Single fingerprint at crime scene detects class A drug use

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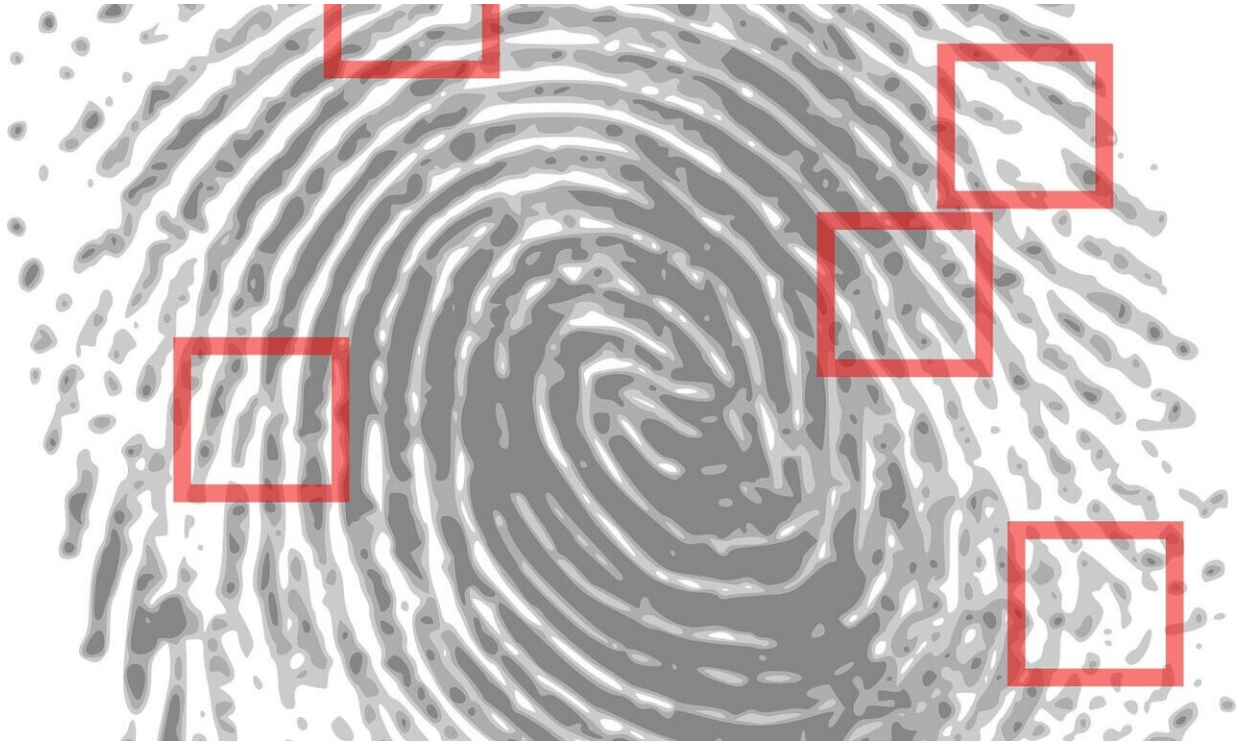

Credit: CC0 Public Domain

The National Center of Excellence in Mass Spectrometry Imaging at NPL, in collaboration with the University of Surrey and Ionoptika Ltd reveal latest findings showing how a single fingerprint left at a crime scene could be used to determine whether someone has touched or ingested class A drugs.

In a paper published in Royal Society of Chemistry's *Analyst* journal, the consortium reveal how they have been able to identify the differences between the fingerprints of people who touched cocaine compared with those who have ingested the drug—even if the hands are not washed. The science behind the advance is the mass spectrometry imaging tools applied to the detection of cocaine and its metabolites in fingerprints.

In 2020 researchers were able to determine the difference between touch and ingestion if someone had washed their hands prior to giving a sample. Given that a suspect at a crime scene is unlikely to wash their hands before leaving fingerprints, these new findings are a significant advantage to crime forensics.

The team have continued to use their world-leading experimental fingerprint drug testing approach based on high resolution mass spectrometry. Cocaine and its primary metabolite—benzoylecgonine, can be imaged in fingerprints produced after either ingestion or contact with cocaine using these techniques. By analyzing the images of cocaine and its metabolite in a fingerprint, and exploring the relationship between these molecules and the fingerprint ridges, it is possible to tell the difference between a person who has ingested a drug, and someone who has only touched it.

Dr. Chelsea Nikula, higher research scientist, NPL said: "This novel application of three different techniques illustrates the capabilities of mass spectrometry imaging to enable next generation forensics analyses. It is great to see that the work we do here at NPL and the facilities we have available to us at the National Center of Excellence in Mass Spectrometry Imaging helped support this research."

Dr. Melanie Bailey, reader in forensic and analytical science and EPSRC Fellow at the University of Surrey, said: "Over the decades, fingerprinting technology has provided forensics with a great deal of

information about gender and medication. Now, these new findings will inform forensics further when it comes to determining the use of class A drugs.

"In forensic science being able to understand more about the circumstances under which a fingerprint was deposited at a crime scene is important. This gives us the opportunity to reconstruct more detailed information from crime scenes in the future. The new research demonstrates that this is possible for the first time using high resolution mass spectrometry techniques."

Dr. Allen Bellew, applications & marketing manager at Ionoptika, commented: "To image these metabolites excreted through the skin requires very powerful analytical tools such as the unique Water Cluster Source that Ionoptika has been developing for over a decade. It's clear that this new technique will be important for forensic science in the future, and as a small business in the UK it's very exciting to see the role that our J105 SIMS instrument has played in its development."

More information: Catia Costa et al, Imaging mass spectrometry : a new way to distinguish dermal contact from administration of cocaine, using a single fingerprint, *The Analyst* (2021). DOI: 10.1039/D1AN00232E

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