

¹H NMR metabolomics combined with gene expression analysis for the determination of major metabolic differences between cancer cell lines

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¹H nuclear magnetic resonance (¹H NMR) of metabolic extracts of cells provides an accurate and reliable method for determination of metabolic difference between cell phenotypes and analysis of specific characteristics of cancer metabolic phenotype across cancer types and subtypes. The analysis of cell lines avoids confounder's that are inevitable in tissue studies. At the same time cell lines have the same heterogeneity in copy number and expression abnormalities as the primary tumours and carry almost all of the recurrent genomic abnormalities associated with clinical outcome in primary tumours. Metabolomics analysis was performed on different breast and glioblastoma cell lines. The obtained Metabolic profiles were analysed qualitatively (from spectra) and quantitatively (from metabolite concentrations). The presented analysis shows that in breast cell lines normal and cancer cell lines as well as cell lines of different cancer subtypes can be separated based on their metabolic profiles and that specific metabolic differences can be related to observed gene expression as well as phenotype differences. In glioblastomas analysis shows that some of the major cancer metabolic markers (such as choline, lactate and glutamine) have significantly different concentrations in different subtypes. Combined gene expression and metabolomics analysis have shown differential expression of metabolite transporters in these cells as well as some of the major metabolic pathways leading to accumulation of metabolites. This list of marker metabolites can be leveraged for subtype determination in glioblastomas.

Biography

Miroslava is a Research Officer with National Research Council of Canada. She obtained a Ph.D. in Physical Chemistry from University of California, Santa Barbara followed by a Postdoc in Biophysics at University of British Columbia. Her work is in the area of Computational Biology and Chemistry with focus of the development of novel diagnostic biomarkers and treatment methods for cancer. Miroslava has authored many articles, book chapters, 2 patents and is currently working on a book entitled NMR Metabolomics in Cancer Research. Miroslava is a member of Editorial Boards of Omics: Journal of Integrated Biology and Journal Drug Designing.