TechnicalNOTE

Waters

LCT PREMIER: SENSITIVE OA-TOF MS

Waters Corporation, MS Technologies Centre, Manchester, UK

Introduction

The Waters® LCT Premier™ Mass Spectrometer is the highest performance bench-top orthogonal acceleration time-of-flight (oa-TOF) LC/MS system available today. Improvements in ion source, transfer optics, vacuum system, TOF optics and electronics have resulted in an oa-TOF instrument with unsurpassed ion transmission that gives an order of magnitude more sensitivity when compared to the previous Waters LCT™ Mass Spectrometer. With these improvements, Waters provides an instrument that has ability to detect analytes with full spectral acquisition that would not have normally been detected without a pre-concentration step.

Analytical application areas that benefit from sensitivity improvements include:

- Metabolite identification
- Impurity profiling in chemical synthesis
- Trace level component analysis in food or environmental samples
- Peptide/protein applications requiring full spectral sensitivity
- Natural product identification

Experimental

Infusion of leucine enkephalin

Leucine enkphalin (50 pg/µL in 50/50 MeCN/H_2O + 0.1% formic acid) was infused at 5 µL/min and measured by electrospray positive ionisation on both the original LCT and the new LCT Premier mass spectrometers. Data was acquired in continuum acquisition mode at a rate of 1 spectrum/second. Figure 1 shows the comparative spectral data obtained from both instruments: the data from LCT Premier has typically 10 times more ion counts than the data from the LCT.

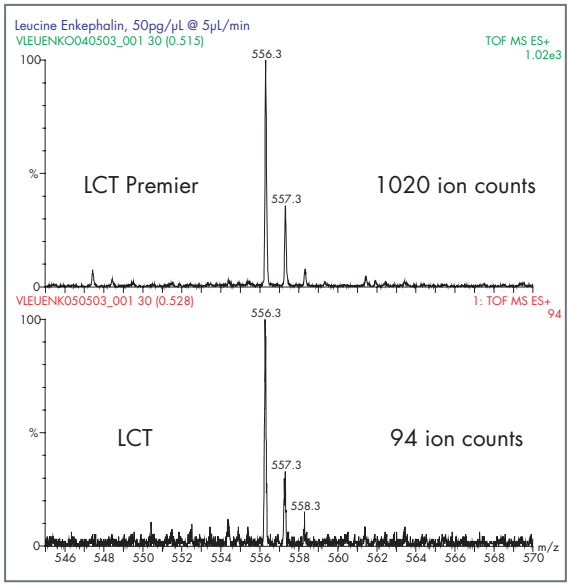

Figure 1. Infusion sensitivity of Leucine Enkephalin.

Chromatographic signal-to-noise measurement on the LCT Premier

Reserpine (1 pg/µL, 10 µL injection) was repeatedly injected onto a HPLC column. Using electrospray positive ionisation, the ion at $[M+H]^+$ = 609.2812 was monitored and the signal-to-noise measurement was calculated for each of the peaks. The analytical conditions were:

HPLC:	Alliance® HT 2795 Separations Module
Mobile phase:	75% methanol/25% water + 5 mM ammonium acetate
Column:	Waters Atlantis® dC18, 3 µM, 2.1 x 30 mm
Injection vol:	10 µL
Flow rate:	0.3 mL/min

Figure 2 shows the calculated signal-to-noise measurement for five repeat injections. The results show that the signal-to-noise measurement is typically in the region of 200:1 for 10 pg of reserpine on-column.

In another example of the LCT Premier's full spectral sensitivity, Glu-fibrinopeptide (GFP) has been analysed by nano-LC with detection by NanoLockSpray™. With positive ionisation, GFP produces a doubly charged ion at m/z 785.8. Figure 3 shows that with the LCT Premier's sensitivity, 500 attomoles of GFP have been detected with a signal to noise of approx 30:1 (upper trace). The peak just after the GFP peak at 22.12 mins is an interference at the same nominal mass.

The LCT Premier: high sensitivity oa-TOF MS for LC/MS applications.

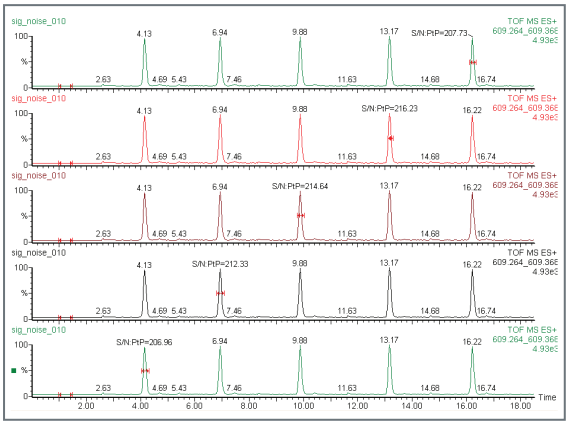

Figure 2. Signal-to-Noise Measurement of Reserpine (10 pg).

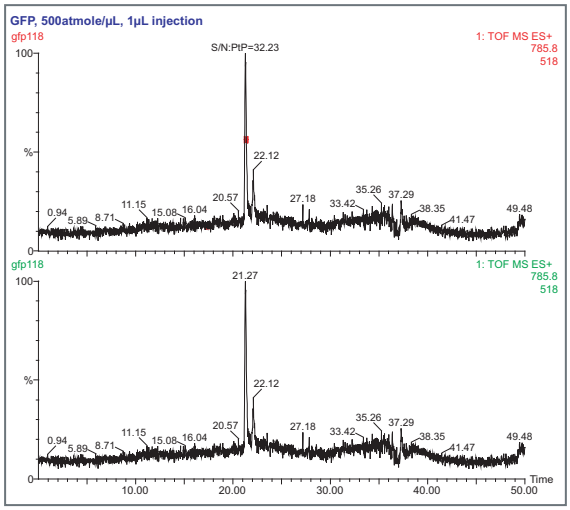

Figure 3. 500 attomole of GFP on-column.

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