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A Study on Current Advances and Techniques in Prognostic and Diagnostics Biomarkers

Jolly Fan*

Department of Biology, University of Fudan, Japan

DESCRIPTION

Solid cancers, which are characterised by rapid tumour growth and local and distant metastases, are one of the leading causes of cancer-related deaths. Recent advances in multimodality care have significantly improved patients' local control and metastasis-free survival after primary tumour resection. The primary concern in disease prognosis is the timely detection of resectable or metastatic tumour, reinforcing the need for the identification of biomarkers for solid cancer premalignant lesions. This ultimately improves the patients' outcomes. As a result, the goal of this review is to provide an update on recent advances in prognostic and diagnostic biomarkers to improve early detection of common solid cancers such as breast, lung, colorectal, prostate, and stomach cancer.We also discuss approaches to turning challenges in this field into opportunities, as well as FDA-approved solid cancer biomarkers; various conventional techniques used for detection of prognostic and diagnostic biomarkers. Biomarkers are becoming increasingly important in the clinical management of cancer patients, thanks to the development of genomic profiling technologies and selective molecular targeted therapies. As predictive biomarkers, single gene/protein or multi-gene "signature"-based assays have been developed to measure specific molecular pathway deregulations that guide therapeutic decision-making. For several cancer types, genome-based prognostic biomarkers are also available for potential incorporation into clinical prognostic staging systems or practise guidelines.However, due to the difficulties in the cancer biomarker development process, there is still a significant gap between initial biomarker discovery studies and clinical translation. In this review, we summarise the steps of biomarker development, highlight key issues in successful validation and implementation, and provide examples from the field of oncology. We also talk about regulatory issues and the future of big data analytics and precision medicine. Cancer biomarker discovery has recently become a major focus of cancer research. The widespread use of prostate-specific antigen in prostate cancer screening has prompted researchers to seek out appropriate markers for screening various types of cancer. Biomarkers are also useful for disease diagnosis, disease progression monitoring, disease prediction, and therapeutic treatment. With the introduction of new and improved genomic and proteomic technologies such as DNA and tissue microarray, two-dimensional gel eletrophoresis, mass spectrometry, and protein assays, as well as advanced bioinformatic tools, it is now possible to develop biomarkers that can predict outcomes during cancer management and treatment. A serum or urine test for every stage of cancer may drive clinical decision making in the future, supplementing or replacing currently available invasive techniques. Significant investment has been made in cancer detection over the last several decades. More efficient screening programmes and changes in clinical practise can be attributed to an increase in the number of early cancers diagnosed as asymptomatic malignancies, or in some cases as premalignant lesions. However, histological examination of tissues has been used to make definitive cancer diagnoses. A protein or protein fragment that can be easily detected in the patient's blood or urine but not in a healthy person would be an ideal tumour marker. Tumor biomarkers are most commonly used today to detect early disease and recurrent disease. Better tests that can predict tumour outcome and individual tumour response to specific therapeutic drugs may be developed in the future. The prostate-specific antigen is the most well-known cancer biomarker that physicians have used to detect early disease (PSA). In the last decade, the serum PSA test has been widely used in screening for prostate cancer, resulting in a dramatic increase in early detection of the disease. The upper limit of a normal PSA level was set at 4 ng/ml. Nonetheless, 33 percent of prostate cancers in men spread beyond the prostate, with PSA levels ranging from 4 to 10 ng/ml, rendering many of these tumours resistant to treatment. Between 1989 and 1996, the incidence of prostate cancer increased steadily, with a 2.5 percent decrease in mortality. The above findings have been attributed to the dramatic increase in

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Corresponding author Jolly Fan, Department of Biology, University of Fudan, Japan, Tel: +61(91686778206); E-mail: jollyfan@gmail.com

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the use of serum PSA, which has allowed for earlier detection of asymptomatic prostate cancer.

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CONFLICT OF INTEREST

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