

## European Lipid Science Award Lecture

### The LIPID MAPS Approach to Fatty Acid and Eicosanoid Lipidomics

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The metabolic pathways involving lipids are complex and intertwined. Developing an integrated metabolomic system capable of characterizing the global changes in lipid metabolites (“lipidomics”) is a daunting task but one that is important to undertake in light of the significant returns produced by the global approaches of genomics and proteomics. Our consortium has developed a Lipid Metabolites And Pathways Strategy, termed LIPID MAPS, that applies a global integrated approach to the study of lipidomics. The specific aim of LIPID MAPS is to develop the requisite technology and conduct an integrated research program that will establish lipidomics as a fully functioning research field. We are employing a rigorously maintained set of common biological, biochemical, and analytical technologies in each of the consortium laboratories, and have developed an extensive informatics infrastructure. After introducing LIPID MAPS [<http://www.lipidmaps.org>] and its new classification system [*J. Lipid Res.*, *46*, 839-861 (2005)], its application and use in lipid and protein databases will be summarized. Then new LC/MS results from the LIPID MAPS Fatty Acid/Eicosanoid Core that establish techniques for the detection and quantitation of various eicosanoid and fatty acid molecules generated by macrophages in response to stimuli such as LPS and a defined species Kdo2-Lipid A [*J. Lipid Res.*, *47*, 1097-1111 (2006)] will be reported. We have now examined the eicosanoid profile of some 23 agonists and combinations and can access the similarities and differences of various signaling molecules. This includes the identification of the major and minor eicosanoid products and the quantification of the increases and decreases of metabolites as a function of time during cell stimulation. Approaches to the identification of unknown eicosanoids using our Diverse Isotope Metabolic Profiling of Labeled Exogenous Substrates Using Mass Spectrometry (DIMPLES/MS) approach and the identification of novel eicosanoids and the family of dihomoprostaglandins will be reported.