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

# **Lipid Science and Technology**

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### A holistic approach in health and disease by membrane lipidomics of mature erythrocytes

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**Statement of the Problem:** Membrane fatty acids contribute to several aspects of cellular homeostasis, growth and signaling. Membrane lipidomics, which follows up the remodeling and modifications of the fatty acid content, is the basic analytical tool for obtaining molecular profiles of human subjects under health and disease conditions. Nowadays, it is used as diagnostic tool for personalized nutra-strategies and nutrilipidomics approach. Tissue specific fatty acid analysis is a difficult strategy, mainly due to its invasive character. Thus, mature erythrocytes, which are circulating for 3-4 months around the body, represent a suitable sample for membrane fatty acid-based lipidomics.

**Methodology & Theoretical Orientation:** Fatty acid profiling of mature erythrocyte membranes was conducted in subject groups with diverse pathologies (obesity, autism and cancer) in comparison with control groups. Statistical treatment was carried out in the membrane profiles database and the obtained results were used as an input for the development of a mathematical model that can describe the membrane asset.

**Findings:** Analysis of control and disease profiles evidenced a fatty acid cluster (consisting of 10 cis fatty acids) that mirrors the structural and functional molecular membrane balance of the individuals.

**Conclusion & Significance:** Membrane lipidomics is a valid tool for studying the pitfalls of membrane profiles and for a holistic approach in health and disease. Further aim is to follow up the effects of specific ingredients, formulas of functional foods and nutraceuticals to address the natural remodeling and recreate the membrane homeostasis for an optimal functioning.



Figure 1: Membrane Lipidomics of mature erythrocytes as a tool for the evaluation of health status and membrane remodeling.

#### **Recent Publications:**

- C Ferreri, A Masi, A Sansone, G Giacometti, A V Larocca, G Menounou, R Scanferlato, S Tortorella, D Rota, M Conti, S Deplano, Maria Louka, A R Maranini, A Salati, V Sunda and C Chatgilialoglu (2016) Fatty acids in membranes as homeostatic, metabolic and nutritional biomarkers: recent advancements in analytics and diagnostics. Diagnostics. Doi:10.3390/diagnostics7010001.
- $2. \quad CFerreri and CChatgilia loglu (2015) Membrane lipidomics for personalized health. Wiley. Doi: 10.1002/9781118683682.$
- 3. G L Nicolson and M E Ash (2014) Lipid replacement therapy: a natural medicine approach to replacing damaged lipids in cellular membranes and organelles and restoring function. Biochimica et Biophysica Acta Biomembranes. 1838(6):1657–1679.
- 4. A Sansone, E Tolika, Maria Louka, V Sunda, S Deplano, M Melchiorre, D Anagnostopoulos, C Chatgilialoglu, C

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Formisano, R Di Micco, M R F Mennella and C Ferreri (2016) Hexadecenoic fatty acid isomers in human blood lipids and their relevance for the interpretation of lipidomic profiles. PLoS One doi: 10.1371/journal.pone.0152378.

5. G Giacometti, C Ferreri, A Sansone, C Chatgilialoglu, C Marzetti, E Spyratou, A G Georgakilas, M Marini, P M Abruzzo, A Bolotta, A Ghezzo, R Minguzzi, A Posar and P Visconti (2017) High predictive values of RBC membrane-based diagnostics by biophotonics in an integrated approach for autism spectrum disorders. Scientific Reports. Doi:10.1038/s41598-017-10361-7.

#### Biography

Maria Louka is hosted as a Marie Skłodowska-Curie fellow in Lipinutragen Srl, within the frame of the ITN-H2020 European project ClickGene (No 642023). In parallel, she performs her PhD training in collaboration with the School of Medicine, University of Bologna, Italy. Her main research interests concern the study of fatty acid-based membrane lipidomic profiles in health and disease, as well as the synergy of nutrition and therapy in membrane remodeling in cancer. Prior to her current position, she obtained her MSc degree in Biomedicine and BSc in Biology at University of Athens, Greece.

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