

# HPLC Markets: Global Analysis and Opportunity Evaluation 2016 - 2020

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## Abstracts

This market report provides a comprehensive and easy-to-review analysis of the analytical HPLC market 2016 to 2020, providing key market data and identifying new and emerging opportunities across this field. This analysis is based on primary data disclosed by experienced end-users on their current HPLC practices and their plans over the next three years. Its findings provide a wealth of market information on HPLC and enable suppliers to target new markets and reduce costs.

### HPLC Market Study

Growth in end-users' HPLC analysis now and anticipated in 3 years ( $\pm\%$  change)

High-growth areas of HPLC now and anticipated in 3 years ( $\pm\%$  change)

End-users' three-year plans for their use of HPLC

HPLC fields and applications now and anticipated in 3 years ( $\pm\%$  change)

HPLC instrument suppliers now and anticipated in 3 years ( $\pm\%$  change)

HPLC consumables suppliers now and anticipated in 3 years ( $\pm\%$  change)

HPLC systems and models now and anticipated in 3 years ( $\pm\%$  change)

HPLC modular instruments and models including detectors, pumps and autosamplers

Sample preparation methods including manual, semi-automated and automated

HPLC pumping pressures now and anticipated in 3 years ( $\pm\%$  change)

HPLC column internal diameters now and anticipated in 3 years ( $\pm\%$  change)

Column packing material sizes now and anticipated in 3 years ( $\pm\%$  change)

Column-switching now and anticipated in 3 years ( $\pm\%$  change)

UPLC used now and anticipated in 3 years ( $\pm\%$  change)

UHPLC used now and anticipated in 3 years ( $\pm\%$  change)

Fast HPLC used now and anticipated in 3 years ( $\pm\%$  change)

Hyphenated HPLC used now and anticipated in 3 years ( $\pm\%$  change)

Chip-based LC used now and anticipated in 3 years ( $\pm\%$  change)

Multidimensional LC used now and anticipated in 3 years ( $\pm\%$  change)

Other separation techniques used now and anticipated in 3 years ( $\pm\%$  change)

HPLC limits of detection achieved now and anticipated in 3 years ( $\pm\%$  change)

Innovation and development needs relating to end-users' future use of HPLC

Sample types analysed using HPLC

Disease biomarkers covering diseases, purposes and utilities

Relative HPLC consumables costs relating to their use of HPLC

Costs of sample analysis estimated by end users, using HPLC

Average monthly throughput of samples using HPLC

## Countries and global regions

### Companies Mentioned

More than 30 companies are mentioned in this report and these include AB Sciex, Advion, Agilent, Aldrich Supelco, Beckman Coulter, Bio-Rad, Bruker, Cecil, Dionex (Thermo), Dorton, Fortis, GE, Gilson, Hamilton, Hichrom, Hitachi, Imtakt, Jasco, Knauer, Merck Millipore, Metrohm, Novasep, Pall Corp, Perkin-Elmer, Phenomenex, Proxeon (Thermo), Shimadzu Corp, Tosoh, W.R. Grace, and Waters Corp.

### This Report

High-Performance Liquid Chromatography (HPLC) is one of today's most established and important analytical tools. It is used in research and routine analysis across more than thirty fields, from environmental analysis and food and drink, through to pharmaceutical development, diagnostic research and biomarker discovery. Efforts to extend its analytical detection limits and its capacity to separate and quantify analytes in complex samples has driven new developments and innovation at every level of this technique, from the column technologies and separation modes that are at the heart HPLC separations, to the instrumentation and data-handling systems. Further developments of this technique continue today and these include Ultra-Performance Liquid Chromatography (UPLC), Ultra High-Performance Liquid Chromatography (UHPLC), Fast HPLC, Multidimensional LC, Hyphenated HPLC Systems and Chip-Based LC. These advances have been accompanied by the scaling-down and miniaturization of HPLC systems, which have taken analytical speeds, separation efficiencies and detection limits to new levels, opening up new and valuable applications in this field.

Laboratory Markets (formerly Biopharm Reports) has carried out a comprehensive market study of HPLC that involved the participation of 259 experienced HPLC chromatographers and profiled current practices, developments, trends and end-user plans over the next three years, as well as growth and opportunities across thirty market sectors, including life science, research and clinical areas. These areas include growth in the use of HPLC, end-user's three year plans across major market areas, instrument suppliers and instrument model numbers, consumables suppliers, costs, HPLC applications, analytical throughput and new innovation and development needs. End-users' current practices and future plans in developing areas were also covered, including Ultra-Performance Liquid Chromatography (UPLC), Ultra High-Performance

Liquid Chromatography (UHPLC), Fast HPLC, Multidimensional LC, Hyphenated HPLC Systems and Chip-Based LC. Other areas include column-switching, packing material particle sizes, column internal diameters, pump pressure ranges, flow and separation modes as well HPLC systems from conventional through to micro- and nano-based systems. The findings of this study provide a wealth of market information on the current and developing used of HPLC to laboratory suppliers in this important field.

Laboratory Markets' specialised market studies are designed to assist suppliers and developers to profile current and evolving laboratory market opportunities. All of our studies are carried out through specialist groups of experienced end-users and therefore findings are based on 'real world' market data. By providing new insights and a better understanding of end-user practices, needs and future plans, our studies assist suppliers to sell into these markets, and also support innovation and strategic planning. The following study areas were investigated:

## HPLC Market Study

### 1. Growth

Based on recent trends in the numbers of samples analysed in their laboratories using HPLC, end-users' own estimates of by how much (% increase or % decrease) their laboratory use of HPLC changed over the last three years. Also, based on current trends in the numbers of samples analysed in their laboratories, end-users' own estimates of by how much (% increase or % decrease) they anticipate their laboratory use of HPLC will change over the next three years.

### 2. HPLC Instrument Suppliers ++

HPLC chromatographers' current main suppliers of HPLC instruments and those companies they anticipate will be supplying HPLC instruments to their laboratories in three years from now, where the companies++ considered were AB Sciex, Advion, Agilent, Aldrich Supelco, Beckman Coulter, Bio-Rad, Bruker, Cecil, Dionex (Thermo), Dorton, Fortis, GE, Gilson, Hamilton, Hichrom, Hitachi, Imtakt, Jasco, Knauer, Merck Millipore, Metrohm, Novasep, Pall Corp, Perkinelmer, Phenomenex, Proxeon (Thermo), Shimadzu Corp, Tosoh, W.R. Grace, Waters Corp, Other and others.

### HPLC Consumables Suppliers ++

HPLC chromatographers' current main suppliers of HPLC consumables and those

companies they anticipate will be supplying HPLC consumables to their laboratories in three years from now, where the companies++ considered were AB Sciex, Advanced Chromatography Technologies, Advion, Agilent, AkzoNobel, Aldrich Supelco, Beckman Coulter, BGB, Bio-Rad, Bonna-Agela Technologies, Bronkhorst, Bruker, Cecil, Chiral Technologies, ChromSword, Diamond Analytics, Dikma Technologies, Dionex (Thermo), Dorton, Fortis, Fortis Technologies, GE, Gilson, GL Sciences, Hamilton, Hichrom, Hitachi, Imtakt, Jasco, Knauer, MACHEREY-NAGEL, Merck Millipore, Metrohm, Novasep, PAL System, Pall Corp, Peak Scientific Instruments, Perkinelmer, Phenomenex, Prolab Instruments, Proxeon (Thermo), Restek, SEDERE, Shimadzu Corp, Shodex, Sigma-Aldrich, Spark Holland, Tosoh, Trajan, VICI, VWR, W.R. Grace, Waters Corp, WHEATON, Wyatt Technology, YMC Europe and any others.

++ This listing of suppliers may include companies that have been acquired by other companies, changed their names, or moved out of this field and transferred their products to a third party. This is because, in our experience, end-users often refer to original supplier's and product names, even when companies have been acquired, changed their company name, or where a product range is made available through an alternative third party

### 3. HPLC System Models (by Model Number)

HPLC chromatographers' current main use of integrated HPLC systems (single suppliers) and those HPLC systems (single suppliers) they anticipate using in their laboratories in three years from now, where the HPLC systems considered were AB Sciex – cHiPLC System, AB Sciex – MicroLC 200 Plus, AB Sciex – NanoLC 400, AB Sciex – UltraLC 110 System, AB Sciex – UltraLC 110-HTC/HTS, AB Sciex – UltraLC 110-XL, Agilent – 1220 Infinity, Agilent – 1260 Infinity, Agilent – 1290 Infinity, Cecil – Merit, Cecil – Q-ADEPT HPLC SYSTEM Q-2, Cecil – Q-ADEPT HPLC SYSTEM Q-4, Cecil – Q-ADEPT HPLC SYSTEM Q-4S, Dionex (Thermo) – UHPLC+ Focused, Dionex (Thermo) – UltiMate 3000 Basic LC, Dionex (Thermo) – UltiMate 3000 Nano LC, Dionex (Thermo) – UltiMate 3000 Rapid Separation LC, Dionex (Thermo) – UltiMate 3000 Standard LC, GE – BioProcess MPLC/HPLC system – Type I, GE – BioProcess MPLC/HPLC system – Type II, Hitachi – Chromaster, Hitachi – Primaide, Jasco – LC-4000 series, Knauer – AZURA Compact HPLC, Knauer – AZURA HPLC Plus, Knauer – Smartline system, Proxeon (Thermo) EASY-nLC 1000, Proxeon (Thermo) EASY-nLC II, Shimadzu – ion i-Series, Shimadzu – Nexera MP, Shimadzu - Nexera X2, Shimadzu – Nexera XR, Shimadzu – Prominence, Shimadzu – Prominence nano, Waters – ACQUITY UPLC I-Class, Waters – ACQUITY UPLC M-Class, Waters – ACQUITY UPLC with 2D LC, Waters – Alliance HPLC, Waters – Breeze 2 HPLC,

Waters – PATROL UPLC, Waters – ACQUITY UPLC and any others.

#### 4. HPLC Pumps (Model Numbers)

HPLC chromatographers' current main use of HPLC pumps where the HPLC pumps systems considered were Dionex (Thermo) – Binary Analytical Pump HPG-3x00SD, Dionex (Thermo) – Dual-Gradient Analytical Pump DGP-3600SD, Dionex (Thermo) – The Binary Rapid Separation Pump HPG-3x00RS, Dionex (Thermo) – The Biocompatible Isocratic Micro Pump ISO-3100BM, Dionex (Thermo) – The Dual-Gradient Rapid Separation, Dionex (Thermo) – The Isocratic Analytical Pump ISO-3100SD, Dionex (Thermo) – The Quaternary Analytical Pump LPG-3400SD, Dionex (Thermo) – The Quaternary Rapid Separation Pump LPG-3400RS, Dionex (Thermo) – The RSLCnano HPG, Dionex (Thermo) – UltiMate 3000 Binary Semipreparative Pump HPG-3200P, Hitachi – Chromaster 5110, Hitachi – Primaide 1110, Knauer – AZURA P 2.1S, Knauer – AZURA P 6.1L, Knauer – BlueShadow Pump 10P, Perkinelmer – Flexar, Perkinelmer – UHPLC, W.R. Grace – 301 Pump, W.R. Grace – 426 Pump and any others.

#### 5. HPLC Detectors (Model Numbers)

HPLC chromatographers' current main use of HPLC detectors where the HPLC detectors systems considered Agilent – 1260 Infinity Diode Array, Agilent – 1260 Infinity Evaporative Light Scattering, Agilent – 1260 Infinity Fluorescence, Agilent – 1260 Infinity Multiple Wavelength, Agilent – 1260 Infinity Refractive Index, Agilent – 1260 Infinity Variable Wavelength, Agilent – 1290 Infinity Diode Array, Agilent – 1290 Infinity Evaporative Light Scattering, Agilent – 1290 Infinity II Diode Array, Agilent – PL-RTLS, Agilent – PL-HTLS GPC Light Scattering, Cecil – WaveQuest, Cecil – CE 4300 Dynamic Absorbance, Dionex (Thermo) – Charged Aerosol, Dionex (Thermo) – MSQ Plus, Dionex (Thermo) – Refractive index detector, Dionex (Thermo) – UltiMate™ 3000 Rapid Separation Diode Array), Dionex (Thermo) – Electrochemical, Dionex (Thermo) – UltiMate 3000 FLD-3000 Fluorescence, Dionex (Thermo) – UltiMate 3000 Rapid Separation Multiple Wavelength, Dionex (Thermo) – UltiMate 3000 VWD Variable Wavelength, Dorton – Quant Nano Quantity Analyte, Hitachi – 5410 UV, Hitachi – 5420 UV-Vis, Hitachi – 5430 Diode Array, Hitachi – 5440 Fluorescence, Hitachi – 5450 RI, Hitachi – Primaide 1410 UV, Hitachi – Primaide 1430 Diode Array, Knauer – Amperometric, Knauer – AZURA CM 2.1S, Knauer – AZURA Detector DAD 2.1L, Knauer – AZURA Detector DAD 6.1L, Knauer – AZURA Detector MWD 2.1L, Knauer – AZURA UV Detector UVD 2.1S, Knauer – AZURA UV/VIS Detector UVD 2.1L, Knauer – BlueShadow UV 10D, Knauer – BlueShadow UV/VIS 40D, Knauer – BlueShadow



UV/VIS 50D, Knauer – Conductivity CDD-10 Avp, Knauer – Electrochemical DECADE II DCC, Knauer – Electrochemical DECADE II SCC, Knauer – Fluorescence RF-20 A, Knauer – Fluorescence RF-20 Axs, Knauer – Light Scattering Sedex 85LT, Knauer – Light Scattering Sedex 90LT, Knauer – Light Scattering Sedex LC, Knauer – Polarimetric CHIRALYSER-MP, Knauer – Radioflow LB 513, Knauer – Refractive Index RefractoMax 520, Knauer – Refractive Index RefractoMax ULTRA, Knauer – Smartline RI Detector 2300, Perkinelmer – Flexar PDA Plus, Perkinelmer – Flexar Refractive Index, Perkinelmer – Flexar UV/Vis, Shimadzu – CDD-10AVP Conductivity, Shimadzu – ELSD-LTII Evaporative Light Scattering, Shimadzu – Nexera SR (with Photodiode array), Shimadzu – RF-20A/RF-20Axs Fluorescence, Shimadzu – RID-20A, Refractive Index, Shimadzu – SPD-20A/20AV (UV-VIS Detectors), Shimadzu – SPD-M20A Photodiode Array, Shimadzu – SPD-M30A Photodiode Array Detector, W.R. Grace – Alltech®3300 ELSD, Waters –, ACQUITY QDa Detector, Waters –, ACQUITY UPLC Detectors and any others.

## 6. HPLC Pumps ( Model Numbers)

HPLC chromatographers' current main use of HPLC autosamples/injectors pumps where the HPLC autosamples/injectors systems considered were Agilent – 1260 Infinity Bio-inert High-Performance, Agilent – 1260 Infinity Dual Loop, Agilent – 1260 Infinity High Performance, Agilent – 1260 Infinity High Performance Micro, Agilent – 1260 Infinity Manual Injector, Agilent – 1260 Infinity Multisampler, Agilent – 1260 Infinity Preparative, Agilent – 1260 Infinity Standard, Agilent – 1290 Infinity, Agilent – 1290 Infinity Flexible Cube, Agilent – PL-GPC 50 Autosampler, Cecil – Autoquest, Dionex (Thermo) – Analytical Thermostatted, Dionex (Thermo) – UltiMate 3000 Nano/Capillary, Dionex (Thermo) – Manual Injector, Dionex (Thermo) – WPS-3000FC, Dionex (Thermo) – UltiMate 3000 Biocompatible Analytical, Dionex (Thermo) – UltiMate 3000 Rapid Separation, Dionex (Thermo) – UltiMate® 3000 Analytical, Dionex (Thermo) – WPS-3000 Well Plate Autosampler, Hitachi – 5210, Hitachi – Primaide 1210, Knauer – Autosampler 3950, Knauer – Autosampler Optimas, Perkinelmer – Flexar HPLC, Shimadzu – SIL-20AXR/SIL-20ACXR, Shimadzu – SIL-30AC and any others.

## 7. Sample Preparation Methods

HPLC chromatographers' current main sample preparation methods and anticipated in three years from now, where the sample preparation methods considered were manual, semi-automated and automated) where the HPLC sample preparation methods considered were Manual – Affinity purification, Manual – Centrifugation only, Manual – Column-Switching, Manual – Derivatization, Manual – Dialysis only, Manual – Filtration

only, Manual – Liquid-Liquid extraction, Manual – Membrane based, Manual – Precipitation only, Manual – Preconcentration, Manual – Proteolysis, Manual – Solid Phase Extraction (SPE), Manual – Sample degradation, Manual – None (direct injection), Manual – Other, Semi-Automated – Affinity purification, Semi-Automated – Centrifugation only, Semi-Automated – Column-Switching, Semi-Automated – Derivatization, Semi-Automated – Dialysis only, Semi-Automated – Filtration only, Semi-Automated – Liquid-Liquid extraction, Semi-Automated – Membrane based, Semi-Automated – Precipitation only, Semi-Automated – Preconcentration, Semi-Automated – Proteolysis, Semi-Automated – Solid Phase Extraction (SPE), Semi-Automated – Sample degradation, Semi-Automated – None (direct injection), Semi-Automated – Other, Automated – Affinity purification, Automated – Centrifugation only, Automated – Column-Switching, Automated – Derivatization, Automated – Dialysis only, Automated – Filtration only, Automated – Liquid-Liquid extraction, Automated – Membrane based, Automated – Precipitation only, Automated – Preconcentration, Automated – Proteolysis, Automated – Solid Phase Extraction (SPE), Automated – Sample degradation, Automated – None (direct injection), Automated and any others.

## 8. HPLC Fields

The fields in which HPLC chromatographers use HPLC, where the fields considered were Biochemistry, Biology, Biotechnology, Clinical Therapeutics, Clinical Diagnostics, Environmental, Food & Drink, Forensics, Government, Healthcare, Medicine, Natural Products, Pharmaceuticals, Veterinary and others.

## 9. HPLC Top-Level Applications

HPLC chromatographers' top-high level applications of HPLC and anticipated in three years from now, where the top-level applications considered were Bacteriology, Biological cells, Biomarkers, Biopharmaceuticals, Bioprocesses, Chiral separations, Clinical research, Clinical therapeutics, Clinical trials, Cytogenetics, Cytology, Diagnostics – research, Diagnostics – routine Tests, Diagnostics screening, Drug ADME, Drug clinical trials, Drug discovery, Drug drug metabolism, Drug preclinical studies, Drug targets, Drug toxicology, Environmental analysis, Food analysis, Genomics, Metabolomics, Microorganisms, Molecular biology, Natural products, Proteins, Proteomics, Virology and others.

## 10. HPLC Systems

HPLC chromatographers' use of different HPLC systems now and anticipated in three



years from now, where the HPLC systems considered were (Conventional) HPLC, Microcolumn HPLC, Capillary HPLC, Nanoflow HPLC, UPLC and any others.

#### 11. HPLC Separation Modes

HPLC chromatographers' use of different HPLC separation modes and anticipated in three years from now, where the separation modes considered were, where the modes considered were Affinity, Chiral, Gel Filtration Chromatography (GFC), Gel Permeation Chromatography (GPC), Hydrophilic Interaction, Ion exchange (IE), Ion exclusion, Ligand exchange, Multi mode, Normal-phase (NP), Reversed-phase (RP) and any others.

#### 12. HPLC Flow Modes

HPLC chromatographers' use of different chromatographic flow modes and and anticipated in three years from now, where the HPLC flow modes considered were Isocratic, Binary gradient, Tertiary gradient, Quaternary gradient and any other.

#### 13. HPLC Detectors

HPLC chromatographers' use of different detectors now and anticipated in three years from now, where the HPLC detectors considered were Chemiluminescence, Conductivity, Electrochemical, Fluorescence, Infrared spectrophotometric, Light Scattering (Evaporative), Light Scattering (Multi Angle), Mass Spectrometric, Optical Rotation, Photo Diode Array, Radioactivity, Refractive Index, UV-VIS Detector and any others.

#### 14. HPLC Instrument Systems

HPLC chromatographers' use of different instrument systems now and anticipated in three years from now, where the instrument systems considered were Fully integrated HPLC systems (from one supplier), Integrated HPLC system (from one supplier) + customisation, Fully modular HPLC systems (multiple suppliers), Fully customised HPLC systems, Modular and Customised and any others.

#### 15. HPLC Pump Pressures

HPLC chromatographers' use of different pump pressures now and anticipated in three years from now, where the pump pressures considered were Up to 1000 psi (~70 bar),

Up to 2000 psi (~140 bar), Up to 3000 psi (~210 bar), Up to 5000 psi (~350 bar), up to 7000 psi (~490 bar), Up to 10,000 psi (~700 bar), Up to 15,000 psi (~1050 bar), Up to 20,000 psi (~1400 bar), Over 20,000 psi (>1400 bar) and any others.

## 16. HPLC Pump Pressures

HPLC chromatographers' use of different HPLC column internal diameters now and anticipated in three years from now, where the internal diameters considered were Standard bore: 4.6 mm ID, Narrow bore: 2.1 mm ID, Micro LC: 0.5 – 1 mm ID, Capillary LC: 100 – 500 microns ID, Nano LC: 10 to 100 microns and any others.

## 17. HPLC Packing Material Sizes

HPLC chromatographers' use of different HPLC packing material particle sizes now and anticipated in three years from now, where the packing material particle sizes considered were > 40 microns, 30 – 40 microns, 20 – 30 microns, 10 – 20 microns, 5 – 10 microns, 3 – 5 microns, 2 – 3 microns,

## 18. Column Switching

HPLC chromatographers' use of column switch now and anticipated in three years from now, including their purpose for using column switching ( Sample clean-up, Sample preconcentration, For separating groups of components, For chromatographic adjustment and any other) and their use of Heart Cut or Comprehensive switching.

## 19. UPLC

HPLC chromatographers' use of UPLC now and anticipated in three years from now

## 20. UHPLC

HPLC chromatographers' use of UHPLC now and anticipated in three years from now

## 21. Fast HPLC

HPLC chromatographers' use of Fast HPLC now and anticipated in three years from now

## 22. Hyphenated HPLC

HPLC chromatographers' use of Fast hyphenated HPLC now and anticipated in three years from now and their current use and anticipated use of hyphenated systems over the next three years where the systems considered were LC-ultraviolet array detection (LC-UV-DAD), LC mass spectrometry (LC-MS), LC-multiple stage MS (LC-MS), LC-nuclear magnetic spectrophotometry (LC-NMR), LC spectrophotometry (LC-IR) and any others.

### 23. Chip-Base LC

HPLC chromatographers' use of Chip-base LC now and anticipated in three years from now

### 24. Multidimensional LC

HPLC chromatographers' use of Multi-Dimensional LC now and anticipated in three years from now

### 25. Other Separation Techniques

HPLC chromatographers' use of other separation techniques now and anticipated in three years from now, where the other techniques considered were Capillary Electrophoresis (CE), Supercritical Fluid Chromatography (SFC), Capillary Electrochromatography (CEC), Micellar Electrokinetic Chromatography (MECK) and any other.

### 26. Limits of Detection

HPLC chromatographers' limited of detection using HPLC now and anticipated in three years from now, where the other limits of detection ranges considered were Milligram/ml (10<sup>-3</sup> g/ml), Microgram/ml (10<sup>-6</sup> g/ml), nanogram/ml (10<sup>-9</sup> g/ml), picogram/ (10<sup>-12</sup> g/ml), femtogram/ml (10<sup>-15</sup> g/ml), attogram/ml (10<sup>-18</sup> g/ml), zeptogram/ml (10<sup>-21</sup> g/ml) and yoctogram/ml (10<sup>-24</sup> g/ml).

### 27. Study Samples

HPLC chromatographers' samples analysed using HPLC, where the sample types considered were Bacterial, Biological Cells, Biological Tissues, Cerebrospinal fluid, Environmental, Forensic, Industrial, Lymph, Milk, Pharmaceutical, Plasma, Saliva, Security-related, Semen, Serum, Smears, Sputum, Synovial fluids, Urine, Viral, Whole

blood and any others.

## 28. Consumables Relative Costs

HPLC chromatographers' relative costs for HPLC consumables, where the consumables considered were Chemical standards, Chemicals & Reagents, Columns, Fittings, Gases, Glassware & Plastic ware, Servicing, Solvents and Study Samples.

## 29. Needs of Innovation Requirements

HPLC chromatographers' future needs or innovation requirements in HPLC, where the needs or innovation requirements considered were Accuracy, Capacity, Convenience, Cost, Data interpretation, Data systems, Ease of use, Method development, Productivity/Throughput, Reliability, Resolution, Robustness, Sample preparation, Sensitivity, Service support, Size footprint, Software, Speed, Stability, Stationary phases, Throughput, Validation, Versatility and any others.

## 30. Disease Biomarkers

HPLC chromatographers' use of HPLC for the study of disease biomarkers now and anticipated in three years from now. Other areas covered under disease biomarkers included disease areas (Arthritis, Autoimmune Diseases, Bone Metabolism, Cancer, Cardiovascular, Central Nervous System, Dentistry, Dermatology, Endocrine, Gastrointestinal, Genito-urinary System, Haematology, Infections, Inflammation, Metabolic Disorders, Musculoskeletal Disorders, Nutrition, Obstetrics and Gynaecology, Ophthalmology, Pain, Psychiatry, Respiratory, Skin and any other), their purpose for studying disease biomarkers using HPLC (Biomarker Discovery, Clinical – Research, Clinical – Trials, Diagnostics – Screening, Diagnostics – Research, Diagnostics – Routine tests, Disease research, Drug R&D – Clinical trials, Drug R&D – Drug targets, Drug R&D – Preclinical, Drug R&D – ADME, Toxicology, Treatment – Decisions, Treatment – Monitoring and any other) and finally, the clinical utility of their HPLC disease biomarker studies (Companion diagnostics, Disease prognosis, Disease stage or severity, Disease susceptibility or risk, Disease variability, Drug discovery, Drug therapy dose, Early detection of disease, Guiding treatment, Multiple utilities, Response to therapy, Safety or toxicity factors, Screening and monitoring, Therapy decision-making and any others)

## 31. Analysis Costs

HPLC chromatographers' per sample analysis costs, where the costing points considered were

## Contents

### 1. INTRODUCTION

- 1.1. This Chapter
- 1.2. Background
- 1.3. This Study

### 2. PARTICIPANTS

- 2.1. This Chapter
- 2.2. Global Regions
  - Figure 2.1. Global regions of participants in HPLC15
  - Table 2.1. Global regions of participants in HPLC15
- 2.3. Countries
  - Figure 2.2. Top ten countries of participants in HPLC15
  - Table 2.2. Countries of participants in HPLC15
- 2.4. Experience
  - Figure 2.3. Top ten HPLC experience levels of participants in HPLC15
  - Table 2.3. HPLC experience of participants in HPLC15
- 2.5. Organisation Type
  - Figure 2.4. Organisation types of participants in HPLC15
  - Table 2.4. Organisation types of participants in HPLC15
- 2.6. Fields
  - Figure 2.5. Fields of participants in HPLC15
  - Table 2.5. Roles of participants in HPLC15
- 2.7. Discussion

### 3. HPLC TOP-LEVEL APPLICATIONS

- 3.1. This Chapter
- 3.2. Current Top-Level HPLC Applications
  - Figure 3.1. Top ten current HPLC applications of HPLC15 participants
  - Table 3.1. Current HPLC applications of HPLC15 participants
- 3.3. Future HPLC Applications
  - Figure 3.2. Top ten anticipated future HPLC applications of HPLC15 participants
  - Table 3.2. Anticipated future HPLC applications of HPLC15 participants
- 3.4. Discussion



## **4. HPLC SYSTEMS**

4.1. This Chapter

4.2. Current HPLC Systems

Figure 4.1. Current HPLC systems used by HPLC15 participants

Table 4.1. Current HPLC systems used by HPLC15 participants

4.3. Future HPLC Systems

Figure 4.2. Anticipated future HPLC systems by HPLC15 participants

Table 4.2. Anticipated future HPLC systems by HPLC15 participants

4.4. Discussion

## **5. SEPARATION MODES**

5.1. This Chapter

5.2. Current Separation Modes

Figure 5.1. Top ten current HPLC separation modes used by HPLC15 participants

Table 5.1. Current HPLC separation modes used by HPLC15 participants

5.3. Future Separation Modes

Figure 5.2. Anticipated top ten future HPLC separation modes used by HPLC15 participants

Table 5.2. Anticipated future HPLC separation modes used by HPLC15 participants

5.4. Discussion

## **6. HPLC FLOW MODES**

6.1. This Chapter

6.3. Current HPLC Flow Modes

Figure 6.1. Current HPLC flow modes used by HPLC15 participants

Table 6.1. Current HPLC flow modes used by HPLC15 participants

6.3. Future HPLC Flow Modes

Figure 6.2. Anticipated future HPLC flow modes by HPLC15 participants

Table 6.2. Anticipated future HPLC flow modes by HPLC15 participants

6.4. Discussion

## **7. HPLC DETECTORS**

7.1. This Chapter

7.2. Current HPLC Detectors

Figure 7.1. Top ten current HPLC detectors used by HPLC15 participants

Table 7.1. Current HPLC detectors used by HPLC15 participants

7.3. Future HPLC Detectors

Figure 7.2. Anticipated top ten future HPLC detectors by HPLC15 participants

Table 7.2. Anticipated future HPLC detectors used by HPLC15 participants

7.4. Discussion

## **8. HPLC INSTRUMENTATION SUPPLIERS**

8.1. This Chapter

8.2. Current HPLC Instrument Suppliers

Figure 8.1. Top ten current HPLC instrument suppliers used by HPLC15 participants

Table 8.1. Current HPLC instrument suppliers used by HPLC15 participants

8.3. Future HPLC Instrument Suppliers

Figure 8.2. Anticipated top ten future HPLC instrument suppliers by HPLC15 participants

Table 8.2. Anticipated future HPLC instrument suppliers used by HPLC15 participants

8.4. Discussion

## **9. HPLC CONSUMABLES SUPPLIERS**

9.1. This Chapter

9.2. Current HPLC Consumables Suppliers

Figure 9.1. Top ten current HPLC consumables suppliers used by HPLC15 participants

Table 9.1. Current HPLC consumables suppliers used by HPLC15 participants

9.3. Future HPLC Consumables Suppliers

Figure 9.2. Anticipated top ten future HPLC consumables suppliers by HPLC15 participants

Table 9.2. Anticipated future HPLC consumables suppliers used by HPLC15 participants

9.4. Discussion

## **10. HPLC INSTRUMENTATION**

10.1. This Chapter

10.2. Current Integrated Vs. Modular Systems

Figure 10.1. Current integrated vs. modular HPLC systems used by HPLC15 participants

Table 10.1. Current integrated vs. modular HPLC systems used by HPLC15 participants

participants

### 10.3. Future Integrated Vs. Modular Systems

Figure 10.2. Anticipated future integrated vs. modular HPLC systems used by HPLC15 participants

Table 10.2. Anticipated future integrated vs. modular HPLC systems used by HPLC15 participants

### 10.4. Current Integrated (Single Supplier) Systems

Figure 10.3. Top ten current integrated (single supplier)

Table 10.3. Current integrated (single supplier)

Table 10.3. Current integrated (single supplier)

### 10.5. Future Integrated (Single Supplier) Systems

Figure 10.4. Top ten anticipated future integrated

Table 10.4. Anticipated future integrated (single supplier)

### 10.6. HPLC Pumps

Figure 10.5. Top ten main HPLC pumps used by HPLC15 participants

Table 10.5. Main HPLC pumps used by HPLC15 participants

### 10.7. HPLC Detectors

Figure 10.6. Top ten main HPLC detectors used by HPLC15 participants

Table 10.6. Main HPLC detectors used by HPLC15 participants

### 10.8. HPLC Autosamplers/Injectors

Figure 10.7. Top ten main HPLC autosamplers/injectors used by HPLC15 participants

Table 10.7. Main HPLC autosamplers/injectors used by HPLC15 participants

### 10.9. Discussion

## 11. SAMPLE PREPARATION

### 11.1. This Chapter

### 11.2. Current Sample Preparation Methods

Figure 11.1. Top ten current sample preparation methods used by HPLC15 participants

Table 11.1. Current sample preparation methods used by HPLC15 participants

### 11.3. Future Sample Preparation methods

Figure 11.2. Top ten future anticipated sample preparation methods by HPLC15 participants

Table 11.2. Future anticipated sample preparation methods by HPLC15 participants

### 11.4. Discussion

## 12. HPLC PRESSURE RANGES

### 12.1. This Chapter

### 12.2. Current Pressure Ranges

Figure 12.1. Current HPLC pressure ranges of HPLC15 participants

Table 12.1. Current HPLC pressure ranges of HPLC15 participants

### 12.3. Future Pressure Ranges

Figure 12.2. Future anticipated HPLC pressure ranges of HPLC15 participants

Table 12.2. Future anticipated HPLC pressure ranges of HPLC15 participants

### 12.4. Discussion

## **13. HPLC COLUMN INTERNAL DIAMETERS**

### 13.1. This Chapter

### 13.2. Current Internal Column Diameters

Figure 13.1. Current HPLC column internal diameters of HPLC15 participants

Table 13.1. Current HPLC column internal diameters of HPLC15 participants

### 13.3. Future Internal Column Diameters

Figure 13.2. Future anticipated HPLC column internal diameters of HPLC15 participants

Table 13.2. Future anticipated HPLC column internal diameters of HPLC15 participants

### 13.4. Discussion

## **14. HPLC PACKING MATERIAL PARTICLE SIZES**

### 14.1. This Chapter

### 14.2. Current Particle Sizes

Figure 14.1. Current HPLC packing material particle sizes used by HPLC15 participants

Table 14.1. Current HPLC packing material particle sizes used by HPLC15 participants

### 14.3. Future Particle Sizes

Figure 14.2. Future anticipated packing material particle sizes by HPLC15 participants

Table 14.2. Future anticipated packing material particle sizes by HPLC15 participants

### 14.4 Discussion

## **15. COLUMN SWITCHING**

### 15.1. This Chapter

### 15.2. Current Column Switching

Figure 15.1. Use of column switching by HPLC15 participants

Table 15.1. Use of column switching by HPLC15 participants

### 15.3. Future Column Switching

Figure 15.2. Future anticipated use of column switching by HPLC15 participants

Table 15.2. Future anticipated use of column switching by HPLC15 participants

### 15.4. Purpose of Column Switching

Figure 15.3. Purpose of column switching indicated by HPLC15 participants

Table 15.3. Purpose of column switching indicated by HPLC15 participants

### 15.5. Heart Cut Vs. Comprehensive Column Switching

Figure 15.4. Heart cut vs. comprehensive column switching indicated by HPLC15 participants

Table 15.4. Heart cut vs. comprehensive column switching indicated by HPLC15 participants

### 15.6. Discussion

## **16. ULTRA-PERFORMANCE LIQUID CHROMATOGRAPHY (UPLC)**

### 16.1. This Chapter

#### 16.2. Current UPLC

Figure 16.1. Current use of UPLC by HPLC15 participants

Table 16.1. Current use of UPLC by HPLC15 participants

#### 16.3. Future UPLC

Figure 16.2. Future anticipated use of UPLC by HPLC15 participants

Table 16.2. Future anticipated use of UPLC by HPLC15 participants

#### 16.4. Future UPLC

## **17. ULTRA HIGH-PERFORMANCE LIQUID CHROMATOGRAPHY (UHPLC)**

### 17.1. This Chapter

#### 17.2. Current UPLC

Figure 17.1. Current use of UHPLC by HPLC15 participants

Table 17.1. Current use of UHPLC by HPLC15 participants

#### 17.3. Future UPLC

Figure 17.2. Future anticipated use of UHPLC by HPLC15 participants

Table 17.2. Future anticipated use of UHPLC by HPLC15 participants

#### 17.4. Discussion

## **18. FAST HPLC**

### 18.1. This Chapter

## 18.2. Current Fast HPLC

Figure 18.1. Current use of Fast HPLC by HPLC15 participants

Table 18.1. Current use of Fast HPLC by HPLC15 participants

## 18.3. Future Fast HPLC

Figure 18.2. Future anticipated use of Fast HPLC by HPLC15 participants

Table 18.2. Future anticipated use of Fast HPLC by HPLC15 participants

## 18.4. Discussion

# 19. HYPHENATED HPLC SYSTEMS

## 19.1. This Chapter

### 19.2. Current Hyphenated HPLC

Figure 19.1. Current use of hyphenated HPLC by HPLC15 participants

Table 19.1. Current use of hyphenated HPLC by HPLC15 participants

### 19.3. Future use of hyphenated HPLC Systems

Figure 19.2. Future anticipated use of hyphenated HPLC by HPLC15 participants

Table 19.2. Future anticipated use of hyphenated HPLC by HPLC15 participants

### 19.4. Current Hyphenated HPLC Systems

Figure 19.3. Current Hyphenated HPLC by HPLC15 participants

Table 19.3. Current Hyphenated HPLC by HPLC15 participants

### 19.5. Future Hyphenated HPLC Systems

Figure 19.4. Future anticipated Hyphenated HPLC by HPLC15 participants

Table 19.4. Future anticipated hyphenated HPLC by HPLC15 participants

## 19.6. Discussion

# 20. CHIP-BASED LC

## 20.1. This Chapter

### 20.2. Current Chip-Based LC

Figure 20.1. Current use of CHIP-BASED LC by HPLC15 participants

Table 20.1. Current use of CHIP-BASED LC by HPLC15 participants

### 20.3. Future CHIP-BASED LC

Figure 20.2. Future anticipated use of CHIP-BASED LC by HPLC15 participants

Table 20.2. Future anticipated use of CHIP-BASED LC by HPLC15 participants

## 20.4. Discussion

# 21. MULTIDIMENSIONAL LC

## 21.1. This Chapter



## 21.2. Current Multidimensional LC

Figure 21.1. Current use of multidimensional LC by HPLC15 participants

Table 21.1. Current use of multidimensional LC by HPLC15 participants

## 21.3. Future Multidimensional LC

Figure 21.2. Future anticipated use of multidimensional LC by HPLC15 participants

Table 21.2. Future anticipated use of multidimensional LC by HPLC15 participants

## 21.4. Off-Line or On-line Multidimensional LC

Figure 21.3. Use of off-line or on-line multidimensional LC by HPLC15 participants

Table 21.3. Use of off-line or on-line multidimensional LC by HPLC15 participants

## 21.5. Discussion

# 22. OTHER TECHNIQUES

## 22.1. This Chapter

## 22.2. Current Other Techniques

Figure 22.1. Current other techniques used by HPLC15 participants

Table 22.1. Current other techniques used by HPLC15 participants

## 22.3. Other Future Techniques

Figure 22.2. Future anticipated use of other techniques by HPLC15 participants

Table 22.2. Future anticipated use of other techniques by HPLC15 participants

## 22.4. Discussion

# 23. LIMITS OF DETECTION

## 23.1. This Chapter

## 23.2. Current Limits of Detection

Figure 23.1. Current HPLC limits of detection of HPLC15 participants

Table 23.1. Current HPLC limits of detection of HPLC15 participants

## 23.3. Future Limits of Detection

Figure 23.2. Future anticipated HPLC limits of detection of HPLC15 participants

Table 23.2. Future anticipated HPLC limits of detection of HPLC15 participants

## 23.4. Discussion

# 24. STUDY SAMPLES

## 24.1. This Chapter

## 24.2. Study Samples

Figure 24.1. Study samples analysed using HPLC by HPLC15 participants

Table 24.1. Study samples analysed using HPLC by HPLC15 participants

24.3. Discussion

## **25. HPLC CONSUMABLES COSTS**

25.1. This Chapter

25.2. Consumables Costs

Figure 25.1. Relative costs of HPLC consumables of HPLC15 participants

Table 25.1. Relative costs of HPLC consumables of HPLC15 participants

25.2 Discussion

## **26. NEEDS OR INNOVATION REQUIREMENTS**

26.1. This Chapter

26.2. Needs or Innovation Requirements

Figure 26.1. Top ten needs or innovation requirements of HPLC15 participants

Table 26.1. Needs or innovation requirements of HPLC15 participants

26.3. Discussion

## **27. HPLC GROWTH TRENDS**

27.1. This Chapter

27.2. Recent Growth Trends

Figure 27.1. Top ten recent HPLC growth trends of HPLC15 participants

Table 27.1. Recent HPLC growth trends of HPLC15 participants

27.3. Future Growth Trends

Figure 27.2. Top ten anticipated future HPLC growth trends of HPLC15 participants

Table 27.2. Anticipated future HPLC growth trends of HPLC15 participants

27.4. Discussion

## **28. DISEASE BIOMARKERS**

28.1. This Chapter

28.2. The Study of Disease Biomarkers

Figure 28.1. The current study of disease biomarkers by HPLC15 participants

Table 28.1. The current study of disease biomarkers by HPLC15 participants

28.3. Future Study of Disease Biomarkers

Figure 28.2. The anticipated future study of disease biomarkers by HPLC15 participants

Table 28.2. The anticipated future study of disease biomarkers by HPLC15

participants

#### 28.4. Biomarker Disease Areas

Figure 28.3. Top ten biomarker disease areas studied by HPLC15 participants

Table 28.3. Biomarker disease areas studied by HPLC15 participants

#### 28.5. Purpose of Biomarker Studies

Figure 28.4. Top ten purposes of biomarker studies of HPLC15 participants

Table 28.4. Purposes of biomarker studies of HPLC15 participants

#### 28.6. Biomarker Clinical Utilities

Figure 28.5. Top ten clinical utilities of biomarkers of HPLC15 participants

Table 28.5. Clinical utilities of biomarkers of HPLC15 participants

#### 28.7 Discussion

### **29. COST OF HPLC ANALYSIS**

#### 29.1. This Chapter

#### 29.2. Cost of HPLC Analysis

Figure 29.1. Top ten cost levels for HPLC analysis of HPLC15 participants

Table 29.1. Cost levels for HPLC analysis of HPLC15 participants

#### 29.3 Discussion

### **30. HPLC SAMPLE THROUGHPUT**

#### 30.1. This Chapter

#### 30.2. HPLC Sample Throughput

Figure 30.3. Top ten sample throughput levels using HPLC of HPLC15 participants

Table 30.3. Sample throughput levels using HPLC of HPLC15 participants

#### 30.3 Discussion

### **31. DISCUSSION**

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