

Technologies and applications of lipidomics

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Around a century ago, the word lipidomics was first introduced and it is an emerging field of biomedical research which constitutes lipidome analysis. Lipids are the crucial components of cellular membranes and lipid particles, such as lipoproteins. Like other molecules, they are generated and metabolised by enzymes that are influenced by the environment of given biological systems. The hydrophobic nature of lipids makes them the most significant constituent of biological membranes and thus, the physical basis of all organisms. There are various techniques from different fields, such as analytical chemistry, genomics and bioinformatics, which are often utilised parallelly for complete lipidome analysis. Lipidome analysis is the study of the lipid profile in cells and tissues of an organism. Further, it is essential to study lipids because they act as signalling and inflammatory molecules. These molecules exhibit various beneficial properties and are hence used to treat certain disorders like cardiovascular diseases. This approach involves the extraction of lipids from a sample and separating them before mass spectrometry (MS) analysis using thin-layer chromatography (TLC) and high-performance liquid chromatography (HPLC). In addition, chromatography, coupled with MS enables the detection and separation of lipid molecules efficiently. Similarly, shotgun lipidomics allows untargeted high-throughput lipids analysis. Here, a sample is ionised before MS lipid detection. Recently, researchers used MS-based shotgun lipidomics to define fingerprinting of lipids in cardiovascular diseases. With the help of these methods, lipidomics holds the potential to reshape the current approaches that are being used to diagnose medical conditions.

Keywords: Lipidomics, Shotgun Lipidomics, Cardiovascular Diseases, High-Performance Liquid Chromatography, Lipoprotein

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