

# Development of Non-Invasive Biomarkers for Diagnostic and Monitoring of Cancer

Debasish Mohapatra\*

Department of Botany and Biotechnology, School of Life Sciences, Ravenshaw University, Cuttack, Odisha, India

## Editorial

Common cancers are currently being identified on a wide scale technique for screening such as CT scans for lung cancer, breast cancer mammograms, and ovarian ultrasounds. While advancement in imaging technology has made identification of small lesions more effective, these improvements have led to an increase in false positives and invasive procedures for definitive diagnosis. Given the high likelihood of false-positive results associated with CT screening, more noninvasive methods of distinguishing between benign and malignant nodules are required. In imaging dependent screening, similar difficulties exist for other malignancies and subsequent diagnostic tests are needed. The potential of Blood-based Biomarkers in cancer testing can extend beyond general public risk assessment to therapeutic response assessment and recurrence monitoring. The need of the hour in these ever-increasing cases of cancer is the development of a biomarker-based noninvasive test for the diagnostic and monitoring of cancer which leads to the development of the following types of biomarkers.

### Utilizing the tumor-antigen immune response

Tests to detect the presence of cancer in the early phases are appealing as this reaction occurs early in the tumor's growth and gives rise to an amplified signal detected by autoantibodies in the blood. For most common cancers, these autoantibodies have been identified. Research on Breast Cancer aimed at the development of multiautoantibody panels to help diagnostic testing checked with sera from 97 people with breast cancer, 40 patients with in-situ ductal carcinoma, and 94 healthy controls on seven antigens (p53, cmyc, Her2, nYeso1, BrCA1, BrCA2, and MuC1). A panel of six of the seven antigens reached 64 percent sensitivity, 85 percent invasive breast cancer specificity, and 8 percent to 34 percent autoantibodies. Although these findings require further analysis before the use of markers in clinical settings, the possible importance of autoantibodies as a biomarker source is demonstrated [1].

### Circulating protein markers

The currently commonly used protein markers like CA125 for ovarian cancer (cancer antigen 125), CA199 (carbohydrate antigen 199) for pancreatic cancer, CeA (carcinoembryonic antigen), and PsA (prostate-specific) for prostate cancer are restricted in their usage for research due to low sensitivity and to differentiate indolent tumors from aggressive ones.

A groundbreaking biomarker testing strategy for biomarkers of lung cancer-focused on the compare proteomic profiling of the venous pulmonary effluent that flows from the tumor's vascular bed and the systemic arterial blood. The definition consists of higher levels of possible biomarkers in effluent blood than in the more distal blood. This approach was used to diagnose lung cancer up to 30 months before the clinical diagnosis by a candidate biomarker called (NAP2 / CXCI7) [2].

### Assays of tumor-derived nucleic acids

In the tumor suppressor gene promoting areas, the hypermethylation of the CpG islands has been considered a contribution event in carcinogenesis by silencing the tumor suppressor gene transcription. Numerous loci, which have greatly increased DNA methylation in tumor tissue relative to neighboring non-tumor-based and peripheral blood cells, have been observed in lung cancer, as in many other forms of cancer. Like P16INK4A, DAPK11, MGMT, GSTP1, APC, RAR $\beta$ , RASSF1A, and other DNA hypermethylation markers identified on the plasma in patients with lung cancer [3]. These markers can be used to identify cancer.

### Plasma metabolomic profiling

Development in global metabolomic profiling enables the collection of particular metabolism signatures through the analysis of intermediate and finished products of genetic and mental effect sensitive paths. The latest techniques include mass spectrometry and nuclear magnetic high-resolution spectroscopy, which can detect hundreds of metabolites at the same time [4]. Because of the complex nature of the metabolome, not only biomarker discoveries but also pathways can be identified, which can be therapeutically affected.

### Circulating tumor cells

The invasive nature of cancer cells, combined with their ability to metastasize far away organs from their primary sites, has led to the hypothesis that tumor cells can circulate in the patients' peripheral blood and can be used as biomarkers of cancer. Several methods have been developed for collecting circulating tumor cells (CTC), such as a positive selection system for epithelial cell adhesion molecule (epCAM), in which anti-EpCAM antibodies select CTCs [5].

Due to the rich content of various cellular and molecular blood components, which provide information about the health status of a person, it is ideal for developing non-invasive cancer diagnostics.

\*Address for Correspondence: Mohapatra D, Department of Botany and Biotechnology, Ravenshaw University, Cuttack, Odisha, India, E-mail: debasish2050@gmail.com

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Never the less, the blood diagnostic tests that detect early cancer and predict the reactions of the treatment are scarce, despite a broad literature on biomarkers of certain cancers dating back decades. There are many reasons for this like limited availability of appropriate quality biological samples for testing and validation studies that can resolve the possible bias inherent in sample collections and there is limited availability of in-depth discovery technologies and limited knowledge of cancer molecular features to direct the creation of such biomarkers.

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