

## Point-of-Care Monitoring for Drugs of Abuse

### INTRODUCTION

Therapeutic Drugs of Abuse testing for critical point-of-care treatment, such as in drug treatment facilities or pain clinics, has traditionally been arduous, expensive and time consuming, requiring a third-party laboratory for analysis. Sending samples to a commercial laboratory creates delays, which increases difficulty in making informed decisions at the critical time-of-need. Due to these factors, on-site liquid chromatography (LC) analysis at the local clinic is a requisite for timely evaluation and effective treatment.

A point-of-care LC system must be easy to use, self-contained, safe for the user, hand portable, and compact to be effective (i.e., occupy a very small footprint on a counter or desk and be easily moved from place to place). The innovative Axcend Focus LC® (AFLC) is the latest exciting analytical tool for clinicians, and it is changing the efficiency and effectiveness of drug treatment in a major way. As a hand-portable and self-contained system, it can be used in ways that previous LC systems could not. The features of the AFLC allow for instant on-demand operation, easy use and reliable performance in an office or at any selected location, with performance equally accurate as to when positioned on a traditional laboratory bench.

### CURRENT TECHNIQUES

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
<b>Axcend Focus LC (AFLC)</b>				
Portable Axcend Focus LC	●	●	◐	◐
Portable Axcend Focus LC-MS	◐	◐	●	●
<b>Status Quo Solutions</b>				
Automated Immunoassay	○	◐	◐	◐
Benchtop LC	○	◐	◐	◐
Benchtop LC-MS	○	◐	●	●
Test Strips	●	◐	◐	◐
Screening Cups	●	◐	◐	◐

○ = lowest  
● = highest

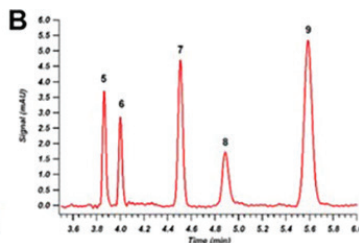
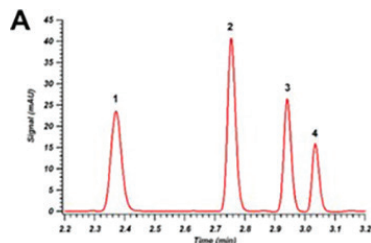
As displayed in the chart above, the AFLC provides excellent results in all four categories. Having across-the-board capabilities positions it as a powerful and valuable tool for enhancing the health and well-being of clients. Adding a mass spectrometer detector in tandem to the AFLC greatly improves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

## LC-UV TESTING PANELS

The below Chromatograms depict the AFLC analysis of 6 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

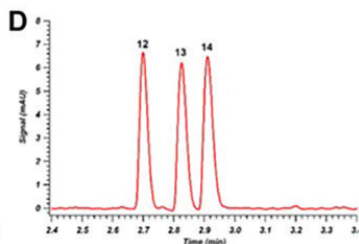
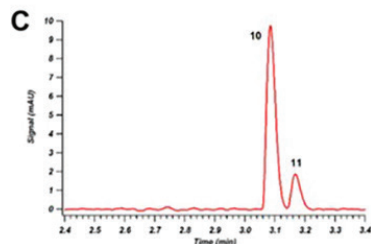


### Panel B (Cannabinoids)

- (5) Cannabidiolic Acid
- (6) Cannabidiol
- (7) Cannabinol
- (8)  $\Delta^9$ -Tetrahydrocannabinol
- (9)  $\Delta^9$ -Tetrahydrocannabinolic Acid

### Panel C (Methadone and Metabolite)

- (10) 2-ethylidene-1,5-dimethyl-3,3-diphenylpyrrolidine (EDDP) perchlorate
- (11) Methadone

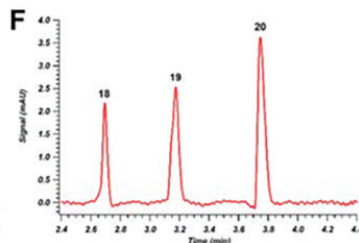
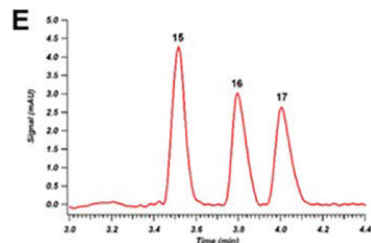


### Panel D (Cocaine and Metabolites)

- (12) Benzoylcegonine
- (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

\* Panel courtesy Rowan University, Grinias, JP, PI

EXPERIMENTAL DETAILS: 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 x 150  $\mu$ m i.d. capillary column packed with 1.7  $\mu$ m 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  $\mu$ L/min.

## SUMMARY

- The Axcend Focus LC is well suited for point-of-care Drugs of Abuse testing.
- Replacing immunoassays with more specific portable LC is straightforward and easy.
- The data handling capabilities of the AFLC allows for clear reporting of each Drug of Abuse.
- The self-contained design of the AFLC makes it safe to use at the point-of-need.

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