

2nd International Conference on

Current Trends in Mass Spectrometry

July 20-22, 2016 Chicago, USA

Lipid imaging of invertebrate model systems by secondary ion mass spectrometry

Nhu Phan^{1,3}, John S Fletcher^{1,3} and Andrew G Ewing^{1,2,3}¹University of Gothenburg, Sweden²Chalmers University of Technology, Sweden³Gothenburg University and Chalmers University of Technology, Sweden

Drosophila melanogaster and *C. elegans* (flies and worms, respectively) are common biological model systems, which have relatively simple anatomy and behavior but possess highly conserved molecular and cellular processes compared to humans. We have applied time of flight secondary ion mass spectrometry (ToF-SIMS) to study lipid structural effects of stimulant drug methylphenidate on the fly brain, and to investigate the 3D chemical anatomy of *C. elegans*. Different distributions of various biomolecules, particularly fatty acids, eye pigment, diacylglycerides, phospholipids have been found across the fly brain. Lipid structures, particularly diacylglycerides (DAG), phosphatidylcholine (PC), phosphatidylethanolamine (PE) and phosphatidylinositol (PI), are shown to dramatically alter following the administration of methylphenidate. For *C. elegans*, the entire worm and worm sections were imaged using 3 dimensional (3D) and 2 dimensional (2D) approaches, respectively. Significant changes in the chemical distribution were observed along the depth of the worm. In addition, correlation between 2D and 3D ion images showed different molecular structures across the worm, possible localization of the nerve ring, the cuticle, and the fluid containing space inside the worm. In addition, we successfully used tandem MS on ToF-SIMS with a high energy 40 keV Ar₄₀₀₀⁺ gas cluster primary ion beam (GCIB) to elucidate the structures of molecular lipids in the fly brain and the worm. ToF-SIMS imaging shows great potential to elucidate chemical distributions in small invertebrate systems in relation to endogenous and exogenous effects.

Biography

Nhu Phan has been working on her PhD at the University of Gothenburg, Sweden. Her research is about developing mass spectrometry imaging methods for biological applications on different biological models, from single cell imaging to invertebrate models particularly *C. elegans* and *Drosophila*. One of her main researches is studying the effects of administrated stimulant drugs on the neurochemistry of *Drosophila* brain. The significant finding in this study is that the stimulant drug induces lipid structure of the brain and that the brain lipids could closely relate to learning and memory.

ngocnhu81@yahoo.com

Notes: