Poster

[P27-6] P27-6: Clinical toxicology (2)

Chair: David William Kinniburgh, Canada
Wed. Sep 27, 2017 12:30 PM - 1:30 PM Annex Hall (1F)

(Wed. Sep 27, 2017 12:30 PM - 1:30 PM Annex Hall)

[P27-6-8] Data dependent or data independent acquisition: evaluation of SWATH for clinical drug testing

Kara L. Lynch[1], Jeffrey D. Whitman[2] (1.University of California San Francisco, 2.University of California San Francisco)

Keywords: high resolution mass spectrometry, drug testing, SWATH

Background

High resolution mass spectrometry has become increasingly common for drug testing. Data-dependent strategies are commonly used for automated data acquisition (DDA). For this study two data-independent acquisition (DIA) methods using Sequential Windowed Acquisition of all Theoretical fragment-ion spectra (SWATH) were developed and compared to DDA using QTOF-MS. Low abundance ions can be missed using DDA due to the limited number of triggered product ion scans at one time; however, with DIA product ion spectra are theoretically collected for all ions. The objective of this study was to compare DDA and DIA for the detection of drugs/metabolites in biological samples.

Methods

Urine samples were diluted 1:10 and separation was performed using a C18-column with a 10-minute gradient from 2%-100% organic. Data was collected on a SCIEX TripleTOF®5600 operating in positive-ion mode using: 1)TOF-MS survey scan with DDA-triggered collection of up to 20 product ion scans at a time, 2)SWATH acquisition using 30 fixed 18 Da windows (fSWATH), and 3)SWATH acquisition using 30 variable windows ranging from 6–59 Da (vSWATH). Limits of detection (LOD), matrix effects, and the ability to identify 115 drugs/metabolites in 50 patient samples were evaluated.

Results

The LODs for vSWATH were lower compared to fSWATH and DDA. vSWATH had the lowest LOD for 43% of the drugs/metabolites, DDA had a lower LOD for 22%, and the LOD was equal for 35%. Overall vSWATH was more sensitive, however in many cases the difference was only 5-15 ng/mL. Matrix effects were observed and similar for the methods, which is to be expected given the same LC and ion source conditions were used. Detection capabilities in 50 patient samples were similar for DDA and vSWATH, with each method detecting 275 and 274 drugs/metabolites, respectively. Of the drugs/metabolites detected, 90% were confirmed by another method for DDA, and 92% for vSWATH. vSWATH detected 5 additional confirmed low abundance drugs/metabolites compared to DDA. For these compounds a peak was detected using DDA, however, no product ion was acquired.

Conclusions

vSWATH is a viable alternative to DDA and in many cases resulted in more sensitive detection of low abundance ions.