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Visualization of localization of lipid inflammatory mediators in tissue sections by imaging mass spectrometry

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Abstract

Previous studies have shown that MALDI-Imaging MS (IMS) can visualize distributions of diverse metabolic molecules in the biological tissues. In this research, we improved and applied this emerging molecular imaging technique to visualize local production of lipid inflammatory mediators, such as lyso-phospholipids and prostaglandins, in inflammatory tissues. Since concentrations of such strong bioactive lipids were kept at very low (under nM order), we so far have improved sensitivity and selectivity of IMS technology.

In this poster presentation, we will present an application study which revealed spatiotemporal alteration of lyso-phospholipids and prostaglandins in a rat model of spinal cord injury (SCI). We determined quantitative and qualitative alterations in lipids during the occurrence and progression of spinal cord injury in rats to identify potential clinical indicators of SCI pathology. IMS was used to visualize the bioactive lipids on thin slices of spinal cord with SCI. In addition, their absolute abundances were quantified by liquid chromatography-electrospray ionization-tandem mass spectrometry (LC-ESI-MS/MS) of lipid extracts from control/injured spinal cords. The results suggest that invasive immune cells that penetrated from the impaired blood-brain barrier at 1–2 weeks post-SCI may have produced



lipid inflammatory mediators in SCI tissue at sites where the immune cells contacted with normal neurons/grail cells of spinal cord.