



# VISION

Issue 2

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# FAST DETECTION FOR IMMEDIATE RESULTS



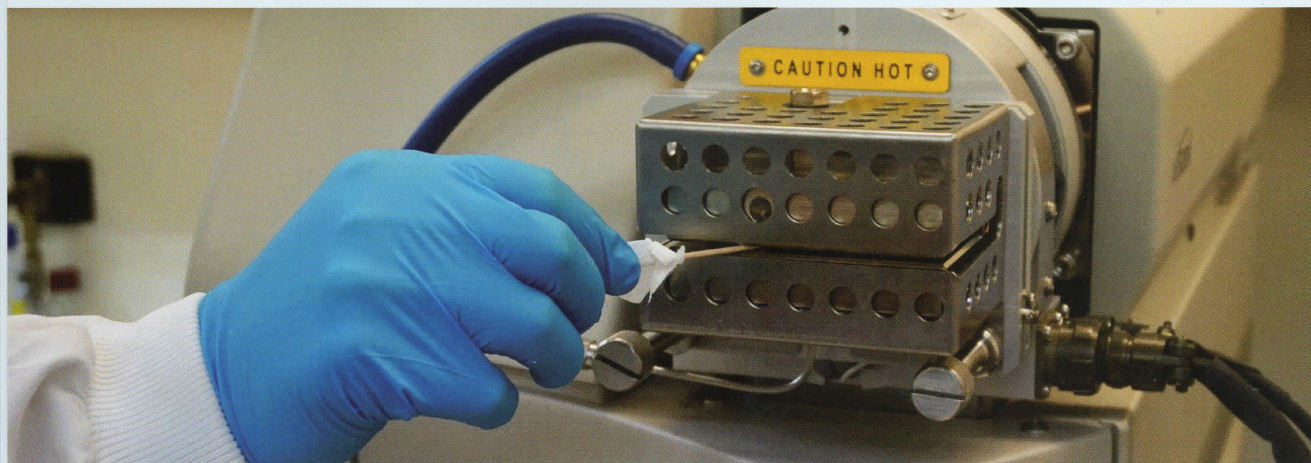
*Richard Sleeman,  
Scientific Director, Mass Spec Analytical*

Fast and accurate drug trace analysis and explosives detection is essential to law enforcement agencies. UK company Mass Spec Analytical specializes in the rapid introduction of samples into tandem mass spectrometers, eliminating sample preparation and separation steps, and enabling results to be gathered in seconds rather than hours.

Trace drug analysis and explosives detection have specific demands that cannot always be met by traditional approaches to mass spectrometry. While ideal for research purposes, time-consuming sample preparation and subsequent gas or liquid chromatography can delay critical public safety decisions, and struggle to keep up with the high throughput demands of some trace drug analyses. Short time to results is a necessary requirement in these fields, as Mass Spec Analytical (MSA) knows well.

The company was established in Bristol, UK, in 1994, and is an accredited provider of forensic chemistry

solutions, discovering trace substances and validating evidence for thousands of court cases. Richard Sleeman, co-founder and scientific director, explained: "We have two strings to our bow: we provide a service to law enforcement agencies, both in the UK and occasionally overseas, in relation to trace drug analysis and explosives detection, and we make custom-built sample introduction units for mass spectrometers. My co-founder John Luke builds the mechanical features of the front-end systems, which are predominantly designed for SCIEX instruments. Swab samples are introduced into the mass spectrometers using thermal desorption/atmospheric pressure chemical ionization





(TD/APCI) to rapidly identify drugs and explosives traces without any sample clean-up. We have had a lot of experience with various mass spec technologies as they've evolved over the years, working with GC- and LC-MS systems, from single quads all the way through to MS/MS, which is now our primary focus. We've been slowly working our way through the SCIEX catalog, and find the instruments are easy to use and very robust."

"In our trace drug analysis work, it's important to be able to quickly test multiple samples. If you can do lots of tests in a very short

period of time, you obtain a clearer overview of a drug's distribution over an item of clothing, for example, allowing a more informed assessment to be made as to whether a drug trace is coincidental or not. We also carry out a lot of work on the contamination of banknotes, enabling us

to compare and contrast populations of notes. We recently published a paper<sup>1</sup> describing a technique for bulk drugs analysis, detecting up to 50 different drugs simultaneously with multiple reaction monitoring (MRM). You can find most of the drugs pretty satisfactorily by MRM-MS, and it takes only a matter of seconds to get an idea of what is in the sample. In contrast, the work-up for traditional GC-MS can take up to an hour."

"We have a number of explosives detectors that we built and maintain, based on the SCIEX API 2000 instruments. Important decisions, such as whether to evacuate a building or not, are made based on

analysis of a sample, and it's important to have a reliable mass spec instrument that can withstand being bumped up and down and driven over kerbs. We are often working with sub-nanogram limits of detection, so, in addition to reliability, sensitivity is very important. If we identify an explosive near a VIP event or public venue, we need to be confident in our identification. We don't get a second bite at the cherry to confirm our analysis, and you wouldn't want to cancel a major event unless you were absolutely certain you had found something that shouldn't be there."

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"My relationship with SCIEX stretches back to my time at British Aerospace (BAE) – when SCIEX was still a tiny company in Toronto – and I've been using the company's instruments ever since. They're good instruments for the kind of work that we want to do, and we have strong relationships with the

teams in Warrington and Toronto. We've been grateful for their input developing the interface between our unit and the mass spectrometer, and I think they've appreciated working with us as we stretch the boundaries of what the instruments can do. It's a two-way street, and I'm sure our collaboration is set to continue in the future. Our mobile drug detection system is currently based on an MRM approach, but there are plans to develop a new, more versatile version, benefitting from the sophistication and accuracy of an integrated X500R QTOF instrument. We've got big hopes for that project, and look forward to spending more time exploring the benefits of SWATH acquisition."

To find out more about Mass Spec Analytical, visit [www.msalt.co.uk](http://www.msalt.co.uk)

To find out more about the SCIEX X500R QTOF System, visit [www.sciex.com/x500r](http://www.sciex.com/x500r)

1. Fletcher CM, Sleeman R. Rapid identification of seized controlled substances and related compounds by tandem mass spectrometry without chromatography. *Rapid Commun. Mass Spectrom.* 2016, **30**, 908-916.

