

Metabolomics as a platform for high-throughput biomarker discovery in cancer

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Metabolomics methods hold promise as part of a platform which is highly complementary to other systems biology tools such as proteomics, transcriptomics and genomics. The two main analytical platforms employed are nuclear magnetic resonance (NMR) spectroscopy and mass spectrometry (MS). These two platforms have unique characteristics which suggest that acquiring data from both platforms would be advantageous. In this presentation, a systematic relationship between serum biomarkers from model systems studies in vivo will first be examined. The successful application of NMR and GC-MS to these model systems serve as a template for clinical biomarkers discovery using a combination of NMR and GC-MS in cancer studies. Data will be presented from cohorts of pancreatic, colon and brain tumors patients. Analysis of these biomarkers is performed using a pattern-driven approach, and as such analytical techniques which are both quantitative and high-throughput are favoured. The outcome is information with respect to a 'biopattern' of disease without the requirement for comprehensively attempting to characterize the entire metabolome. Furthermore, the resulting multivariate data is characterized by concerted changes in multiple markers, in contrast with traditional biomarker-driven approaches that rely on single markers. Finally, several challenges in the evolution of the field will be discussed, including interpreting coherent biological meaning from a combination of both NMR and MS data, and reliable assessment of candidate markers using multivariate statistics.

Biography

Dr. Weljie is currently the co-Director of the Metabolomics Research Centre at the University of Calgary, where his primary focus is developing a program in cancer metabolism using a combination of highly sensitive mass spectrometry methods and quantitative nuclear magnetic resonance spectroscopy. In addition to methods development, projects in Dr. Weljie's group are focused on i) elucidating the connection between energy and lipid metabolism and cancer, and ii) the impact of environmental toxicants on carcinogenesis and cellular proliferation. Dr. Weljie's group is also involved in several multidisciplinary clinical collaborations focusing on serum metabolomics in cancer. This program builds on his previous expertise in nuclear magnetic resonance metabolomics, which has been productive in both methods development and elucidating biological phenomena both at the University of Calgary, with Chenomx Inc, and at the University of Cambridge in the lab of Dr. Jules Griffin.