Point-of-Care Monitoring for Drugs of Abuse

Abstract

This application note demonstrates the use of the Axcend Focus LC® (AFLC) for point-of-care analysis of drugs of abuse in clinical settings such as treatment facilities and pain clinics. Traditional methods for confirmation testing often require sending samples to third-party laboratories, delaying results and impacting treatment decisions. The AFLC's small footprint, self-contained design, and portability enable rapid, on-site liquid chromatography (LC) testing with accuracy and sensitivity comparable to conventional laboratory systems. Example chromatograms for six drugs of abuse testing panels show that results can be obtained in six minutes or less, providing clinicians with timely, actionable data.

Introduction

Present diagnostic techniques available to clinics for drugs of abuse testing offer benefits such as speed or low cost; however, none of them provide the results required for making informed critical decisions at the time the client is tested. For example, test strips offer fast results but may not be able to confirm which drug of abuse is present. They also are not sensitive enough to detect residual amounts of a substance. On the other hand, the AFLC can provide both speed and sensitivity at the time-of-need. The table below presents the features and benefits of current techniques:

Technique	Speed	Simplicity	Sensitivity	Accuracy
Axcend Focus LC (AFLC)				
Portable Axcend Focus LC	●	●	◕	◕
Portable Axcend Focus LC-MS	◕	◕	●	●
Status Quo Solutions				
Automated Immunoassay	○	◑	◑	◑
Benchtop LC	○	◑	◕	◕
Benchtop LC-MS	○	◕	●	●
Test Strips	●	◔	◔	◔
Screening Cups	●	◔	◔	◔

○ = lowest
● = highest

As displayed in the chart above, the AFLC provides excellent results in all four categories. Having across-the-board capabilities positions it as a powerful and valuable tool for enhancing the health and well-being of clients. Adding a mass spectrometer detector in tandem to the AFLC greatly improves the sensitivity and accuracy of the analysis.

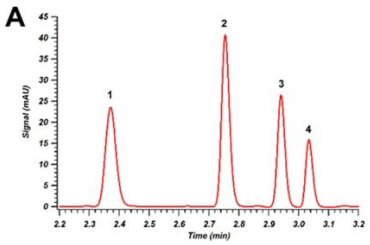
Materials and Methods

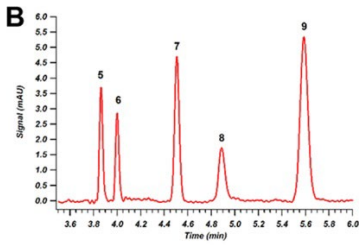
Samples were prepared from 1.0 mg/mL stock solutions of listed analytes (in methanol) from Restek (Bellefonte, PA) and Cerilliant (Round Rock, TX) and diluted with acetonitrile. The cartridge contained a 100 mm × 150 µm i.d. capillary column packed with 1.7 µm C18 fully porous particles (CoAnn Technologies, Richland, WA). Mobile phase A was 97:3 water:acetonitrile (with 0.1% trifluoroacetic acid) and mobile phase B was 3:97 water:acetonitrile (with 0.1% trifluoroacetic acid). The injection volume was 40 nL and the mobile phase flow rate was 2 µL/min.

Results

The below chromatograms depict the AFLC analysis of six drugs of abuse testing panels for different classes of compounds targeted by current immunoassay tests. Each peak represents a specific illicit drug of interest. These results can be obtained in six minutes or less as represented on the x-axis of the chromatograms.

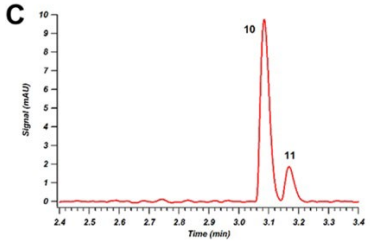
Panel A (Benzodiazepines):
(1) Bromazepam
(2) Nitrazepam
(3) Diazepam
(4) Lorazepam

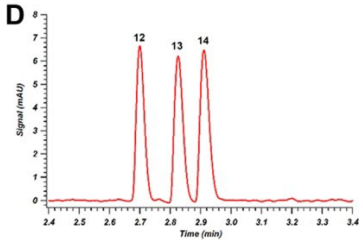




Panel B (Cannabinoids):
(5) Cannabidiolic Acid
(6) Cannabidiol
(7) Cannabinol
(8) Δ9-tetrahydrocannabinol
(9) Δ9-tetrahydrocannabinolic acid

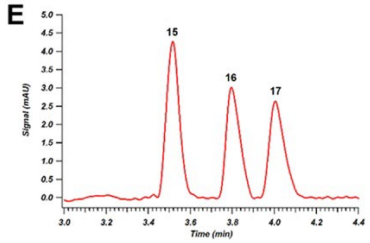
Panel C (Methadone and Metabolite):
(10) 2-ethylidene-1,5-dimethyl-3,3-diphenylpyrrolidine (EDDP) Perchlorate
(11) Methadone

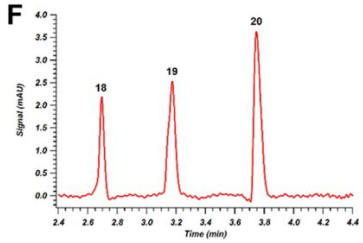




Panel D (Cocaine and Metabolites):
(12) Benzoylecgonine
(13) Cocaine
(14) Cocaethylene

Panel E (Opioid drugs):
(15) Oxycodone
(16) Hydrocodone
(17) Codeine





Panel F (Heroin and Metabolites):
(18) Morphine
(19) 6-Acetylmorphine
(20) Heroin

Figure 1. Peaks correspond to individual analytes listed in the panel descriptions. Total analysis time for each panel is six minutes or less. Panel courtesy Rowan University, Grinias, JP, PI.

Summary

The Axcend Focus LC® provides an effective, portable solution for point-of-care drugs of abuse testing. By delivering high-quality chromatographic data in under six minutes, it enables clinicians to replace or supplement immunoassay screening with more specific LC-based analysis. Its ease of use, compact size, and robust performance make it ideal for deployment in treatment facilities, pain clinics, and other critical care environments.