

MARKET REPORT



Mass Spectrometry For Drug Discovery Trends 2016

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Mass Spectrometry For Drug Discovery Trends 2016

HTStec's Mass Spectrometry For Drug Discovery Trends 2016 report was published on 28 September 2016. This 56 page market report summarizes the results of HTStec's 2nd industry-wide global web-based benchmarking survey on mass spectrometry (MS) in drug discovery and development carried out in September 2016. The survey was initiated by HTStec as part of its tracking of emerging life science marketplaces. The questionnaire was compiled to meet the needs, requirements and interests of the mass spectrometry (MS) instruments and assays vendor community. The objective was to comprehensively document the current status and preferences of using MS for drug discovery and development, and to understand future user requirements, particularly with respect to higher throughput screening platforms. Equal emphasis was given to soliciting opinion from Pharma, Biotech and Academic Research market segments in both North America and Europe. The report is based on 77 responses from University, Pharma and Biotech Labs, mainly in North America and Europe.

Executive Summary

- This market report summarizes the results of HTStec's 2nd industry-wide global web-based benchmarking survey on mass spectrometry (MS) in drug discovery and development carried out in September 2016.
- The survey was initiated by HTStec as part of its tracking of emerging life science marketplaces. The questionnaire was compiled to meet the needs, requirements and interests of the mass spectrometry (MS) instruments and assays vendor community. The objective was to comprehensively document the current status and preferences of using MS for drug discovery and development, and to understand future user requirements, particularly with respect to higher throughput screening platforms.
- Equal emphasis was given to soliciting opinion from Pharma, Biotech and Academic Research market segments in both North America and Europe.
- The survey looked at the following aspects of MS-based assays and approaches, as practiced today (2016) and in a few cases as predicted for the future (2018): drug discovery areas where MS-based assays have been used; what is most analyzed by MS-based assays; key diseases/therapeutic areas targeted with MS-based assays; target classes most interested in applying MS-based assays; biological sample types most analyzed using MS-based assays; ADME applications of greatest interest; main drivers for wanting to adopt MS-based assays in drug screening; biggest limitations associated with MS-based assays; alternative label-free technologies/approaches displaced by MS-based assays; what instrument throughput constitutes true HTS; throughput wanted from an MS detection device; compatibility requirements of an MS platform; number of FTE devoted to MS-based assay research; assay development of MS-based assays; MS-based primary screening (HTS) assay metrics; costs per sample (well) analyzed using MS-based assays; if MS-based screening assays are implemented how this has been achieved; how many MS detection units are there available in respondent's screening facilities; approach to MS-based screening automation respondents are most likely to adopt in the future; plans to purchase automated high throughput MS-based screening systems; most wanted types of MS detection systems; most appealing vendors of MS detection systems and sample automation; vendors most associated with cutting-edge (forward looking) MS developments; MALDI-MS target price-points; how respondents intend to load/spot samples onto MALDI targets; importance of different applications being enabled on the same MS-based platform in the future; approach to enabling truly high throughput automated MS-based drug discovery expected to gain most traction over the coming years; where vendors should prioritise their efforts to make MS a more widely used lab readout technology; level of agreement with statements about the status of MS-based screening assays; and any unmet needs in MS-based screening approaches today.
- The main questionnaire consisted of 28 multi-choice questions and 3 open-ended questions. In addition, there were 6 questions related solely to the administration of survey.
- The survey collected 77 validated responses, of these 70% provided comprehensive input.
- Survey responses were geographically split: 43% Europe; 36% North America; 13% Asia (excluding Japan & China); 4% Japan; and 4% ROW (rest of World).
- Survey respondents were drawn from persons or groups using MS-based assays or approaches in drug

discovery and development or planning future investigation in this area.

- Respondents represented 34 University/Research Institute/Government Lab/Not-For-Profit; 14 Large Pharma; 8 Medium-Small Pharma; 6 Biotech Company; 5 Biopharma; 4 Contract Research Organisation; 3 Academic Screening Lab; 1 Agrochemical/Agri-Biotech Company; 1 Medical School /Hospital/Clinic; and 1 Other.
- Most survey respondents had a senior job role or position which was in descending order: 15 senior scientists/researchers; 13 research scientists; 12 professor/assistant professors; 7 lab managers; 7 directors; 7 principal investigators; 5 section/group leaders; 3 other roles; 2 graduates/PhD students; 2 post-docs; 2 department heads; and 1 vice president.
- Survey results were expressed as an average of all survey respondents. In addition, where appropriate the data was reanalyzed after sub-division into the following 5 survey groups: 1) Pharma; 2) Biotech; 3) Academic Research; 4) North America; and 5) Europe.
- 84% of respondents were currently using MS-based approaches for drug discovery and development, the remainder aspire to or intend to implement or outsource in the near future.
- The drug discovery related areas where most have used or attempted MS based assays and approaches were metabolomics and characterization of biologics.
- The majority of respondents most want to analyze small molecules using MS-based screening assays.
- The majority of respondents were targeting MS-based screening assays within the oncology area.
- ADME-Tox & PK was rated the area/target class where most interest in applying MS-based screening approaches currently resided.
- Biological fluids/tissue homogenates collected from in vivo drug studies were rated the biological samples most respondents were interested in analyzing using MS-based assays and approaches.
- Metabolic stability was rated the ADME area most interested in applying MS-based assays & approaches.
- Sensitivity was ranked the most important driver for wanting to adopt MS-based screening assays.
- Feedback on the biggest limitations of using MS-based screening assays today were documented.
- High cost of instrumentation was rated the main issue limiting MS-based assays and approaches.
- Protein-ligand NMR was rated the alternative label-free technology/approach most likely to be displaced by MS-based assays or approaches.
- Respondents view on what currently constitutes high throughput screening (HTS) in their laboratory was a median of <1K samples (wells) processed per 24h day.
- The median acceptable throughput sought in a new MS detection device was a 10sec interval between successive sample ionizations.
- Regarding the future deployment of MS-technology platforms for primary screening (HTS) compatibility with 1536-well plates was rated nice to have and low volume sample utilization was rated an absolute requirement.
- A median of 1-5 FTE were devoted in house to MS-based assay research today.
- A median of 1-5 MS-based targets/projects/programs were supported today.
- A median of 1-2 weeks assay development time was reported for MS-based assays.
- A median of 2 MS-based primary screens (HTS) were performed per year today.
- A median of <1K wells were performed per MS-based primary screen today.

- A median of \$2-\$5 was paid per sample well analyzed by MS-based screening assays today.
- A median of 3 MS-based detection systems (units) were available in respondent's screening facilities.
- Most respondents have no plans to purchase a new MS screening system over the coming years. Of those considering purchases most were interested in an injection-based LC-MS involving ONLINE sample prep.
- The median budget allocation for a new MS screening system was \$500K-\$750K; with 1 unit per budget; and the most cited reason for purchasing was to achieve greater automation/higher throughput.
- The market of high throughput MS-based screening systems used in drug discovery and development was estimated to be around \$100M in 2016.
- Respondents who have already implemented MS-based screening assays gave brief details of their system, MS vendor and any associated automation.
- The type of MS system respondents were most interested in deploying in high throughput drug discovery was either a Tandem MS/MS or Triple QUAD (QqQ).
- The most preferred vendors of MS detection systems were Thermo Scientific; AB Sciex and Agilent.
- The most preferred vendors of MS sample automation were Agilent, Thermo Scientific and Hamilton.
- Thermo Scientific was the vendor most associated with cutting edge MS developments.
- The median prohibitive price-point of a 1536 MALDI-MS target plate was \$50-\$100 per plate.
- The median stimulative price-point of a 1536 MALDI-MS target plate was \$15-\$20 per plate.
- Awareness or use of MALDI-MS target spotting systems was greatest for the Beckman Biomek FX.
- Metabolomics was ranked the most wanted (highest priority) application to be enabled on a multi-function MS-based screening platform.
- Respondent's opinion on the approach to enabling truly high throughput MS-based drug discovery likely to gain most traction in the future was injection-based MS that typically involves ONLINE sample prep (e.g. Agilent RapidFire).
- No or minimal sample preparation requirement was ranked where vendors should most prioritise their efforts to make MS a more widely used lab readout technology.
- Respondent's level of agreement with statements about the current status of MS-based screening assays showed strongest agreement for the statement - 'Enabling higher throughput with minimal sample prep is the key to future adoption' and strongest disagreement for the statement - 'MS-based assays will never be the preferred screening format for cell-based assays'.
- The full report provides the data, details of the breakdown of the responses to each question, its segmentation and estimates for the future (2018). It also highlights some interesting differences, particularly between Pharma versus the other survey groups.

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HTStec (formerly HTS Technologies) is an independent consultancy that was founded by Dr. John Comley in spring 2002. HTStec is focused on providing informed opinion and market research on those enabling and emerging technologies that underpin high throughput screening (HTS) today. HTStec works with clients, drawn mainly from those companies that are developing novel liquid handling and detection instruments, laboratory automation, assay reagents and platform technologies, to help them maximise the market potential of their developments and gain the competitive edge through better understanding of the latest requirements of customers working in HTS laboratories.

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