory conditions. It was not surprising that they developed latent prints composed of artificially introduced oily substances on embalmed cadavers. Yet, those early efforts provided important background data for subsequent research conducted in Tennessee.

In 1991, a police specialist from the Knoxville, Tennessee, Police Department contacted the FBI Latent Fingerprint Section to inquire about the FBI's experience and previous research on developing latent prints on skin. His own examination of numerous homicide victims had not produced prints with identifiable ridge detail, even though some cadavers exhibited observable outlines of fingers and palms. Out of these discussions arose a joint research project involving the Knoxville Police Department, the University of Tennessee Hospital, the Department of Anthropology at the University of Tennessee, and the FBI.

To develop a consistent and reliable technique for developing

latent prints on human skin, the researchers established a protocol significantly different from previous efforts. They decided to use only unembalmed cadavers, and to place latent prints composed of only natural perspiration and sebaceous (oily) material. They felt that such conditions more accurately replicated field conditions faced by police investigators.

## RESEARCH

The researchers first examined the body of a 62 - year old white female who had been dead for 9 days. Areas of skin were sectioned into numbered squares drawn on the body. One researcher placed latent prints on the skin by wiping his hand across his brow or through his hair and then touching the cadaver. The researchers then tried to develop the latent prints at timed intervals by employing several methods, including the use of lasers, alternate light sources, iodine/silver transfer, cyanoacrylate fuming (commonly referred to as "glue fuming"), regular and fluorescent powders, specially formulated powders, regular and fluorescent magnetic powders, liquid iodine, RAM, ardrox, and thenoyl europium chelate.<sup>1</sup>

Most of these methods developed the latent prints up to approximately 1 hour after the prints had been deposited. For additional documentation, during the next several days, researchers tested the techniques on other cadavers, but most methods failed to provide consistent results.

The one technique that developed identifiable latent prints most often was glue fuming in conjunction

with regular magnetic fingerprint powder. Similar to iodine/silver transfer, this method involves heating glue and directing fumes onto skin, then applying fingerprint powder to reveal the latent prints. To test this technique further, researchers glue fumed several areas of skin containing sebaceous latent prints 2 hours after depositing the prints. Sixteen hours later, they applied various fingerprint powders to those areas. Using a fluorescent powder specially formulated for this testing, they developed a latent print of value for identification purposes. Initially, the researchers believed that the special fluorescent powder provided the key to obtaining usable prints, but additional tests proved that the type of powder did not matter as much as the amount of time allowed for glue fuming.

## GLUE FUMING DEVICE

As they continued their research, the scientists realized that they needed an improved method for spreading glue fumes over the skin. The earlier method used - forming an airtight plastic tent over a small area of skin or over an entire body - did not always work. It was impossible to distribute glue fumes evenly over the skin and extremely difficult to confine all of the fumes to the tent. In addition, when they removed the plastic tent at the end of the fuming process, the fumes often forced the researchers out of the work area. To alleviate these problems, one of the researchers, the police specialist from the Knoxville Police Department, developed a portable glue fuming chamber.

The glue fuming chamber contains a built-in heat source and a small electric fan. Glue is poured into a small disposable preheated aluminum pan and placed in the chamber. After approximately 5 minutes, the fan is turned on and the glue fumes flow out through a plastic hose attached to the top of the chamber. When set at maximum, the amount of fumes forced through the hose approximates the exhaust from an automobile on a cold day. This device enables the user to control the amount and time of the glue fuming much more easily than the tent method.

Using the new device, the scientists tested squares of skin to determine the optimal fuming time. They tried fuming in increments of 5 seconds up to 2 minutes. They obtained identifiable latent prints most often when glue fumes had been applied to the skin for 15 seconds.

## POWDERS

In the early testing, it seemed that particular types and brands of fingerprint powders provided the best results. As the research progressed, however, it became apparent that this was not the case. More than 30 brands and several types of powders and applicators were tested. In the end, researchers determined that powder selection is less critical than ensuring that the glue fuming process is performed correctly.

Both fluorescent powders and regular magnetic powders produce identifiable prints. With non-magnetic fluorescent powders, the best results are obtained by applying the powder with a feather

duster rather than a conventional brush, which generally holds more powder. Too much fluorescent powder tends to overwhelm the latent print and the background. While fluorescent powders work, they do have some drawbacks. They generally cost more than regular magnetic powders, are more difficult to see, and require special light sources, filters, and additional photographic knowledge.

In comparison, regular black magnetic powders produce useful prints and cost much less. They also do not require special photographic skills. Indeed, technology does not need to be complex or costly in order to be effective.

## FIELD CONDITIONS

Developing latent prints under ideal laboratory conditions proved that prints could be obtained from human skin, but the researchers wanted to make sure that practitioners in the field could obtain similar results. In real life, homicide victims might not be found immediately, bodies might be exposed to the elements or other harsh conditions, or they might be taken to the morgue and refrigerated before they can be examined for prints.

To ensure that the process would work, the researchers simulated field conditions by testing cadavers that had been exposed to the elements for several days, as well as the refrigerated corpses. They replicated potential delays that could occur in the field by waiting for approximately 12 hours between the glue fuming ( which

could be done at the crime scene) and the application of fingerprint powders ( perhaps conducted later at the morgue). The results showed that by following proper procedures, investigators could develop identifiable latent prints even under harsh conditions.

## RECOMMENDATIONS

This research indicates that homicide victims should be examined for latent prints whenever investigators believe that the perpetrator touched the victim. If possible, bodies should be examined at the crime scene immediately after the coroner or medical examiner has completed an initial examination and granted permission. At a minimum, the body should be glue fumed at the scene to preserve the prints and help prevent contamination or obliteration of prints when the body is moved.

Ideally, bodies should not be refrigerated prior to examination for latent prints. The condensation that builds up on refrigerated bodies can have adverse effects by washing away the prints, reacting with the glue to distort prints, or causing the powder to cake, thus losing the prints. Bodies that have been refrigerated should not be processed until the moisture evaporates, roughly several minutes, depending on ambient temperature. A control area of skin least likely to have prints can be tested to ensure that the moisture has dissipated.

Skin that is warm or near normal body temperature should be glue fumed for only 5 to 10 seconds. Colder skin should be glue fumed

for a maximum of 15 seconds. Regular magnetic powders can then be applied. Any identifiable latent prints should be photographed first and then lifted using transparent lifting tape.

## CONCLUSION

For many years, investigators and forensic scientists have tried to retrieve latent prints from dead bodies, but often the key evidence has been just out of reach. Frustrated, investigators often gave up after several failed attempts. This research proves that with practice, it can be done by those who are willing to try. As it becomes routine for law enforcement to obtain latent prints from skin, murderers who reach out to harm their victims will just be putting themselves within easy reach of the long arm of the law.

<sup>1</sup> These are commonly used methods for developing latent fingerprints on a variety of surfaces. For more information, see *Chemical Formulas and Processing Guide for Developing Latent Prints* (Washington, DC: Latent Fingerprint Section, Laboratory Division, FBI 1991)

### An interesting pattern.....



This pattern has all the characteristics of a whorl, loop, and tented arch, along with having 3 deltas. Not a common pattern even for an accidental whorl. Submitted by Detective Sandra Draper Homestead Police Department.