Editorial
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Application of Biomarkers in Cancer Diagnosis and Treatment

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Editorial

The Biomarker is "a biological molecule contained in blood, other body fluids, or tissues, a sign of a normal or abnormal process, or of a disorder or disease," like cancer as described by the National Cancer Institute (NCI). Usually biomarkers differentiate the healthy person from the patient with disease. The modifications may be caused by many factors, such as germ or somatic mutations, transcriptional changes, and post-translational changes. The spectrum of biomarkers is vast, including proteins (for instance, an enzyme or receptor), nucleic acids (e.g. micro-RNA or other non-encoding ARNs), antibodies and peptides, etc. A biomarker may also be a series of changes such as gene expression, proteomic signatures and metabolomics. Biomarker can be found in the bloodstream or excretions (stool, urine, sputum or nipple discharge) (wholly blood, serum, or plasma). This makes a simple non-invasive or serial assessment of the biomarkers which can be extracted from tissues, requiring either biopsy or special imagers for testing. Genetic bio-markers may inherit DNA isolated from whole blood, sputum, or buccal cells, or be somatic and known as DNA mutations derived from tumor tissue as sequence variations in a germ line [1].

Over the last two decades, less than twelve biomarkers for detection, monitoring or recurrence of cancer were approved by the US Food and Drug Administration [2]. It is shocking because hundreds of thousands of biomarkers for cancer diagnosis and detection were detected or considered possible biomarkers. None has, however, proved successful to date. Biomarkers must distinguish between people with cancer and those without to be useful. Most biomarkers do not advance beyond that, because researchers cannot either establish reliable, accurate assays or validation studies show that there is not enough sensitiveness and/or specificity to the biomarker [3].

The sensitivity of a bio-marker in the test for cancer biomarkers refers to the proportion of cases that are positive for the biomarker (individuals with confirmed disease) and the specificity refers to the proportion of those monitored by the biomarker (individuals without diseases) reporting the negative. An ideal biomarker test would be 100% accurate and specific; in other words, anyone with cancer would have a positive test and everyone would have a negative test without cancer. The less sensitivity, the more often people with cancer are not identified, and the less the specificity, the more likely they are positive without cancer [4].

Some biomarkers which are currently used in detection and diagnosis of various cancer are CA 125 (MUC 16), Kallikrein 6 (Protease M), and Osteopontin for the detection of Ovarian cancer; Prostate-specific antigen (PSA), and Alpha methyl CoA-racemase for Prostate, Methylation of promoter regions of genes for Prostate, colon, lung, and gastric; Protein Profiling for prostate, colon and lung; APC and CDKN2 A for Colon; BRCA-1 and BRCA-2 mutations for Breast; Glutathione S-transferase –1 (GSTP-1) for Breast, and prostate; EGFR for Lung; Haptoglobin for Lung, colon, and breast; Microsatellite Alterations for urine Bladder; Des-gamma-carboxyl- prothrombin (PCP) and AFP for Hepatocellular carcinoma are some of the biomarkers used in cancer treatment and detection [5].

There is a change from conventional clinical methods to modern approaches in the treatment of cancer. Cancer patients have historically been taking medicines of low toxicity or high tolerance irrespective of their effectiveness in a particular patient because both experimental and clinical conditions have shown the benefits of this medication. Nonetheless, recent developments have created opportunities to build 'personalized' care approaches in basic and clinical science. Such innovative methods are designed to define individual therapy outcomes for patients, mitigate toxicity risks and reduce care costs. Throughout the field of biomarker discovery, a significant concerted effort is needed. The lack of useful biomarkers for cancer diagnosis, screening and treatment is clear from recent developments. For cancer detection and the entry into clinical study needed to measure drug impact, the majority of biomarkers do not meet the sensitivity and specificities necessary. For efficiency calculation in drug production, validation of biomarkers is important.

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