



CASE STUDY

Oral Fluid Screening & Confirmation on EVOQ[®] DART-TQ⁺

One platform, two distinct analytical approaches – for chromatography-free and liquid chromatography-based methods

The Challenge: Streamline Oral Fluid Testing

High-throughput forensic labs face pressure to adopt oral fluid testing—a non-invasive, tamper-resistant method ideal for roadside, workplace, and legal applications. However, challenges include:

- Limited sample volumes and matrix variability
- Analyte instability and interferents
- Regulatory requirements to meet sensitivity levels often difficult with existing screening (typically immunoassay) and LC-MS/MS confirmation, requiring additional instruments or method R&D.

Adding oral fluid testing to existing blood and urine workflows strains resources unless instrumentation and staff are efficiently repurposed.

Why oral fluid testing matters?

Oral fluid is transforming forensic toxicology with:

- **Simple, non-invasive, observed collection** for enhanced sample integrity
- **Lower risk of adulteration** compared to urine
- **Better correlation with recent drug use**, critical for time-sensitive cases and roadside sample collection



The Solution: Bruker EVOQ® DART-TQ+ and the Lab Accelerator Program

The Bruker EVOQ® DART-TQ+ integrates two independent ionization sources – **Direct Analysis in RealTime (DART)** for rapid, chromatography-free screening and **Vacuum Insulated Probe-Heated Electrospray Ionization (VIP-HESI)** for precise LC-MS/MS confirmation – on a single triple quadrupole mass spectrometer. Paired with the Lab Accelerator Program, this solution empowers labs to:

- **Screen and confirm on one instrument**, eliminating the need for separate systems
- **Switch sources in minutes**, enabling seamless workflows
- **Meet ISO 17025 and ANSI/ASB Standard 036 requirements** with independent methodologies for screening & confirmation. Methods developed & tested from scientists at the PinPoint Applications Research Center (PARC)
- **Simplify sample preparation** with a unified approach for both workflows
- **Accelerate the onboarding of new methods and technology** with the help of PinPoint Testing's consulting and ToxBBox®

Methods and performance

The forensic toxicology experts at the PARC developed a dual-method workflow:

- **Direct Analysis in Real Time (DART) screening:** Chromatography-free, rapid screening of multi-panel drugs, ranging from opiates, stimulants, cocaine, and benzodiazepines using high and low temperature pulses.
- **Conventional LC-MS confirmation:** High specificity using standard confirmation workflows of a 68 multi-drug panel within 8 minutes utilizing a C-18 column and optimized water/methanol with 0.1% formic acid mobile phase gradient. Panel has been fully validated to ANSI/ASB Standard 036.
- **Streamline sample preparation:** Fully optimized sample extraction for both screening and confirmation workflows – employing simple SLE extraction for screening and L/L extraction for confirmation combined with ready-to-use ToxBBox® consumables.

Comparison of Methods

Method	LOD (ng/mL)	Key Advantage
DART Screen*	0.8 - 2000	Fast, chromatography-free screening
LC-MS/MS Confirmation*	0.1 - 25	High specificity for complex panels
Immunoassay* (Legacy)	3.0 - 360	Widely adopted, familiar, and supported

The Results: Efficiency, accuracy and compliance

- 50% reduction in instrument costs** by consolidating screening & confirmation workflows with one instrument.
- 30% faster throughput** with unified prep and simple, rapid source switching.
- Screen with Accuracy & Precision –** Calibration curves for DART screening showed excellent linearity.
- LC-MS/MS method followed and met criteria established in the ANSI/ASB Standard 036.** The DART Screening method performed with equivalent and often superior performance to that of immunoassays. Both the LC-MS/MS and DART-MS methods met or were within acceptable proximity to the published cut-offs released by the National Safety Councils Committee on Alcohol, Drugs and Impairment - NSC-ADID. (see Table 1.)
- Linearity and accuracy were tested for both methods** with QC recoveries falling within specifications. (see Figure 1)

Analyte	LC-MS/MS Confirmation Cutoff	DART Screen - SLE - Dilution Corrected	Immunoassay Cutoff Dilution Corrected
7-Aminoclonazepam	5	20	9
Alprazolam	2.5	4	2
Clonazepam	25	20	13
Diazepam	1	4	6
Lorazepam	5	2000	18
Nordiazepam	1	2	9
Oxazepam	2.5	40	12
Temazepam	2.5	2	
Buprenorphine	1		3
Fentanyl	0.1	0.8	
Amphetamine	1	100	150
Benzoyllecognine	1	20	15
Cocaine	1	See Benzoyllecognine	15
Hydrocodone	1	0.8	108
MDMA	1	20	360
Methadone	1	2	15
Methamphetamine	1	40	360
Morphine	1	400	113
Oxycodone	1	2	30
Gabapentin	25		
Tramadol	1		
6-MAM	1	See morphine	42
Codeine	1	20	72
Heroin	2.5		
Hydromorphone	1	40	126
O-Desmethyltramadol	1		
Acetaminophen	25		
alpha-PVP	1		
Amitriptyline	1		
Carisoprodol	1		
Chlordiazepoxide	2.5	100	117
Citalopram	1		
Cotinine	1	20	
Cyclobenzaprine	1		
Delta-9-THC	1		3
Desipramine	1		
Doxepin	1		
Duloxetine	5		
EDDP	1	200	
Fluoxetine	1		
Flurazepam	1	0.8	6
Imipramine	1		6300
Ketamine	5		
Meperidine	1		
Meprobamate	1		
Methylphenidate	1		
Mitragynine	1		
Naloxone	1		
Naltrexone	1		
Norbuprenorphine	1		
Norfentanyl	1	2	
Norhydrocodone	1		
Norketamine	5		
Noroxycodone	1	40	
Nortriptyline	1		
Oxymorphone	1	4	
Paroxetine	1		
Pentazocine	1		
Phencyclidine	1	40	3
Phentermine	1	40	
Pregabalin	25		
Propoxyphene	1	4	
Quetiapine	1		
Ritalinic Acid	5		
Sertraline	2.5		
Tapentadol	1		
Venlafaxine	1		
Zolpidem	1		

Table 1. – Cutoff values compared across methods

Values for LC/MS/MS and DART-MS were experimentally verified. Immunoassay cut-offs were compiled from publicly available sources known to be utilized by Forensic Labs. They are for demonstration only and do not represent any specific manufacturer. All values are corrected for dilution from the collection device.

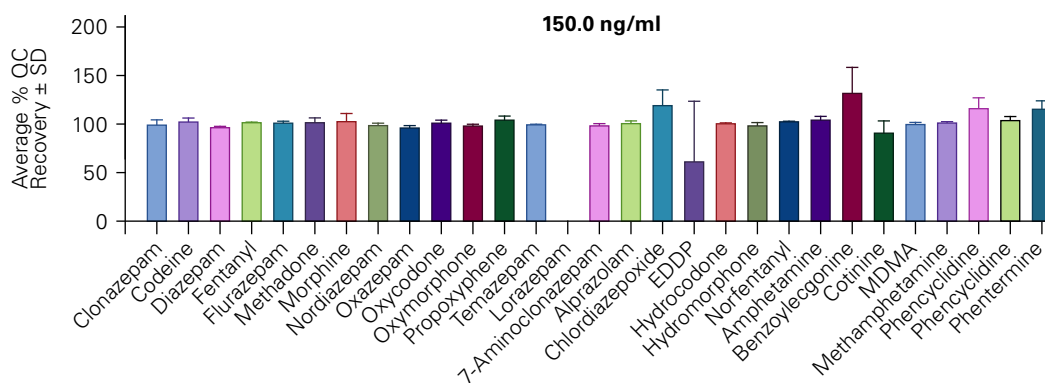


Figure 1. – Representative recovery data for a mid-level QC sample for DART Screen

Recovery of second source quality control (QC) material that span the AMR determined for each analyte. QC recoveries were assessed across seven concentrations ranging from 0.75 ng/mL to 800.00 ng/mL to evaluate accuracy and precision of the calibration curve. The data presented reflect a single, mid-level QC sample used for illustrative purposes only and do not represent the assay’s analytical sensitivity, cut-off, or limit of detection (LOD). Lorazepam is still under development and is not included in the finalized data set.

Partner with Us

The Lab Accelerator Program is commercially available through Bruker, PinPoint Testing, and R&D efforts are made possible at the PARC, an ISO 17025 accredited laboratory in Little Rock, AR

Discover how the **Lab Accelerator Program** can streamline your toxicology workflow with one vendor offering instrumentation, method implementation support, and after sale service. Learn more about how this program helps update and modernize accredited laboratories.

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Related Products

- [Lab Accelerator Program](#) ↗
- [Bruker EVOQ® DART-TQ+](#) ↗
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