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How to make MS data work best for biological research

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Mass spectrometry and proteomics have witnessed tremendous progress in the past two decades. From instrumentation and novel techniques and methodologies, to advanced software packages that handle large data sets, some of the most complex biological problems can be addressed today by capitalizing on the power of this technology. In our laboratory we develop proteomics approaches for the analysis of breast cancer cells. Our goal is to use a systems-level approach to uncover biological mechanisms that lead to uncontrolled cell proliferation, novel markers indicative of disease and protein clusters that can be used as effective therapeutic targets. In addition, we develop microfluidic instrumentation as a mass spectrometry front-end for high-throughput sample processing. In this presentation we will discuss the challenges that researchers face when dealing with the complexity of biological systems and the unique benefits offered by mass spectrometry in complementing genomics research. In particular, we will focus on the implications of achieving proteome depth, the complex dimension of posttranslational modifications, and proper timing of experimental conditions with biological relevance. Ultimately, we will discuss the potential of technologies such as mass spectrometry to transform our thinkingabout addressing problems that lie at the root of human disease.

Biography

Iulia M. Lazar earned her Ph.D. in Chemistry from Brigham Young University in 1997. Following two postdoctoral appointments at Sensar Larson-Davis and Oak Ridge National laboratory, and a Principal Research Scientist position at The Barnett Institute/Northeastern University, she joined Virginia Tech in 2003. Presently, she is an Associate Professor with research interests focused on oncoproteomics, breast cancer cell cycle, signaling, biomarker discovery and the development of microfluidic and mass spectrometry technologies for the interrogation of biological systems. The findings of her research led to over 55 publications, book chapters, patents and numerous presentations at national and international symposia.

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