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Metabolomics research at the National Institutes of Health (NIH)

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Abstract

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 (Nat.Med.17:448-453), novel metabolites associated with cancer (Nature 462:739-44), and the discovery of over 500 unique lipids in plasma (J. Lipid Res. 51: 3299-3305) 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. Metabolomics research efforts at NIH, especially Metabolomics Common Funds, will be discussed. The NIH Metabolomics Common Fund program is focused on enabling the comprehensive analysis of the output of biological pathways, what is considered a truer reflection of the functional status of the biological system than other molecular "omic" approaches. The program includes multiple components focusing on the common goal of increasing metabolomics research capacity, these components include the establishment of comprehensive Resource Cores, training programs, technology development, reference standards and data sharing. Potential applications and issues in metabolomic approaches in cancer epidemiology will be discussed.

Biography

Mukesh Verma holds a M.Sc. from Pantnagar University and a Ph.D. from Banaras Hindu University. He did postdoctoral research at George Washington University and was a faculty member at Georgetown University. He has published 126 research articles and reviews and edited three books in cancer epigenetics and epidemiology field. 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).