Proteomic analysis for the early detection and rational treatment of cancer--realistic hope?

Posadas EM, Simpkins F, Liotta LA, MacDonald C and Kohn EC
Laboratory of Pathology, National Cancer Institute and NCI/FDA Clinical Proteomics Program, USA

Proteomics is an emerging field in medical science focused on the library of proteins specific to a given biosystem, the proteome, and understanding relationships therein. This field incorporates technologies that can be applied to serum and tissue in order to extract important biological information to aid clinicians and scientists in understanding the dynamic biology of their system of interest, such as a patient with cancer. These tools include laser capture microdissection, tissue lysate arrays and mass spectrometry approaches. These new technologies are more potent coupled with advanced bioinformatics analysis. They are used to characterize the content of, and changes in, the proteome induced by physiological changes, benign and pathologic. The application of these tools has assisted in the discovery of new biomarkers and may lead to new diagnostic tests and improvements in therapeutics. These tools additionally can provide a molecular characterization of cancers, which may allow for individualized molecular therapy. Understanding the basic concepts and tools used will illustrate how best to apply these technologies for patient benefit for the early detection of cancer and improved patient care.