

Clean Techniques for Handling Evidence

Law enforcement officers carry lots of equipment, either on their persons or in their vehicles. They carry handcuffs, guns, flashlights, laptop computers, video cameras and cell phones. And in recent years has come the addition of sterile gloves, bleach, disposable tools and face masks.

It is important for all forensic science disciplines, especially DNA identification, to analyze samples that have been collected and handled in a manner that prevents contamination. Laboratories practice “clean techniques” as a means of avoiding sample contamination, and recommend that use of those preventive practices begin in the field during sample collection.

“Most laboratories do a good job of training local officers and crime scene response personnel in biological evidence collection,” says Debra Figarelli, DNA technical manager at the National Forensic Science Technology Center (NFSTC), which hosts the National Institute of Justice’s (NIJ) Forensic Technologies Center of Excellence. “They advise them to not only always wear disposable gloves, but to change gloves between every sample that is collected. They explain the importance of not talking over samples (to prevent saliva contamination) and to always wear a face mask if they have a cold or are prone to allergies.”

“The implementation of many of these procedures starts in the laboratory, but they’re a little more difficult to apply in the field where officers must deal with weather and less than ideal conditions in general,” Figarelli says. “Some agencies use disposable instruments/tools to collect evidence, opening a fresh kit for each sample, but for others, their budgets just won’t support that. I’ve worked with officers from the Phoenix Police Department and the Arizona Department of Public Safety, teaching them how to bleach and sterilize their instruments between each collection, and I think any forensic laboratory around the country will do the same if requested.”

Figarelli suggests that law enforcement agencies and laboratories work together to build cooperative relationships that include teaching clean techniques, and adds

that online training courses are available at NIJ’s www.DNA.gov Web site.

“The methods we’re using are very sensitive, and we don’t want to introduce contaminants that might interfere with interpretation of DNA data,” she says.

The emphasis on clean techniques became much greater with the advent of DNA testing in the 1980s. Prior to that, laboratories were primarily using ABO and enzyme typing for analysis, which required larger samples and were less sensitive than the current DNA typing and therefore contamination was not a concern since it was unlikely that those tests were sensitive enough to detect contamination.

Some of the procedures that have become commonplace in the laboratory include:

- Always wearing gloves and changing them in between samples. Some labs also mandate face masks and/or hairnets.
- Using a barrier, such as a piece of butcher paper, between the countertop and the sample during analysis.
- Opening only one sample at a time.
- Processing items under a hood.
- Constant cleaning of countertops and instruments, using either a freshly prepared 10 percent bleach solution or other commercially available decontamination solutions.
- Processing samples from known individuals separately in time or space from unknown forensic samples; for example, in a sexual assault case, a reference sample such as a buccal (cheek) swab from the victim, could be processed at a different time or in a separate area from that of the biological evidence collected at the crime scene.

- Ensuring that the amplification or creating copies of DNA from the samples (a process that Figarelli likens to “photocopying” the DNA) is generated, processed and maintained in a room(s) separate from the evidence examination, DNA extractions and amplification-setup areas.

“When we started amplifying biological samples using the polymerase chain reaction in the early 1990s, laboratories really started to pay attention to applying clean techniques,” Figarelli explains. “The DNA analysis methods commonly used today in crime laboratories are so sensitive that it may only take a few foreign cells to contaminate a sample; a sneeze or forgetting to change gloves could introduce contamination. And many of the clean technique procedures not only protect the evidence but protect the analyst from pathogens such as HIV or hepatitis that may be present in the biological samples.”

Many laboratories also routinely maintain in-house databases of the DNA profiles developed from staff members. If a DNA profile is generated from a sample that cannot be linked to the crime, the laboratory may query their staff database to ensure that it does not belong to a staff member before entering the unknown DNA profile into the Combined DNA Index System (CODIS).

“The hope is that the laboratory’s clean techniques will prevent contamination from occurring during sample handling and analysis, but laboratories should have a strong enough quality control system in place so that they can rule out staff contamination before submitting the DNA profile for search in the FBI’s database,” Figarelli says.

Laboratories may also contact the officer or technician who collected the evidence and ask for a reference buccal swab, although for many organizations, officers have the option of refusing.

“When a laboratory does ask an officer for a reference sample, they are not trying to imply that they did something wrong,” she says. “What analysts really want is for officers or crime scene personnel to be able to go to court and state with confidence that any unknown DNA profile developed in a case is a true unknown sample, and show that the laboratory has excluded the possibility of contamination from individuals who came into contact with that sample during sample collection and/or analysis. This is the primary goal of all clean techniques procedures.”

For more information on forensic clean techniques, visit <http://www.dna.gov> or contact the forensics laboratory used by your agency.

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