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Mass spectrometry imaging in flies, cells, and vesicles

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We have been developing mass spectrometry imaging methods to study the process of neuro communication at the system and cellular level. We focus on PC12 cells as a model of exocytosis and the fly model (*Drosophila melanogaster*) providing a unique system to examine neurotransmitter release and drug dependence mechanisms in a small, but complete system. Mass spectrometry imaging with ion beams allows spatial resolution of a few micrometers down to 40 nanometers in favorable cases. We have been using secondary ion mass spectrometry (SIMS) with a unique 40-kV argon cluster ion source and the NanoSIMS to measure the lipids across the fly brain and catecholamine in nanometer vesicles, respectively. Here, we have focused on the effect of the drug, methylphenidate, on lipid composition in the brain and find that it varies in a way that might affect learning and memory. We have also used NanoSIMS to measure transmitter in sub-regions of nanometer vesicles. Combined with other new methods to measure the content of the interior of vesicles, we have begun to investigate the details and implications of open and closed exocytosis on regulation of how the brain works.

Biography

Andrew Ewing received a PhD from Indiana University. After 25 years at Penn State University, he is now Professor at Chalmers University and University of Gothenburg, Sweden. His 300 publications have been cited over 15000 times with an H-index of 69. He has recently received the Norblad-Ekstrand Medal of the Swedish Chemical Society (2014), and the Pittsburgh Conference Award in Analytical Chemistry (2015). He is an Honorary Professor at Nanjing and Beijing Universities of Science and Technology. He is a member of the Royal Swedish Academy of Sciences (from 2012) and the Gothenburg Academy of Arts and Sciences (2013).

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