Imaging mass spectrometry: state of the technology and clinical potentials

**ABSTRACT:**

Over the past ten years, numerous technological progress in the field of mass spectrometry have allowed to develop molecular profiling and imaging techniques directly from thin tissue cryosections. Molecular imaging by mass spectrometry allows to simultaneously map the location of several hundreds of compounds. Our latest research efforts have mainly focused on the development of protocols for the direct analysis of formalin fixed paraffin embedded tissue specimens by MALDI MS. We are now able to detect, map and identify proteins after in situ enzymatic digestion and analysis of the resulting proteolitic peptides by tandem mass spectrometry. Such an approach has been used for the high-throughput analysis of a large cohort of biopsies obtained from cancer patients. The results show clear expression of subsets of proteins in correlation with the progression of the disease and open a new avenue for molecular diagnosis.

**SHORT BIOGRAPHY:**

For the past 20 years, Prof. Pierre Chaurand has contributed to the development and characterization of various aspects of matrix-assisted laser desorption ionization (MALDI) mass spectrometry. During his Ph.D. years (Université de Paris Sud, Orsay, France), his contributions ranged from the fundamental understanding of ion production via the MALDI process and subsequent detection by impact on various surfaces including microchannel plate detectors. During his post-doctoral training (University of Düsseldorf, Germany), Prof. Chaurand's efforts were forwarded focused on the design and construction of MALDI time-of-flight mass spectrometers optimized for peptide sequencing by post-source decay. Prof. Chaurand has spent the last 11 years of his professional career has research faculty at Vanderbilt University (Nashville TN, USA) contributing to the development of a technology named 'imaging mass spectrometry', which through the direct analysis of thin tissue sections by MALDI mass spectrometry, allows the profiling and mapping of biomolecules including proteins, lipids and other metabolites, as well as administered pharmaceuticals. Prof. Chaurand has very recently joined the Dept of Chemistry at the University of Montreal, where his research efforts for the development of the imaging mass spectrometry technology will be continued.