



Dr. Mukesh Verma

National Cancer Institute, USA

Metabolomics approaches in cancer epidemiology and risk assessment

Metabolomics is the study of low molecular weight molecules or metabolites produced within cells and biological systems. It involves technologies, such as mass spectrometry (MS) and nuclear magnetic resonance spectrography (NMR), which can measure hundreds to thousands of unique chemical entities (UCE). The metabolome provides one of the most accurate reflections of cellular activity at the functional level and hence can be leveraged for discerning mechanistic information during different normal and disease states. In clinical samples metabolites are more stable than proteins or RNA. In fact, metabolomic profiling in basic, epidemiological, clinical and

translational studies has revealed potential new biomarkers of disease and therapeutic outcome and led to novel mechanistic understanding of pathogenesis. These include the recent biomarkers for diabetes risk, novel metabolites associated with cancer, and the discovery of over 500 unique lipids in plasma. However, unlike genomics or even proteomics, the degree of metabolite complexity and heterogeneity within biological systems presents unique challenges requiring specialized skills and resources to overcome. An example of association of metabolomics predictors of body fat amount and distribution and associated risk with cancer will be discussed.

Biography

Dr. Mukesh Verma is a Program Director and Chief in the Methods and Technologies Branch (MTB), Epidemiology and Genetics Research Program (EGRP) of the Division of Cancer Control and Population Sciences (DCCPS) at the National Cancer Institute (NCI), National Institutes of Health (NIH). Before coming to the DCCPS, he was a Program Director in the Division of Cancer Prevention (DCP), NCI, providing direction in the areas of biomarkers, early detection, risk assessment and prevention of cancer, and cancers associated with infectious agents. He also was Coordinator of DCP's Small Business Programs (SBIR/STTR Programs). Dr. Verma has developed concepts (PA and RFA) on exfoliated cells and circulating DNA and their application in cancer detection and risk assessment, cancer epidemiology, risk prediction models in cancer, mitochondrial DNA and cancer epidemiology, cancer epigenetics, pancreatic cancer etiology, AIDS related malignancies, and systems genetics. He also served as the Project Officer for an Inter Agency Agreement with CDC with focus on biomarkers of cervical cancer. Dr. Mukesh Verma holds a M.Sc. from Pantnagar University and a Ph.D. in the field of host-virus interaction from Banaras Hindu University. He did postdoctoral research at George Washington University and demonstrated glucocorticoid mediated regulation of prostaglandin synthase gene in cardiovascular diseases. Mukesh also was a faculty member at Georgetown University where he pioneered research in the field of tracheobronchial mucin, which is a glycoprotein that is abnormally expressed in lung cancer. He was the PI of a competitive grant. He defined the structure of the promoter of the tracheobronchial mucin gene and its regulation, which led to development of gene therapy approaches to airways diseases. In 1997, he joined NIH's National Institute of Allergy and Infectious Diseases and extended his work in the field of T-cell receptor biology and retroviral-based gene therapy of cancer. Subsequently, he joined National Cancer Institute in 1999. NIH recognized him in 2006 by a Group Award for his leadership role in developing the Breast and Prostate Cancer Cohort Consortia (BPC3).