Phospholipid Analysis by combined MS, NMR and Chromatographic Methods: the Search for Species-independent Disease Markers

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The research focus of the group is (phospho)lipid analysis and the identification of potential disease markers such as oxidized lipids and lysophospholipids (LPL). They has already shown that elevated LPC concentrations are indicative of atherosclerosis, rheumatic diseases and infertility diseases of extreme socioeconomic significance that are accompanied by inflammation and the generation of reactive oxygen species (ROS).

Regarding analytical methods, the research group is using a combination between mass spectrometry (MS), nuclear magnetic resonance (NMR) spectroscopy and different chromatographic methods. One particular focus is the establishment of a direct coupling between matrix-assisted laser desorption/ionization MS and high-performance thin-layer chromatography (HPTLC) that helps to identify even minor species in complex lipid mixtures. HPTLC/MALDI is very sensitive and provides the additional advantage that phospholipids with different fatty acyl compositions may be identified within a single HPTLC spot due to the achievable spatial resolution of about 50 µm. The image shows a comparison between a MALDI MS image (left) and the conventional image of the stained HPTLC plate (right).

Finally, the group is also interested in finding more suitable MALDI matrices.

Keywords
- Lipids/Phospholipids
- Lipid oxidation
- Identification of lipids and lipid-derived metabolites as disease markers
- TLC/MALDI coupling

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