

## **Liquid Biopsy: Connecting the missing links of precision medicine in cancer**

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Liquid biopsy and precision medicine in cancer have been hot topics both in research and biomedical industry. Tumor heterogeneity is the key obstacle to achieve precision diagnosis or effective cancer therapy. Liquid biopsy, a non-invasive alternative to tissue biopsy, is an emerging new technology that can provide real-time biomarker analysis and molecular profiling of circulating tumor cells (CTCs) and circulating tumor DNA (ctDNA). There are several misconceptions in the understanding of liquid biopsy: 1) CTC is a late event in cancer development; 2) Molecular analysis of liquid biopsy is only achieved through PCR/dPCR/NGS of ctDNA. CTCs are counted and CTC count is only a prognostic tool for cancer; 3) Positive result of CTC isolation from blood indicates cancer metastasis has already occurred. In fact, CTCs can be isolated in early stages of cancer. And new generation of liquid biopsy technologies allow both biomarker and molecular analysis of CTCs. Longitudinal molecular profiling of CTC and ctDNA enables real-time monitoring and effective therapy choice in the whole process of cancer management. It is a constant battle between cancer and the immune system of human body. Liquid biopsy plays an increasingly important role in the monitoring of disease status and will evolve as an effective tool for precision medicine in cancer diagnosis and treatment.