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Tissue proteomic alterations of colon adenocarcinoma

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Introduction & Objectives: Adenocarcinomas are the cancers originating from the gland forming cells of the colon and rectal lining and are known to be the most common type of colorectal cancer. The current diagnosis options for colorectal cancers are limited to biopsy, stool tests and other laboratory tests, barium enema based imaging and other imaging techniques, colonoscopy and other endoscopic procedures which are time consuming. In this study, we used proteomics approach with an aim to identify protein biomarkers which can aid in early detection of colon adenocarcinomas to be precise.

Methods: Proteins from tumor tissue of colon adenocarcinoma subjects (n=11) and their matched controls were subjected to 4-plex iTRAQ labeling followed by off-gel fractionation prior to LC-MS/MS run. The mass spectrometry data were analyzed independently using two different analysis software: Spectrum mill (SM) and Trans proteome pipeline (TPP). The proteins identified using either SM and/or TPP were subjected to pathway analysis using the database for annotation, visualization and integrated discovery (DAVID) v6.8 and the proteins common between the two analyses were compared with the data from CPTAC portal and human protein atlas. The expression level of the shortlisted panel of proteins was studied in brain cancers as a non-colon adenocarcinoma control group and validated using MRM approach.

Results: A list of 285 unique proteins was identified to be significantly dys-regulated in colon adenocarcinoma as compared to its matched controls. These proteins were found to be involved in glycolysis, pentose phosphate pathway, biosynthesis of amino acids, protein processing, spliceosome, proteosome, focal adhesion and proteoglycans in cancer. 94 of the 285 proteins were identified by both SM and TPP. 34 of these 94 proteins were found to be dysregulated with same trend as that in data reported on CPTAC portal and 9 of these 34 proteins were validated using MRM approach. Further, to shortlist the proteins specific to colon adenocarcinoma, the list of 34 proteins was compared for their expression levels in brain tumors and 10 proteins were found to be dysregulated with same trend in colon adenocarcinoma vs. its controls as that in colon adenocarcinoma vs. brain tumors.

Conclusion: The proteins identified from this study could be validated further to investigate the role of these proteins as potential biomarkers for early detection of colon adenocarcinoma.

Biography

Sanjeeva Srivastava is an Associate Professor and Group Leader of Proteomics Laboratory at Indian Institute of Technology Bombay, India. He has obtained his PhD from the University of Alberta and Post-doctorate from the Harvard Medical School in the area of Proteomics, Stress Physiology and has specialized expertise in applications of data enabled sciences in global health, developing country and resource limited settings.

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