

The promise of liquid biopsies: An overview

Advances in screening and diagnostic tools are crucial as it is known that cancers identified at earlier stages require less aggressive treatment that are often also more effective. Traditionally, cancer is diagnosed via tissue biopsy, where a sample of cells is collected from a suspicious lesion and analyzed in a lab.¹ Although effective, this diagnostic method frequently requires the use of invasive procedures that can cause discomfort and pose significant stress for patients and their families. Additionally, the practicality of a classic tumor biopsy has been questioned, as it is apparent that the application of this technology is limited to the diagnostic phase of a patient's cancer journey.

Recently, there has been a push towards personalized medicine in the field of oncology to improve clinical results. To facilitate this focused approach, reimagination of standard practices in cancer care have been made and rethinking diagnostic biopsies was part of the process. Liquid biopsy is a technology that addresses the shortcomings of classical cancer diagnosis with a modern and personalized twist.^{1,2} Its premise is similar to that of traditional biopsy; however, instead of subjecting patients to invasive procedures, liquid biopsy requires only a blood sample. The idea is that as cancer begins to grow, it will start to shed cells that are able to travel freely throughout the blood, known as circulating tumour cells. Malignant tumours also shed their own mutated DNA in the form of cell-free circulating tumour DNA (known as ctDNA in the precision oncology vernacular), which can be captured in a blood sample.¹⁻³ This blood sample can then be analyzed in the lab and used to detect disease presence based on genetic signatures that reveal the existence of a cancer. Additionally, the genetic information from these cancer cells can be used to inform treatment approaches, allowing care to be tailored to a patient's specific cancer. As a prognostic tool, liquid biopsy can be used to inform physicians about treatment progress; assessment at specific treatment intervals can show how a tumour is responding to medications and can even be used to monitor patients following treatment completion.^{1,2}

With the expanded scope of this biopsy technology, it is thought that many cancer facilities will adopt this change in practice within the next 10 years.² In the meantime, research is directed towards further understanding the information gained from this technology and its potential use in cancer screening. Analytic strategies will have to be fine-tuned to allow scientists to optimize the use of this information and ensure its use in the clinical setting to improve cancer care and, ultimately, improve the cancer experience.

References

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