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With an ever-increasing demand for mass spectrometry-based biomarker validation, it is crucial for mass spectrometry platforms to provide high throughput solutions, high mass accuracy, increased sensitivity, and most importantly, sound quantitative analysis. Achieving this level of quantitative performance requires powerful software and sufficient dynamic range. The LC-MS platform we discuss here is a hybrid system that combines the unparalleled separation of a Hitachi nanoLC with the high sensitivity of a linear ion trap and the high mass accuracy and resolution of a time-of-flight mass analyzer. This LC-MS platform, the Hitachi NanoFrontier®, has been improved specifically to meet the increasing needs for quantitative analyses, and data illustrating these enhancements will be presented in this note.

Conclusions

Preliminary data show an approximate 2× increase in the dynamic range from an initial value of 2–4 orders of magnitude. This can be attributed to a variety of instrument design changes including a new, proprietary ADC converter for the TOF detection circuitry (Figure 1). Additionally, the splitless nanoLC system affords an improvement in the peptide detection limit. By lowering the LC flow rate from 200 nL/min to 50 nL/min, a significant increase in sensitivity is realized (4×). The result is an enhanced peptide/protein identifica-

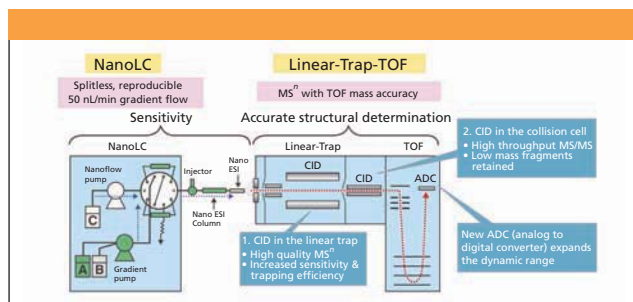


Figure 1: Schematic of hybrid system.

Dynamic Range Improvements on the Hitachi NanoFrontier Linear Ion Trap-TOF LC-MS Platform

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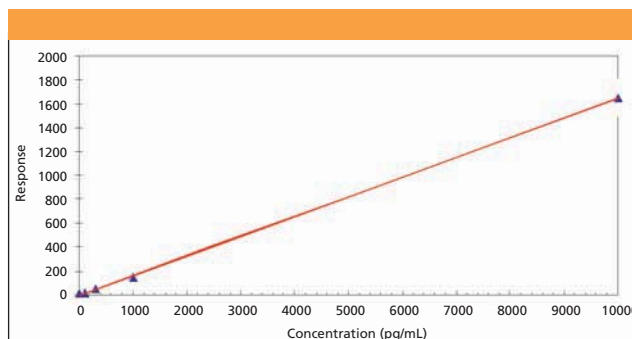


Figure 2: Plot of Reserpine data illustrating 4 orders of magnitude.

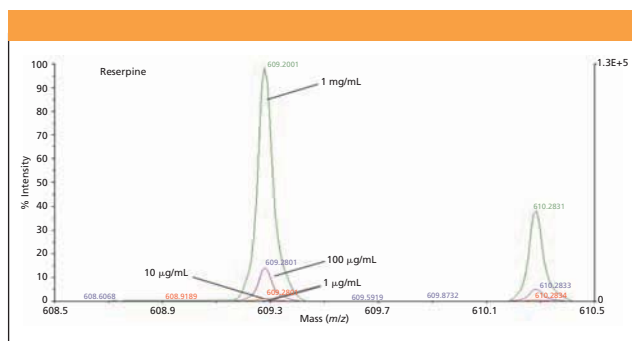


Figure 3: Overlay of Reserpine data obtained from NanoFrontier.

tion process with quantitative capabilities necessary for proteomic, biomarker applications.

Acknowledgments

The authors wish to thank Dr. Terui at Hitachi High Technologies Corporation for kindly supplying the data.

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Table 1.

	Reserpine Conc.(ppt)	No.1	No.2	No.3	No.4	No.5	Average	SD	%RSD
Blank	0	10.6	11.0	9.0	10.0	9.1	9.94	0.9	9%
100ppt	100	18.9	18.0	17.2	18.6	16.9	17.92	0.9	5%
300ppt	300	51.8	52.4	50.6	53.4	51.9	52.02	1.0	2%
1ppb	1000	141.6	146.0	146.0	161.1	154.5	149.84	7.8	5%
10ppb	10000	1606.0	1505.4	1503.0	1816.0	1822.0	1650.48	159.4	10%
100ppb	100000	18798.0	18600.0	17577.0	18592.0	18898.0	18493	528.5	3%
500ppb	500000	74245.0	70537.0	70934.0	75107.0	73086.0	72781.8	2005.8	3%
1ppm	1000000	124057	121678	123106	122454	120101	122279.2	1498.4	1%

*Conditions: Syringe pump–Direct infusion 3 µL/min; Source–MicroIon spray; Reserpine standards–1 µg/L–1 mg/L concentration range