



Lipidomic analysis

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The growth of the field of lipidomic analysis is enormous with numerous papers published annually, as shown on the statistics from Web of Science for keywords “lipidomic(s)” and “mass spectrometry” (Fig. 1) with 2923 published papers, where over a hundred of them have been published in *Analytical and Bioanalytical Chemistry*. The detailed analysis of these papers shows the approximate relative portions for major analytical approaches in lipidomic analysis: 59% liquid chromatography, 29% shotgun (direct infusion), and 12% mass spectrometry imaging. The following authors have contributed the most frequently to this set: X.L. Han (99), G. Liebisch (52), P.J. Meikle (50), R.W. Gross (44), M. Oresic (44), and M.R. Wenk (44). We also highlight five most cited papers from this set [1–5].

In 2015, *Analytical and Bioanalytical Chemistry* published a previous topical collection on lipidomics [6]. Lipidomic analysis is almost exclusively based on mass spectrometry (MS) analysis [7], starting from low-

resolution analyzers (typical QqQ), now shifting more towards tandem mass analyzers with ultrahigh resolving power, e.g., Orbitraps. New trends are the implementation of ion mobility, dedicated approaches for the determination of double-bond positions, and ultrahigh-performance separation techniques to speed up the analysis time, such as ultrahigh-performance liquid chromatography and ultrahigh-performance supercritical fluid chromatography coupled with MS. Current challenges in the field of lipidomics include high variations in concentrations as well as misquantification and misidentifications [8]. Therefore, Lipidomics Standards Initiative (LSI) [9] was recently founded to develop guidelines for lipidomics. These efforts are aligned with other major initiatives in the field, such as Lipid MAPS [10]. Moreover, the International Lipidomic Society (ILS) [11] just started to represent and promote lipidomics through worldwide cooperation also by hosting various interest groups like LSI or the development of reference values for human plasma [12]. These activities are embedded in a series of conferences, providing space and time to engage with interest groups and discuss further developments.

This topical collection on Lipidomic Analysis includes research papers and one review from leading lipidomic groups worldwide, which represent latest advances in lipidomics and a variety of methods, such as shotgun, LC, and SFC coupled to low- and high-resolution mass spectrometry, in line with the current challenges. We express our gratitude to all authors for their excellent contributions, as well as the reviewers, and editorial office for their great efforts to compile this topical collection.

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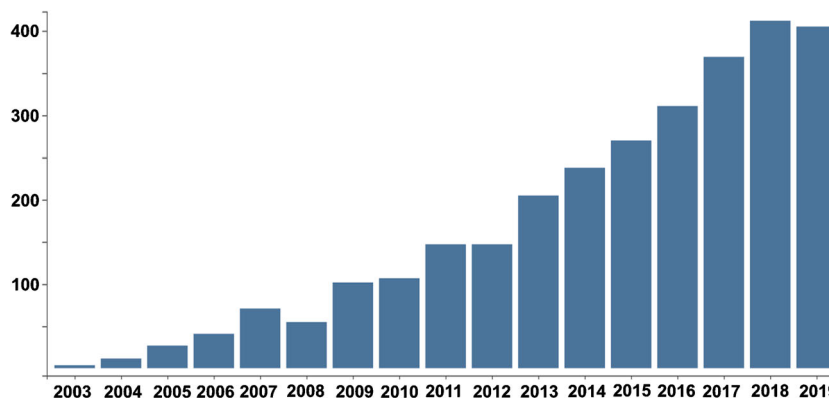
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Fig. 1 The annual number of published papers for keywords “lipidomic(s)” and “mass spectrometry” according to the Web of Science search from December 15, 2019



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Michal Holčapek obtained his Ph.D. at the Department of Analytical Chemistry, University of Pardubice. Now he is a full professor of analytical chemistry at the same university. His research focus is in mass spectrometry and its coupling with liquid chromatography and supercritical fluid chromatography, applied mainly in the lipidomic analysis and cancer biomarker research. He is a co-author of over 130 papers in peer-reviewed international journals, h-index 39, and a member of the editorial advisory boards of *Analytical and Bioanalytical Chemistry* and *Lipids*. He was a co-editor of the books *Handbook of Advanced Chromatography/Mass Spectrometry Techniques* (Academic Press and AOCS Press, 2017) and *Extreme Chromatography: Faster, Hotter, Smaller* (American Oil Chemical Society, 2011). He is one of founding members of the Lipidomics Standards Initiative and Vice President for conferences in the International Lipidomics Society.



Gerhard Liebisch obtained his Ph.D. at the University of Regensburg. He is a research associate at the Institute of Clinical Chemistry and Laboratory Medicine at the University Hospital in Regensburg and responsible for the instrumental analytics lab. His research interests focus on the development of mass spectrometric methods for lipid species quantification. For more than 20 years, these methods have been applied in clinical studies and basic research, including the

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Kim Ekroos, PhD, is the founder and CEO of Lipidomics Consulting Ltd. His expertise includes high-throughput technologies for the precise assessment of lipidomes enabled by advanced mass spectrometry, automation, and software tools towards discovery of biological architectures and of diagnostic biomarkers for clinical purpose. He is one of the pioneers in the field of lipidomics, with >20 years of experience in the academic, industry, and regulatory disciplines of lipidomics.

He is a co-founder of the Lipidomics Standards Initiative (LSI) and President of the International Lipidomics Society.