A safer way for police to test drug evidence

September 17 2019

Credit: CC0 Public Domain

Scientists have demonstrated a way for police to quickly and safely test whether a baggie or other package contains illegal drugs without having to handle any suspicious contents directly. The new technique can limit the risk of accidental exposure to fentanyl and other highly potent drugs that can be dangerous if a small amount is accidentally inhaled.

The proposed method involves swiping the outside of a baggie then analyzing the swipe for drugs in the same way that airport security officers swipe carry-on luggage to detect explosives. Researchers at the National Institute of Standards and Technology (NIST) and state forensic laboratories in Maryland and Vermont have demonstrated that this approach can reliably predict whether a package contains fentanyl, even if mixed with cocaine, heroin or other substances. Their research was published this week in *Forensic Science International*.

"What's needed is a fast and safe way to screen drug evidence so that it can be handled appropriately," said Ed Sisco, a research chemist at NIST and the lead author of the study. For instance, hazardous packages can be flagged so they are opened only under a laboratory fume hood.

The swipe method works because opening a bag contaminates its outside surface. "If you've ever opened a bag of flour, you know that some of it poofs into the air," said NIST co-author Elizabeth Robinson. "That's just the way lightweight powders behave."

Before fentanyl became a common street drug, police often field-tested evidence by scooping a bit of powder into a solution that would change color depending on what type of drug was present, if any. But many police departments now discourage or prohibit such "color tests" in the field for safety reasons. Instead, officers must send the suspected drugs to a crime lab, then wait for a result before getting a search warrant or making an arrest.

Amber Burns, manager of the Maryland State Police forensic chemistry lab and a co-author of the study, said that she gets a lot of rush requests, and each request currently requires a full work-up of the evidence. Her lab plans to install an instrument called a Direct Analysis in Real Time Mass Spectrometer (DART-MS) to do the quick screening, which should speed up the process considerably. "They just need to bring me the

swipe, and they can be on their way in two minutes," she said.

Alternately, departments can purchase instruments that fit in a police vehicle. Wherever the screening is done, it provides only a preliminary identification. To bring a criminal case to court, a complete work-up using standard laboratory equipment would still be necessary.

To conduct this study, the NIST scientists teamed up with Burns and her counterpart at the Vermont Forensic Laboratory, Rebecca Mead, who was also an author of the study. When suspected drug evidence arrived at their labs, Burns and Mead swiped the outside of the packages. Most were plastic baggies, though they also included envelopes, tinfoil and pill bottles. The chemists also dissolved a small amount of the suspicious material in alcohol and put a drop of the resulting solution onto a second swipe for comparison. They then sent the pair of swipes to NIST for analysis.

The NIST authors received swipes from 191 suspicious packages, which they analyzed using DART-MS and another technique called liquid chromatography-mass spectrometry (LC/MS). Those swipes contained a panoply of contemporary street drugs, including several types of fentanyl as well as heroin, cocaine, methamphetamines, ketamine and others. Many of the cocaine and heroin samples were mixed with fentanyl. The swiped packages also contained plant material sprayed with synthetic cannabinoids, which are often marketed as K2 or Spice.

Two of the packages contained carfentanil, a super-potent form of fentanyl, sometimes used as a large animal tranquilizer, which can be particularly dangerous for police and first responders. Carfentanil is roughly 5,000 times as potent as heroin.

The authors found that swiping the outside of a package correctly predicted its contents 92% of the time. In cases involving fentanyl and

other opioids, the outside of the package predicted the contents 100% of the time. In other words, if the goal is to flag fentanyl-containing packages for special handling, the technique worked every time.

The 8% of non-matches involved cases where several bags of different material were placed together by police into a single evidence bag, allowing for cross-contamination. Also, the technique did not work in most cases involving plant material in heat-sealed bags.

This swipe technique will do more than help police get faster answers when investigating drug crimes. It will also help at crime labs. At the Maryland lab, Burns said that upon receiving evidence they use color tests—the same tests that officers once used in the field—to quickly get an idea of what's in the bag so they can line up the right types of laboratory analysis. But those color tests don't detect many of the new designer drugs that make up an increasing fraction of the caseload.

The swipe test will work for this, however. "We plan to use this to optimize our whole workflow," Burns said.

More information: Edward Sisco et al, What's in the Bag? Analysis of Exterior Drug Packaging by TD-DART-MS to Predict the Contents, *Forensic Science International* (2019). DOI: 10.1016/j.forsciint.2019.109939