

Lipid analysis from amphibian eggs, cell pellets and tissues by reactive LAESI mass spectrometry

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Due to the of extensive sample preparation requirements, the *in situ* mass spectrometric analysis of lipids in biological samples is challenging. Additionally, information on the spatial localization is lost when a class of molecules is extracted from a tissue. We demonstrated the ability of laser ablation electrospray ionization (LAESI) mass spectrometry (MS) for ambient analysis of lipids directly from a variety of biological samples, such as mouse brain tissue sections, *Xenopus laevis* egg, *Pisum sativum* embryo, and β cell pellets from rat islet of Langerhans. Lipid standards representing different lipid subclasses, such as glycerophosphocholine, lyso-glycerophosphocholine, glycerophosphoethanolamine, glycerophosphoserine, sphingomyelin, sterols, etc., were also analyzed by LAESI-MS to assess its utility in the context of broader lipidomics. For structure specific fragmentation lipids, the ions were produced by introducing in-plume reactions between a solute (e.g., lithium sulfate) in the electrospray solution and the analyte in the infrared ablation plume of the sample. This new ionization modality, termed reactive LAESI, was used to elucidate the structure of glycerophosphocholines by producing fragment ions related to both of the individual acyl groups followed by collision activated dissociation.