Lipidomics of Oxygenated Metabolites of Polyunsaturated Fatty Acids

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Oxidation of polyunsaturated fatty acids by enzymatic and free radical mediated reactions produces a diverse family of lipid mediators. Through the activity of cyclooxygenases, lipoxygenases and cytochrome P450 monooxygenases, polyunsaturated fatty acid metabolites include the arachidonic acid and eicosapentaenoic acid derived eicosanoids, docosahexaenoic acid derived docosanoids and linoleic acid derived octadecanoids.

These potent bioactive lipids are involved in many biochemical and signalling pathways, and have an essential role in inflammation and innate immunity. Analysis of these compounds can be complex as they are produced by multiple pathways and substrates, and are present in a variety of biological milieu. Thus, the use of conventional methods is not always possible. Liquid chromatography coupled to electrospray mass spectrometry provides a flexible and sensitive approach to the analysis of bioactive lipids allowing specific and accurate quantitation of a wide range of mediators in any biological material. Mediator lipidomics has now become an important tool in the elucidation of lipid mediator biomarkers of specific diseases and in assessment of nutritional and pharmacological interventions.