Simultaneous Quantitation of Multiple Analytes with Mass Spectrometry Imaging

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Mass spectrometry imaging (MSI) has emerged as a promising tool for tissue-based diagnostics, providing maps of drug distributions and detailed metabolite mapping of the tumor microenvironment. In order to meet the requirements of bioanalytical methods validation for clinical implementation, sample preparation and analytical parameters need to be considered. We have explored several instrumental approaches including selective reaction monitoring (SRM) and trapped ion mobility spectrometry (TIMS) using the timsTOF flex (Bruker), and continuous accumulation of selected ions (CASI) using the 15 Tesla solariX FTICR (Bruker), improving sensitivity, selectivity, and dynamic range for quantitation of drugs and metabolites directly from tissues. We have further established methods to simultaneously quantify multiple analytes and improved reproducibility in quantitation resulting in a Chemical QuantArray which provides multiple calibration curves for quantitative imaging of drugs and biometabolites from tissue specimens. This approach allows to measure several analytes over a wide dynamic range from a clinical tissue section with minimal use of space on a microscope slide.

Biography:

Dr. Sylwia A. Stopka obtained her Ph.D. in Analytical Chemistry under Professor Akos Vertes at George Washington University where she focused on the development of new mass spectrometry ionization sources to probe metabolism at both the tissue and single-cell levels. She joined Professor Nathalie Agar at Brigham and Women’s Hospital and Harvard Medical School for her postdoctoral studies in 2019. She has since been developing new mass spectrometry imaging methodologies to quantitatively probe drug and metabolite distribution in pre-clinical animal models and human clinical trial specimens and continues to develop new instrumentation.