

Agilent 6550 iFunnel Q-TOF LC/MS System

# Breakthrough iFunnel Technology

for CLEARLY BETTER sensitivity



The Measure of Confidence



**Agilent Technologies**

# Unmatched speed and analytical sensitivity for your most challenging qualitative and quantitative analyses in a single instrument

Incorporating breakthrough Agilent iFunnel technology, the Agilent 6550 iFunnel Q-TOF LC/MS system delivers the lowest detection levels of any high resolution LC/MS instrument. For the first time ever, you can achieve low femtogram-level sensitivity with high resolution and accurate-mass—making the 6550 iFunnel Q-TOF the ideal choice for pharmaceutical, proteomics, metabolite ID, lipidomics, food safety, forensic toxicology, and environmental screening applications.

Agilent Ion Beam Compression and Shaping (IBCS) technology provides the greatest sensitivity while maintaining 45k mass resolution and sub 1-ppm mass accuracy. Enhanced electronics and software algorithms enable exceedingly high data acquisition rates of up to 50 spectra/second for ultra-fast UHPLC separations with the Agilent 1290 Infinity II LC and for maximum sampling during data-dependent MS/MS experiments.

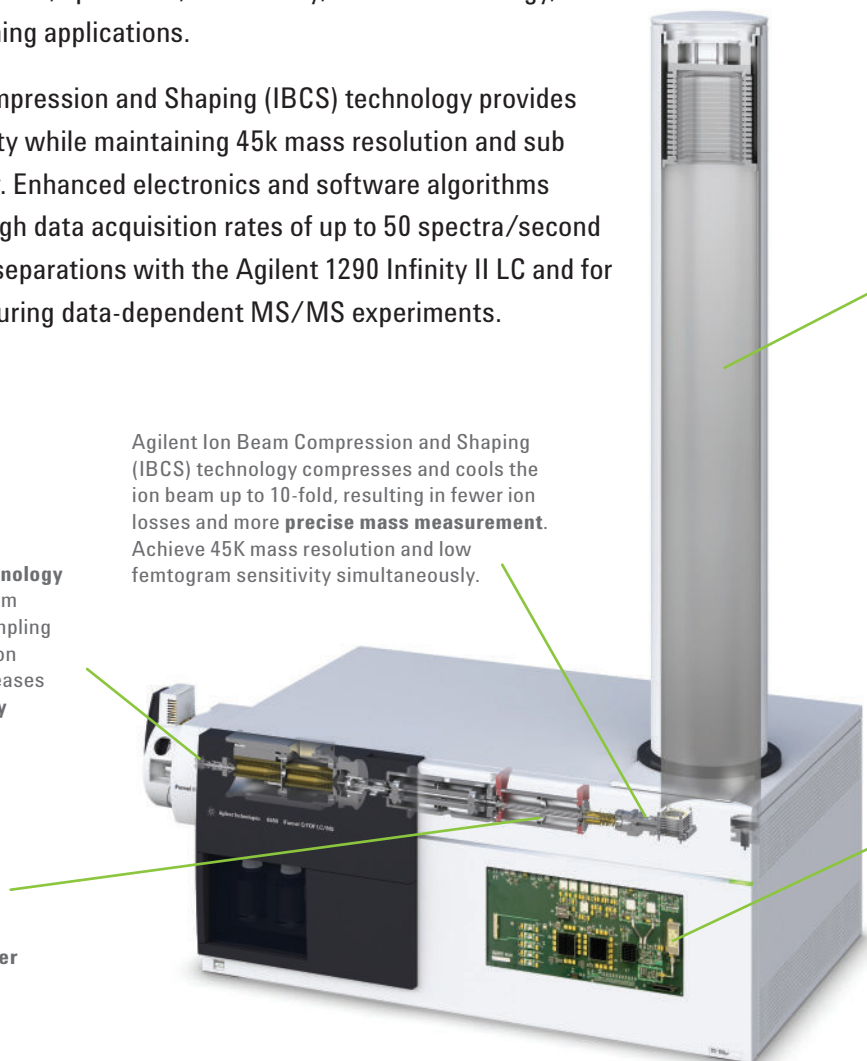
Revolutionary **iFunnel technology** combines Agilent Jet Stream technology, a hexabore sampling capillary and a dual stage ion funnel to dramatically increase ion transmission for **greatly improved sensitivity**.

Ions are accelerated in the collision cell to enable **faster generation of high-quality MS/MS spectra**.

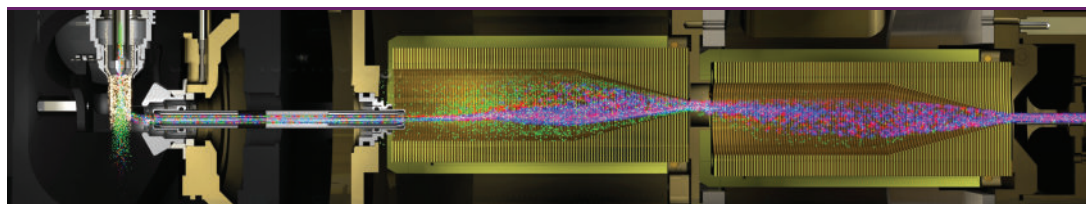
Agilent Ion Beam Compression and Shaping (IBCS) technology compresses and cools the ion beam up to 10-fold, resulting in fewer ion losses and more **precise mass measurement**. Achieve 45K mass resolution and low femtogram sensitivity simultaneously.

Proprietary INVAR flight tube sealed in a vacuum-insulated shell eliminates thermal mass drift due to temperature changes to maintain **excellent mass accuracy, 24/7**. Added length **improves mass resolution**.

Modern electronics enable a fast acquisition rate of 50 spectra/sec. 4 GHz digitizer enables a high sampling rate (32 Gbit/s) to improve the resolution, mass accuracy, and sensitivity for low-abundance samples. Dual gain amplifiers **extend the dynamic range to 10<sup>5</sup>**.



*The Agilent 6550 iFunnel Q-TOF LC/MS delivers the lowest limits of detection over the widest in-spectral dynamic range in a benchtop system.*



iFUNNEL TECHNOLOGY  
REVOLUTIONIZES  
ATMOSPHERIC SAMPLING

*“Ion Funnel technology could possibly be the most significant MS development since the introduction of the API. It delivers a fundamental sensitivity and detection limit breakthrough—resulting in performance far exceeding the capabilities of conventional mass spectrometers.”*

**Dr. Richard Smith**  
Inventor of the Ion Funnel,  
Battelle Fellow and  
Chief Scientist, PNNL

Agilent’s proprietary iFunnel technology combines the high-efficiency ESI ion generation and focusing of Agilent Jet Stream sample introduction with unique hexabore sampling capillary and dual stage ion funnel assemblies. This innovative technology demonstrates double-digit increases in sensitivity compared to older instruments.

Agilent iFunnel technology provides a level of robustness unmatched in the industry by combining true orthogonal electrospray orientation with a heated, off-axis funnel geometry to prevent transmission of uncharged species.

Three technological innovations work together to reduce contamination, and dramatically improve overall signal within the system:

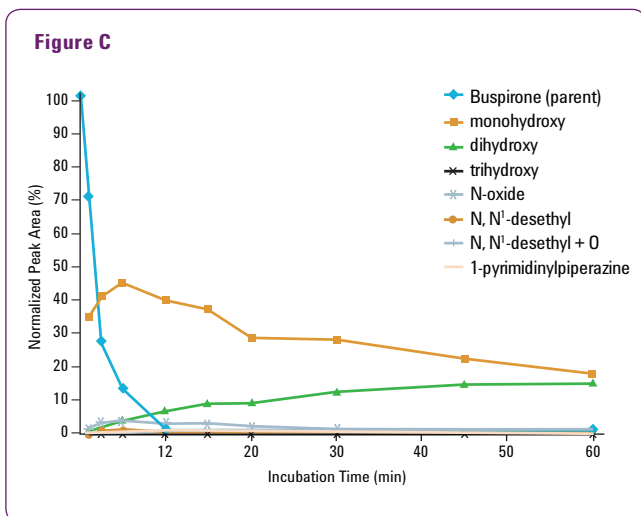
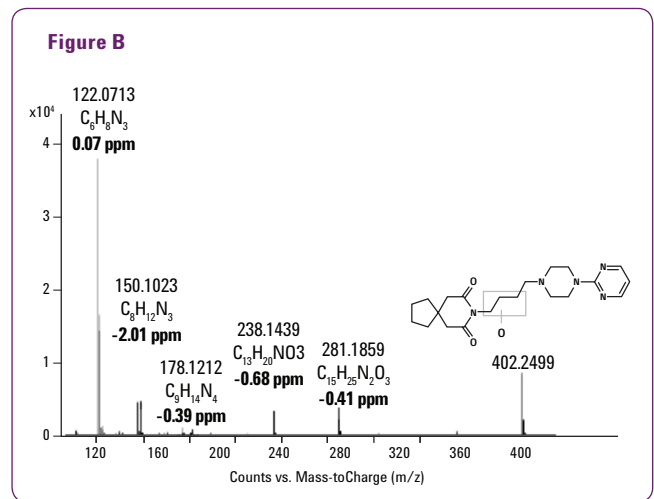
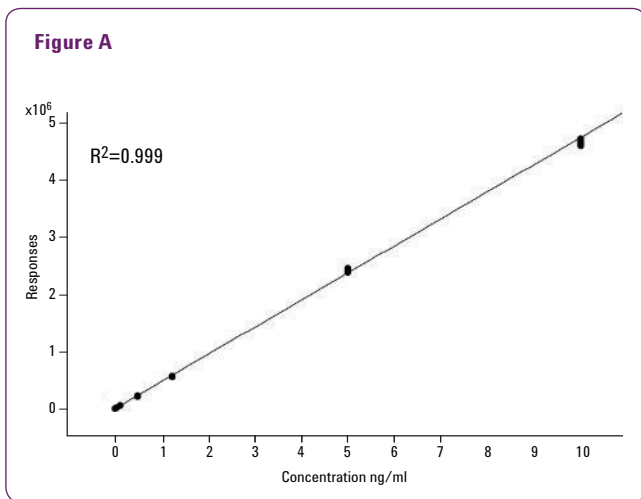
- **Agilent Jet Stream thermal gradient focusing**—A precisely micro-machined sprayer surrounds ESI droplets with a sheath of superheated gas to desolvate and concentrate ions near the MS inlet for more effective sampling.
- **Hexabore sampling capillary**—Six independent, parallel bores enable a much larger fraction of the ions formed in the ESI spray plume to enter the mass spectrometer while reducing turbulence to maintain a stable signal.
- **Dual-stage ion funnel**—Novel design facilitates increased ion transfer to Q1 while evacuating the higher gas load.



# Pharmaceutical Research

## Ultra-sensitive performance in the most critical Qual/Quan applications

Imagine combining the quantitative requirements of metabolic stability testing and metabolite profiling with the qualitative requirements of metabolite identification – all in a single instrument. This has been realized with the 6550 iFunnel Q-TOF. The dramatically enhanced analytical sensitivity of this system facilitates accurate quantification of parent drug and metabolites at levels well below those previously attainable with a high resolution, accurate mass LC/MS system. The system is ideally suited for metabolic stability and profiling studies, combining the highest sensitivity to detect compounds at low pg/mL levels, with 45k resolving power and excellent mass and isotope accuracy for confident identification of metabolites.



**The 6550 iFunnel Q-TOF with high sensitivity and mass-accuracy enables** (Figure A) accurate, linear quantitation of buspirone in complex matrix down to low pg/mL concentrations, (Figure B) high quality, accurate-mass MS/MS spectrum of a metabolite, buspirone monohydroxy metabolite, with sub-ppm mass accuracy on both precursor and fragment ions for confident metabolite identification, and (Figure C) metabolic stability and metabolite profiling in rat liver microsomal incubation illustrating complete coverage of major and low level metabolites.

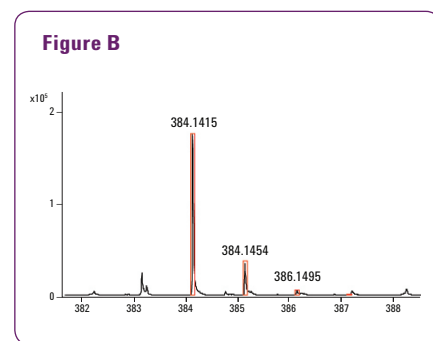
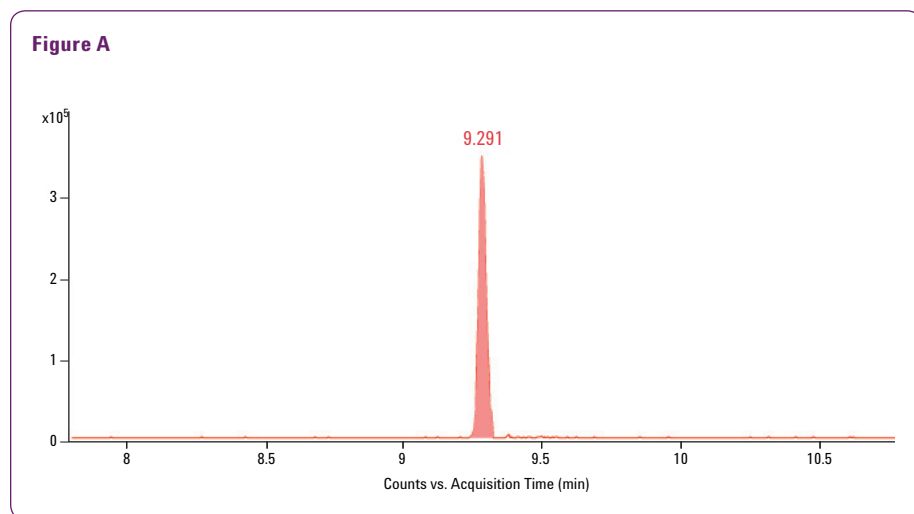


## Food Safety

Screen and identify pesticide residues with unsurpassed speed and analytical sensitivity

To assure food safety, robust methods are needed to rapidly screen samples for a large number of pesticides and other undesirable contaminants at ultra-trace levels. Unparalleled accuracy in mass measurements and isotope abundance make Q-TOF LC/MS systems the ideal choice for detection and identification of both targeted and non-targeted pesticides. The unsurpassed sensitivity of the 6550 iFunnel Q-TOF LC/MS system facilitates detection and quantitation of trace level compounds, allowing labs to keep pace with evolving regulations and to confidently identify new, emerging contaminants.

While the international action level for pesticide residues in fruit and vegetables is 10 ppb, a recent study by the European Reference Laboratory (Almeria, Spain) showed that 15% of the pesticide compounds tested with a previous generation high resolution system could only achieve detection limits of 20 to 100 ppb. Using the dramatic sensitivity gains of the Agilent 6550 iFunnel Q-TOF, a significant improvement in detection limit was demonstrated for the majority of these compounds to less than 10 ppb — including many of the least responsive pesticides.



**For pesticide analysis, the 6550 iFunnel Q-TOF demonstrated** (Figure A) 10-fold sensitivity gain for a poor responding pesticide (fluzifop-butyl) in pepper matrix. Extracted ion chromatogram shows excellent detection (S/N 1200) on 10 ppb fluzifop-butyl and (Figure B) confident compound identification of fluzifop-butyl with an excellent library match score of 98 based on a mass error of only 0.5 ppm and correct fit of isotope abundance and spacing.

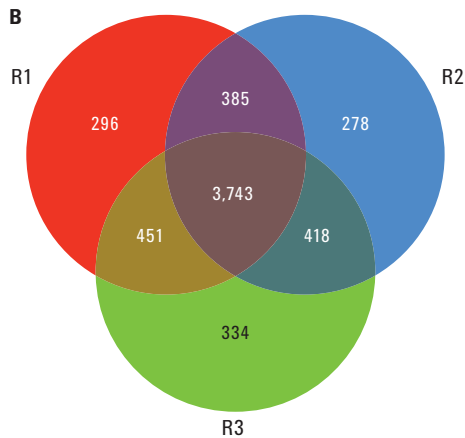
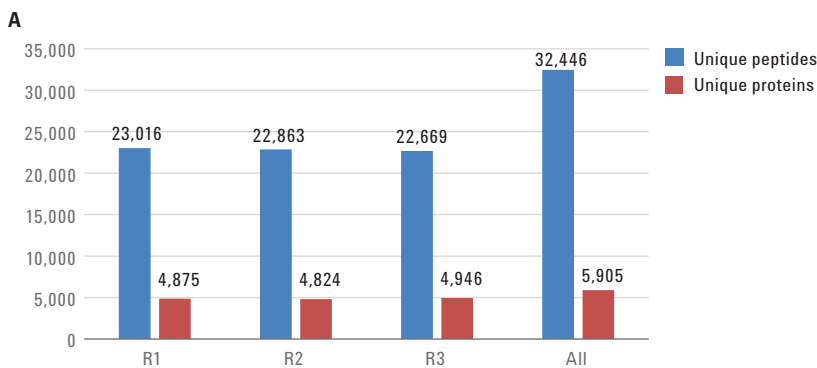


# Jet Stream Proteomics

Get unconventional analytical sensitivity from conventional LC

Sensitivity and robustness – for proteomics studies that are not sample-limited, you no longer have to choose! Based on Agilent's revolutionary Jet Stream source, the Agilent Jet Stream proteomics solution achieves near-nanoflow sensitivity with the robustness, reproducibility, and ease-of-use of standard-flow chromatography.

*Jet Stream proteomics uses iFunnel technology to enable the use of standard flow LC/MS. It combines the mass-flow dependent detection and enhanced analytical sensitivity of the Agilent Jet Stream source with the improved sensitivity of ion funnel mass spectrometers. With that, it is now feasible to use UHPLC for high-throughput, robust, and reproducible LC/MS analysis of complex proteomics samples for both discovery and targeted workflows.*

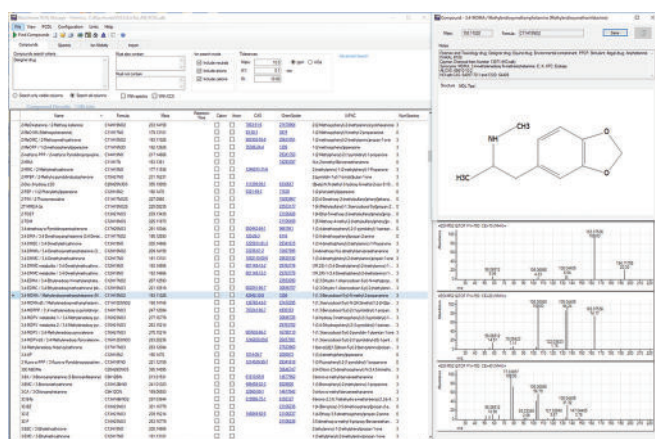


Analysis of a human breast cancer cell line demonstrates the performance of the Jet Stream-enabled protein discovery workflow. A) A total of 32,446 unique peptides and 5,905 unique proteins were identified across triplicate 100 minute LC/MS analyses of MDA-MB-231 cell lysate digest (25 µg on-column), demonstrating excellent reproducibility. B) Venn diagram of unique proteins identified in the triplicate analyses.

# MassHunter Workstation Software

The fastest, easiest way to transform MS data into answers

Agilent MassHunter Workstation software, now operating on Windows 10 in native 64-bit mode, is designed to make your MS analyses faster, easier, and more productive. In addition to data acquisition, and instrument control for your Agilent LC/MS, GC/MS, and ICP-MS instruments, the software incorporates advanced data mining and processing tools that let you rapidly and accurately extract all available information from the compounds in your samples—not just peaks and data points, but answers.



PCDL Manager for Forensic Toxicology PCDL\*, with compound pane with list of designer drugs, as well as spectra, structure, and detailed notes for compound 3,4-MDMA.

The analytical sensitivity and accurate mass of the 6550 iFunnel Q-TOF LC/MS system is complemented by a comprehensive suite of software applications, supporting solutions for pharmaceutical research, food safety, forensics, forensic toxicology, environmental analysis, metabolomics, and proteomics.

## Agilent SWARM Autotune

Get expert results, every time. By combining next generation tuning algorithms with easy to select customizations you get the best performance from the 6550, no matter your application. Quickly tailor your instrument performance to your analysis.

## MassHunter Personal Compound Database and Library (PCD and PCDL)

Compound identification is a key element for metabolomics, forensics, forensic toxicology, food safety, and environmental analyses. Agilent offers the market's first PCD and PCDL with the ability to use accurate mass MS/MS library for more confident identification of compounds of interest as well as the flexibility to create customizable PCDs and PCDLs.

Agilent provides PCDLs for the analysis of water contaminants, pesticide residues, veterinary drugs and mycotoxins, as well as for compounds of forensic toxicology interest (Broecker, Herre & Pragst)\*, and a PCD/PCDL for metabolomics (METLIN)\*\*.

\*For Forensic Use.

\*\*For Research Use Only. Not for use in diagnostic procedures.



## Experience clearly better speed and sensitivity for your qualitative and quantitative analyses

If you need to analyze low femtogram-levels of detection for pharmaceutical, proteomics, metabolite ID, lipidomics, food safety, forensic toxicology, and environmental applications—take advantage of the unsurpassed analytical sensitivity and robust performance of the Agilent 6550 iFunnel Q-TOF LC/MS system.

## The Agilent Value Promise: 10 years of guaranteed performance

In addition to our continually evolving products, Agilent offers the industry's only 10-year value guarantee. Agilent guarantees you at least 10 years of instrument use from your date of purchase, or we will credit you with the residual value of that system toward an upgraded model.

It's our way of assuring you of a safe purchase now and protecting your investment.



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