

Liquid Biopsy : A Narrative Review

Abstract:

Liquid biopsy has emerged as an important diagnostic method in the oncology discipline. Investigation of CTCs(circulating tumor cells), microRNAs, extracellular vesicles, and ctDNA(circulating tumor DNA, liquid biopsies allows understanding of the treatment feedback, tumor heterogeneity, individualized cancer treatment, and lowest residual disease recognition. Liquid biopsies show various advantages more favorable, less invasive, and more explanatory for directing personalized treatment recommendations. Liquid biopsies are being employed in clinical oncology, especially for those patients suffering from metastatic diseases. In this present review, the components and clinical applications of liquid biopsies are discussed so that we can understand about basics of liquid biopsy. In this review, literature or information on liquid biopsy is discussed. English language articles were scrutinize in plentiful directory or databases like Pubmed, Scopus, Web of Science, Science direct, Google scholar

Key-words: Liquid biopsy, Oncology, Application, Diagnostic tool, Limitations

Introduction:

According to NCI (national cancer institute) definition of oncology, liquid biopsy is defined as "A test done on a sample of blood to look for cancer cells from a tumor that are circulating in the blood or for bits of DNA from tumour cells that are in the blood"[1,2].

Liquid biopsy attribute to technique for identifying the existence of definitive molecular markers of a diseases in various liquid samples like saliva, blood, urine etc. It is imminent as a considerable domain in the rigor oncology accession[3]. It has been entrenched as an contemporary diagnostic dimension by analyzing circulating tumour cells (CTCs), circulating tumour DNA (ctDNA), exosomes, Cell-free DNA (cfDNA) in biological fluids[4,5].

COMPONENTS OF LIQUID BIOPSIES:

A. Circulating tumour cells (CTC):

CTC was first stated by Thomas Ashworth, an Australian physician, in 1869. They observed it at the time of comprehensive identification of CTC analysis to distinct tumor cells in patients with blood cancer[6]. Consequently, it

was determined that tumor cells could infiltrate the bloodstream and vessel walls[7]. Cancer metastasis has been recognized with definitive genetic biomarkers like chromosomal alterations, mutations, and gene expression arrangement. Hence, CTCs investigation is stationed on the estimation of the mechanism of metastasis of cancer[8,9]. Tumor profiling and detection via CTCs is more practicable than conventional biopsies. It results in the advancement of novel approaches not only in diagnosis but also in the consideration of tumor metastasis and recurrence[10].

¹HIMANSHU SINGH, ²BHUPESH BHAYYAJI BAGULKAR, ³ARUNEE GARG, ⁴URVASHI TOMAR, ⁵ATUL BHAT, ⁶BHUVNESH AIREN,

^{1,3,4}Department of Oral And Maxillofacial Pathology and Oral Microbiology, Index Institute of Dental Sciences, Indore

^{2,5}Department of Oral and Maxillofacial Pathology and Oral Microbiology

Sri Aurobindo College of Dentistry, indore

Sri Aurobindo University, Indore

⁶Department of Public Health Dentistry, Index Institute of Dental Sciences, Indore

Address for Correspondence: Dr. Himanshu Singh

MDS, Associate Professor

Department of Oral and Maxillofacial Pathology and Oral Microbiology

Index Institute of Dental Sciences, Indore, Madhya Pradesh, India-452016

Email: himanshustar3g@gmail.com

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CTCs get segregated from the locus of the primary tumor and dispersed into the bloodstream of patients suffering from cancer at distinctive phases of cancer advancement[11]. These CTCs can be efficiently confined from human biological fluids and hence can be utilized in the diagnosis of cancer. Sample acquisition of body fluids shows the advantage of being patient-friendly and easily accessible[12,13]. CTCs are recognized to mature into aggregates by adhering to cells like platelets and fibroblasts. These aggregates are guarded against encompassing immune systems and oxidative stress[14,15].

B. Circulating tumour DNA (ctDNA):

ctDNA-based liquid biopsy is a distinct apparatus for surveillance and molecular diagnosis of cancer[16,17]. When freed from the tumor cells, ctDNA gains access to the bloodstream. The investigation of the ctDNA helps in deciding the genetic landscape of the patient[18].

C. Cell-free DNA (cfDNA):

cfDNA was discovered by Mandel and Metais in 1948. cfDNA was found in numerous biological fluids like blood, cerebrospinal fluid, urine, and saliva. It is discharged from cells essentially by necrosis and apoptosis[19,20].

D. Exosomes:

Exosomes are one of the imminent fields of biomarkers that are biologically effective at different phases and also determine numerous cell-cell communications in carcinogenesis. Exosomes are minute cell-derived nano-vesicles. These nano-vesicles aid in moving the cargo to the receiver cell from the donor cell[21-23].

CLINICAL APPLICATIONS OF LIQUID BIOPSIES:

A. Treatment Selection and Personalized Medicine:

The liquid biopsies recognized peculiar genetic alterations and mutations. This recognition helps in choosing treatments very accurately. Determination about targeted therapy might be favored by ctDNA investigation[24].

B. Early Detection of Cancer:

Cancer in its initial phases can be recognized by liquid biopsies. Tumor-specific markers or genetic changes related to initial phase malignancies can be recognized by physicians by investigating CTCs and ctDNA discharged into the circulation. This approach assures in recognizing colorectal,

breast, lung, and various other malignancies[25].

C. Monitoring Treatment Response:

An effective assessment of treatment response and advancement of disease is rendered by liquid biopsies. Tracking of alteration in ctDNA levels or specific genetic mutation is done to measure the potentiality of the treatment. Deterioration in ctDNA after starting the treatment signifies positive feedback[26].

DIAGNOSTIC TOOLS FOR LIQUID BIOPSY SAMPLE ANALYSIS:

A. qPCR :

It may be practiced to show how much of a positive miRNAs. qPCR is the most accepted measures for observing liquid biopsy specimens and discovering oral malignant cells[27].

B. Microarray:

It is considered an important biological stand with different uses, including investigation of non-cod expression profiles and DNA methylation and interpretation of expression of genes. For the recognition of oral cancer-associated biomarkers, samples of liquid biopsy have been accountable to microarray pertinence[28,29].

C. Elisa :

The recognition and assessment of hormones, glycoproteins, proteins antigens, and antibodies are made feasible by the principle of antigen-antibody. Biomarkers of oral cancer may also use ELISA. Therefore, these observations show that ELISA assay is a beneficial method for detecting biomarkers linked with oral cancer[30,31].

Limitations:

Liquid biopsies have appeared as an eminently hopeful mechanism in the diagnosis and observation of cancer. However, some questions pertinent to specificity and sensitivity remain. The quantity of ctDNA discharged into the bloodstream may alter and tumors with decreased desquamation of ctDNA may go undiscovered which results in boundless and false-negative results. Moreover, liquid biopsies do not help in confining the diseases and do not locate the position of metastasis during the advancement of the tumor[32].

Conclusions:

Liquid biopsy is considered an important aid for the diagnosis of various medical conditions chiefly when tissue biopsies are not able. Liquid biopsy analyzes various biomarkers in body fluids which results in early identification of diseases.

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