EMN Live Webinars

Wednesday, 22nd February 2024

14:00 UTC, 09:00 EDT, 15:00 CET, 8:00 CST

METABOLOMICS SOCIETY
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‘Lipidomics workflows: from analysis to data integration.’

Lipids are fascinating class of biomolecules teaching us how Nature translates chemistry into the biology and, ultimately, the Life as we know it. Variety of chemical moieties encoded in lipids allow for an amazing diversity of their functions. At our group, we are looking at lipids diversity by using advanced bioanalytical and computational tools. Our team combines biochemical knowledge on lipid metabolism with high-end lipidomics technologies. We are working on development of analytical pipelines with a specific focus on liquid chromatography (LC) and mass spectrometry (MS) analysis of lipids in a variety of biological matrices. To this end, we established several high-throughput LC-MS workflows based on the application of different LC types (reversed phase (RP) and hydrophilic interaction liquid chromatography (HILIC)) coupled on-line to MS detection for identification and quantification of lipids. We specifically focused on accurate annotation of identified lipids taking into account both MS, MS/MS and retention time information. To improve the accuracy of quantitative analysis, we looked into formation of different structure-dependent ionization adducts and in-source fragmentation. In the last few years we have especially focused on setting up robust

and high-throughput methods for in-depth identification and quantification of lipids in human tissues (e.g. white adipose tissue, aortic valve) and blood plasma samples which we now can apply to larger cohort studies focused on defining lipid fingerprints associated with metabolic diseases. With MS based lipidomics we can take apart complex lipidomes down to the lipid molecular species level to detect and quantify even fine alterations in lipid metabolism. And then, using our computational tools we assemble this information into the detailed metabolic maps reflecting the biological status of the system.

Prof. Dr. Maria Fedorova studied Biochemistry at Saint-Petersburg State University, Russia and obtained her PhD at the Faculty of Chemistry and Mineralogy, Leipzig University, Germany. She worked as a Group Leader at the Institute of Bioanalytical Chemistry at the University of Leipzig. In 2021 Maria group moved to the Center for Membrane Biochemistry and Lipid Research, TU Dresden. Maria research is focused on understanding the mechanisms behind plasticity, adaptation and maladaptation of natural lipidomes in response to different stressors (metabolic, redox, etc). Using innovative mass spectrometry and bioinformatics solutions, her group looks at the lipid quality control machinery at subcellular, cellular and organismal levels. Maria also serves as a vice-chair of Pan-European Network in Lipidomics and Epilipidomics (EpiLipidNET; https://www.epilipid.net/), a community of researchers interested in lipid biology and lipidomics technologies, supported by European Cooperation in Science and Technology.