## 3<sup>rd</sup> International Conference on

# **Lipid Science and Technology**

December 11-12, 2017 | Rome, Italy

### Fatty acid-based membrane lipidomics: Connections with metabolic and nutritional issue

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ipid research in life sciences has renewed its attractiveness in the beginning of the 21st century linking chemical, analytical, and biological subjects, with health and nutrition, as well as with the increasing societal relevance of diseases related to inflammation and lipid metabolism. Fatty acid-based membrane lipidomics examines phospholipid components related to individual metabolic and nutritional status. Indeed, fatty acid-based nutrition and nutraceuticals are essential to life and occupy a leader positions in the healthcare market. Unsaturated fatty acids are involved in oxidative and free radical processes, which also naturally occur during metabolic functions and signaling activities. The transformations due to peroxidation processes have been considered for many decades to be by far the most crucial events to natural lipids. In the last decade, the cis to trans isomerization of the double bond, due to the reversible addition of sulfur-centered radicals, has attracted considerable attention. On the top of these transformations, fatty acids are affected by stress conditions that activate the remodeling by phospholipase enzymes (PLA, response), starting the cascade of lipid signaling, so decisive for inflammatory and apoptotic consequences. Fatty acid-based membrane lipidomics represents a powerful diagnostic tool for assessing the quantity and quality of fatty acid constituents of the lipid pool in individuals, and also for the follow-up of the membrane fatty acid remodeling, that are associated with different physiological and pathological conditions. We contributed in this area of lipidomics studying the chemical and biological responses to various metabolic and environmental conditions of free radical and metabolic stress, modeling the effects of a liposome, cellular and animal models. Our analytical methodology is able to evidence positional and geometrical fatty acid isomers. For example: sapienic acid, a member of the hexadecenoic family, has been recognized as biomarker of obesity and; the reference membrane lipidomic cluster, formed by the cohort of ten fatty acids in phospholipids of red blood cell membranes, has been clearly connected to metabolic and nutritional status in healthy and diseased subjects.



Figure 1: Fatty acid-based membrane lipidomics (membrane profile) at the crossroad of personalized health.

#### **Recent Publications:**

- 1. Ferreri C and Chatgilialoglu C (2015) Membrane Lipidomics for Personalized Health. Wiley DOI: 10.1002/9781118683682
- 2. Ferreri C and Chatgilialoglu C (2012) Role of fatty acid-based functional lipidomics in the development of molecular diagnostic tools. Expert Reviews in Molecular Diagnostics 12(7):767-780.

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- 3. Chatgilialoglu C, Ferreri C, Melchiorre M, Sansone A and Torreggiani A (2014) Lipid geometrical isomerism: chemistry to biology and diagnostics. Chemical Reviews 114(1):255-284.
- 4. Sansone A, Tolika E, Louka M, Sunda V, Deplano S, Melchiorre M, Anagnostopoulos D, Chatgilialoglu C, Formisano C, Di Micco R, Faraone Mennella R and Ferreri C (2016) Hexadecenoic fatty acids isomers in human blood lipids and their relevance for the interpretation of lipidomic profiles. PLoS ONE 11(4): e0152378.
- 5. Ferreri C, Masi A, Sansone A, Giacometti G, Larocca A V, Menounou G, Scanferlato R, Tortorella S, Rota D, Conti, M, Deplano S, Louka M, Maranini AR, Salati A, Sunda V and Chatgilialoglu C (2017) Fatty Acids in membranes as homeostatic, metabolic and nutritional biomarkers: recent advancements in analytics and diagnostics. Diagnostics 7:1.

### Biography

Chryssostomos Chatgilialoglu is a Research Director at the Italian National Research Council (CNR) in Bologna, Italy. He is also a Co-founder and President of the spin-off company Lipinutragen. His research interests lie in free radical reactivity applied to biosciences and biomarker discovery. He is an author of more than 250 publications in peer-reviewed journals, 34 book chapters and six patents and author or editor of several books, including *Membrane Lipidomics for Personalized Health*, Wiley 2015.

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