Liquid Biopsy: Current Prospects and Challenges

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Liquid biopsy is a noninvasive diagnostic approach involving the isolation of circulating tumor markers such as cell-free nucleic acids and circulating tumor cells from peripheral blood. Circulating biomarkers including circulating tumor DNA, circulating tumor cells, cell-free RNA, tumor-educated platelets and exosomes can serve as noninvasive tests for screening, diagnosis, prognosis, and therapy guidance for many solid tumors. A variety of analysis methods are being developed to detect and characterize these markers including next-generation sequencing, PCR, amplification refractory mutation system (ARMS).[1,2]

Multiple studies have shown the advantages of using liquid biopsy as a method for early detection and longitudinal monitoring of cancer patients. Despite the development of several advanced technologies with increased sensitivity for cancer detection, current early detection methods for early detection of cancer are insufficient. Some studies have reported excellent performance in detecting early cancers like colon and lung cancer and ctDNA is the best biomarker. [3]

CircRNAs are novel, convenient, and non-invasive liquid biopsy biomarkers. Their high abundance and stability, abundant expression, and high specificity make circRNAs a promising biomarker for various diseases, particularly cancers. It has got also promising prospects in cancer treatment Reintroducing circRNAs as a drug into cells and inhibiting the invasion, metastasis, drug resistance, and inducing apoptosis of cancer cells by overexpressing certain important circRNAs.[4]

The clinical use of the liquid biopsy has significantly increased since 2014, when the first commercially available multigene liquid biopsy platform became available. Several assays are commercially available and some are FDA-approved and some are considered as sufficient for treatment eligibility by insurance companies. Liquid biopsies may be more helpful to confirm malignancy in patients with already clinically or radiographically apparent lesions.The procedure can be used to identify a broad range of mutations, including KRAS, BRAF, and EGFR mutations, in patients with colon carcinoma, breast cancer, melanoma, and lung cancer.[5,6]

Several challenges remain that need to be addressed before it can be routinely used. Studies have shown that the levels of cfDNA in serum and plasma vary. Among cancer patients, tumor-derived cfDNA accounts for 0.1 to 10% of the total cfDNA. Additionally, the level of tumor cfDNA depends on a variety of factors, such as the cancer stage, tumor vascularization, tumor burden, metastatic potential of cancerous cells, and apoptosis rate. Moreover, the current costs of liquid biopsies are substantially higher than those for comparable conventional biopsies.Furthermore, there is a need for optimizing DNA isolation techniques to improve the extraction yield and improving the sensitivity of current DNA analysis techniques.[6, 7]

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In conclusion, liquid biopsy has the potential to create new horizons for the screening and management of solid tumor. However, as of today liquid biopsy is best used as a second-line diagnostic tool, building on the results primarily gained from classical tissue biopsies. Further studies are required to overcome the current shortcomings of this method and to establish standardized protocols for its utilization in clinical settings.[7]In Bangladesh yet it is not established. But in near future we hope this will be an excellent adjunct for radiologist, surgical pathologist and oncologist in solid tumor management.

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