

clonal evolution, and the presence of non-malignant DNA fragments. Moreover, the clinical utility of liquid biopsy requires robust validation in large, prospective studies across diverse cancer types and stages [10].

In this review, we provide a comprehensive overview of liquid biopsy in oncology, encompassing its principles, methodologies, clinical applications, limitations, and future directions [9]. By elucidating the current state-of-the-art and emerging trends in liquid biopsy research, we aim to underscore its potential as a transformative tool for precision oncology, ultimately improving patient outcomes and revolutionizing cancer care.

Understanding liquid biopsy

At its core, liquid biopsy involves the analysis of various biomarkers present in bodily fluids, such as blood, urine, or saliva, to detect the presence of cancer or monitor its progression. Unlike traditional tissue

